# Public Health Recovery after the Great East Japan Earthquake

Experiences in selected areas of Miyagi Prefecture











































Should a disaster strike, can you protect thousands of lives?



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### List of acronyms

- ASD Aging Society Division of the HWB (Miyagi Prefecture)
- DMAT Disaster Medical Assistance Team
- EMIS Emergency Medical Information System
- EOC Emergency Operations Center (known as a "Headquarters" in Japan)
- FDMA Fire and Disaster Management Agency (Government of Japan)
- HWA Health and Welfare Administration of the HWB (Miyagi Prefecture)
- JSDF Japan Self Defence Force, Ministry of Defence (Government of Japan)
- MHLW Ministry of Health Labour and Welfare (Government of Japan)
- MOU Memorandum Of Understanding
- NCD Non communicable disease
- NGO Non Governmental Organization(s)
- NIID National Institute for Infectious Diseases (Japan)
- PHC Public Health Center
- PHN PHN(s)
- RDC Great East Japan Earthquake Reconstruction Design Council (Government of Japan)
- UN United Nations
- WHO World Health Organization
- WPRO Western Pacific Regional Office of WHO



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Photo: Koichiro Tezuka/The Mainichi Newspapers Co., Ltd/Aflo
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# Summary .

### 2011.3.11.Friday 14:46



Houses damaged and destroyed

Evacuees

### **Executive Summary**

The eastern coast of Japan, known as the Sanriku coast, has a well-documented history of significant seismic activity generated in an area known as the Japan Trench subduction zone, where the eastern Pacific plate meets the western Honshu plate. Since 1973, nine earthquakes of magnitude 7.0 or above have been recorded in this area, and although off shore seismic activity is very common (earthquakes of low magnitude occur daily), significant tsunamis are comparatively rare. Up to 2010, six catastrophic tsunamis have been recorded on the Sanriku coast; the first occurred 6,000 years ago and the sixth occurred in 1933, killing over 3,000 people.

On 11 March 2011 at 14:46 local time, one of the most powerful earthquakes ever recorded occurred 120 km off the north eastern coast of Japan, at a relatively shallow depth of 24 km. This magnitude 9.0 earthquake caused Honshu, Japan's largest island, to move 2.4 meters east and the Earth to shift on its axis by an estimated 10 to 25 cm. Within 30 minutes after the earthquake, a series of tsunamis followed, with a maximum height at landfall of 40 meters and an average height of 10 meters, made direct impact along 700 km of the eastern coast of Japan, with the prefectures of Iwate, Miyagi and Fukushima being hardest hit.

Although tsunami warnings were issued immediately after the earthquake, there was little time for coastal residents to respond before the first wave arrived. The existing tsunami defense walls in the coastal villages were ineffective against waves of such massive force, and their speed of travel meant that it was impossible to outrun these waves. People living some distance from the coast did not respond to the warnings as they did not believe a tsunami could reach them, but the force caused destruction that occurred up to 10 km inland, and the waves travelled up river-beds and shallow valleys.

As of June 2012, the official casualty figures are 15,859 deaths, 6,107 injured and 3,021 people remain listed as missing. Over 800,000 houses were damaged or destroyed and 492,000 people were forced into evacuation centers. A total of 123 hospitals were damaged and 5 were destroyed, killing 38 health workers and 115 patients in Miyagi prefecture alone.

In addition to the damage from the tsunami along the coast, the earthquake had an impact across a large part of eastern Japan. Electricity, water, fuel and domestic gas distribution systems were cut, road and rail transport networks disrupted and telecommunication systems failed. Furthermore, the national government needed to simultaneously deal with the Fukushima Daiichi nuclear power plant cooling system failure. This caused further delays to the responding of the earthquake and the tsunami.



The event occurred in early spring, late on a snowy afternoon. The temperature was ranging from -2.5 to 6.2 on the day. Those who may have survived the tsunami and earthquake had to face a long night in the open, trapped in damaged buildings or washed into the sea in sub-zero temperatures. It will never be known how many people died waiting to be helped but it is likely to be a significant number.

The unprecedented level of destruction across such a wide area of the country was beyond the worst case scenarios anticipated by the national disaster management system. Although the system was activated within 15 minutes of the earthquake, the loss of electricity and telecommunications across eastern Japan severely hampered information flow and the widespread damage to roads and bridges frustrated local attempts in search and rescue operations. It took at least a week for the national government to reach a complete understanding of the scale of the problems they were facing.

Despite all this, by the end of March, significant progress had been made in meeting the needs of the affected populations. Most of the key infrastructure networks had been repaired and basic services restored to all but the most severely affected areas. In Miyagi Prefecture, the number of people living in evacuation centers had fallen by 60% from a peak of 320,000 and all important public services were functioning at some level.

The response to the disaster went far beyond government actions alone. People from all over Japan responded as individuals and as groups. Individual volunteers, non-government organizations and professional associations flooded into the area, bringing donated supplies and expertise. They provided a range of support, from comfort to the bereaved to moving rubble to clear roads. In addition, the courage, patience and resilience of the victims themselves was much admired internationally, and contributed a great deal to both their survival in the early days and to the on going rebuilding and recovery of their communities. The international community also responded generously. Support included search and rescue teams from 23 countries, relief supplies from 163 countries and 43 organizations and 17.5 billion Yen (approximately USD 200 million) in donations from 126 countries and organizations.

The last great disaster in Japan was the Hanshin-Awaji earthquake in January 1995, known internationally as the Kobe earthquake. It occurred in Hyogo prefecture in western Japan, and caused 6,434 deaths, 30,000 injuries and damage estimated at USD 100 billion. Following that event, the Government of Japan invested considerable resources in improving national and local disaster management capacities, with a particular focus on earthquakes. The MHLW, responding to criticisms of improper management of the severely injured, established a national system of disaster response medical teams, known as DMAT, and by the end of 2010, almost 6,000 health professionals from all regions of Japan had been trained to work in the DMAT system.



The northeast part of Honshu is known as the Tohoku region. The three east coast prefectures of this region, Iwate, Miyagi and Fukushima, were devastated by the tsunami. Miyagi Prefecture had the highest number of deaths (9,325 confirmed, 1,514 missing, as of June 2012) and the most damage to infrastructure and livelihoods. Tohoku University is located in Sendai City of Miyagi Prefecture. The university comprises 10 undergraduate schools, 16 graduate schools, 5 research institutes, 13 research centers, and the university hospital; as of May 2012 it employs about 5,000 teaching staff and has an enrolment of approximately 18,600 students. Graduate School of Medicine has about 331 teaching staff and over 1,317 undergraduate students and 842 graduate students including 72 international students. The school is also actively conducting advanced bio-medical researches. The school also has strong historical links with hospitals in Miyagi and other prefectures in Tohoku region.

After the tsunami, most departments of Graduate School of Medicine participated in relief and response actions in affected areas, and many departments established longer term recovery projects in particular communities. The School established the Center for Community Health on May 1, 2011 to provide support on public health to the local communities in Miyagi Prefecture that were affected by the earthquake and the tsunami. The center has been working closely especially with two affected communities in north east Miyagi Prefecture, Ogatsu and Oshika, which are in Ishinomaki City.

The Dean of Tohoku University Graduate School of Medicine, Professor Noriaki Ohuchi signed MOU with WPRO in order to share the lessons learnt from the Great East Japan Earthquake with the international community, especially on recovery activities. This project has been conducted within this framework of agreement.

This report describes the impact of the tsunami and earthquake in Miyagi Prefecture, and in Ogatsu and Oshika of Ishinomaki City in particular, and documents the efforts made by prefectural and municipal public health staff to restore and recover public health services in the first 18 months since the disaster.

The Hanshin-Awaji Great Earthquake on January 17, 1995

The Great East Japan Earthquake on March 11, 2011

553.65

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# Summary of observations and conclusions

This report highlights the achievements of the disaster management system in Japan in managing the Great East Japan Earthquake of March 2011, but also identifies areas in which improvements can be made.

For the health sector, the principle observation is that the current disaster management arrangements did not meet the needs arising from the Great East Japan earthquake. The system to provide acute medical care after a natural disaster was established based on the experience of the Hanshin-Awaji Great Earthquake. For the Hanshin-Awaji Great Earthquake, most damages were caused by the strong earthquake and subsequent fires. Therefore, there were many severely injured people under collapsed buildings. On the other hand, most damages were caused by the tsunami and the number of severely injured was relatively small for the Great East Japan Earthquake. Another important difference between these two major disasters was population demographics of the affected populations. Kobe City, the hardest hit municipality by the Hanshin-Awaji Great Earthquake is a cosmopolitan city with a higher proportion of younger people. Japan is known to be a country with a rapidly aging population. The main industry in coastal areas of Tohoku region is fishing, and the proportion of elderly in the region is even much higher than the national average. The rapidly changing demography of Japan means that in future disasters, the major challenge for the health sector will not be immediate care of relatively young people with severe injuries, but the immediate and longer term care of elderly people with complex medical, psychological and social needs. The current system does not fully address these issues yet.

Similarly for Japan as a whole, the current disaster management system was built on a policy of strong national and local capabilities for prevention, preparedness, mitigation and response, but recovery is much less well promoted and supported. This may be an effective arrangement with a young and healthy population who can actively contribute to local recovery, but given the demographics of Japan, much more effort needs to be given to build the capacity of local governments to plan, allocate resources and implement recovery programs.

The lack of a legal requirement for a standardized post disaster health assessment, lack of standard health data sets for disasters and lack of a formal post disaster public health reporting system made it difficult for local public health staff to collect and report useful information. Local governments reported across different time periods using non standardized data sets with many gaps, making collation incomplete and unreliable. At a wider level, it limits the quality of any analysis of the health response to the disaster and the ability of researchers to make meaningful contributions to the evidence base for public health actions in disasters in terms of both immediate response and mid-long-term planning.

In Japan, PHNs in local government offices have a key role in planning and implementing public health activities in the community. During and after a natural disaster, they are also responsible for many public health related issues. PHNs in Ogatsu and Oshika of Ishinomaki City were in an extremely difficult situation after the earthquake. In a first few days, they were completely

isolated without any external support. They had to take care of the severely injured and disabled elderly. In addition, they had to arrange food, water and other essential items for local people who were evacuated from the tsunami. After a few days, they started visiting evacuation centers to check the health statuses of evacuees. At the same time, many medical teams and other groups started visiting areas and PHNs had to spend time to respond to these teams. During this period, PHNs did not have any chance to go back to their own homes and did not even know if their family was alive. After a few weeks, they gradually tried to restart their routine activities such as medical check of infants without proper guidance. The health and wellbeing of people in affected areas by the Great East Japan Earthquake were maintained by these dedicated local government staff, particularly by PHNs.

At a consultation meeting in September 2012 organized by Tohoku University, Graduate School of Medicine\*, which was attended by representatives from the health departments of tsunami affected local governments in Miyagi Prefecture and organizations that provided support to them, participants affirmed the observations in this report, with emphasis on the following points:

- 1.PHNs do not have the knowledge and skills needed to manage post disaster health needs. From the experience of March 2011, the most difficult areas were establishing lines of authority, setting priorities and coordination of the many humanitarian actors in their areas.
- 2. There is no post disaster reporting system for public health, no standard reporting format and no standard data sets, so PHNs did not know what information they should collect while performing assessments, what information they should include in reports and how often they should report.
- 3. There are no tools available to help PHNs to set priorities after a disaster. Particularly needed are tools to screen people for urgent mental health care, especially for suicide risk, and for screening children.
- 4.Although clinical and technical support was provided though medical teams, much of their burden after the first weeks was management and coordination with heavy clerical and administrative components. There was little support provided for these unfamiliar responsibilities.



The Consultation meeting in September 28, 2012 organized by Tohoku University, Graduate School of Medicine © Center for Community Health, Tohoku University Graduate School of Medicine

\* Report available in Japanese only

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### Introduction

The purpose of this report is to document, using publicly available information, the impact of the earthquake and the tsunami on 11 March 2011 in Miyagi Prefecture in general, and in particular to document the experience of PHNs during the recovery of public health services especially in the two areas of Ishinomaki City in Miyagi Prefecture, Ogatsu and Oshika, over an 18 month period. These areas were chosen because various departments of Tohoku University Graduate School of Medicine are implementing tsunami related projects in these areas, and therefore information was readily accessible.

This report, which focuses on Miyagi Prefecture, is a contribution to a wider project defined in the MOU signed between WHO WPRO and Tohoku University Graduate School of Medicine. This project is supporting documentation of recovery across the Tohoku region and will culminate in an "International Symposium on Public Health Recovery after the Great East Japan Earthquake" to be held in March 2013. Financial support for the preparation of this report has been provided by the Sasakawa Peace Foundation, which sponsors projects in the fields of health and human security in many countries.

Historically, recovery is relatively less studied than other areas of disaster management, and although case studies on specific sectoral and social aspects of recovery are being published, the entire recovery process from the perspective of community has yet to be documented. Much work has been done at the international level to develop standards for risk reduction, emergency preparedness and response, but for recovery, there are no standardized data sets to work to or recognized methodologies to follow in documenting, monitoring and evaluating recovery processes. At a national level, few governments have paid as much attention to recovery as they have to risk reduction, preparedness and response.

Given the above, an additional purpose of this project is to encourage others to undertake research on recovery after disasters, so that in time, standard frameworks for collecting and analyzing data can be developed in time, subsequently allocate a better understanding of processes and actions needed in recovery.

This project arose from an unforeseen event. In Japan, recovery is recognized as a local government's responsibility. However, the national government provides neither guidance to local governments on how recovery should be planned, implemented and reported, nor advice on how recovery activities will be monitored and evaluated. Given the lack of national standards and technical guidance to benchmark recovery after the Great East Japan Earthquake, this document does not provide a critical analysis of the recovery process now underway in the Tohoku region. The project presents information collected and collated by local, prefectural and

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national governmental agencies, and where relevant to recovery issues, some non-government agencies such as UN agencies and the Red Cross. Analyses in this report were therefore limited to the compiled observations and discussion points arising from the information collected.

This project has two components:

- to collate publicly available information on the Great East Japan Earthquake, as published by national, prefectural and local governments in the 18 months following the tsunami. The main area of interest is public health recovery in Miyagi Prefecture, but in the context of an overall recovery in the Prefecture. Main information sources are national, prefectural and local governmental official reports. This component uses the following methodology:
- A reference framework of basic information needed to describe recovery was developed based on information obtained from published guidance on recovery planning and published case studies on recovery;
- Published and/or publicly available official reports on the Great East Japan Earthquake were obtained and reviewed to extract data needed to populate the framework;
- When gaps and/or conflicts in available data were identified, discussions were held with the relevant government agency to obtain additional information and/or clarify conflicts;
- All data in this component of this project is publicly available secondary data.
- to document the personal experiences of PHNs in two areas of Ishinomaki City in Miyagi Prefecture. This component uses the following methodology:
- Beginning in the first weeks after the disaster, unstructured interviews were conducted with PHNs in the field and their supervisors in local government offices on a regular basis. The purpose was to get a broad understanding of the experience they had been through, and both personal and professional problems they were facing in the early days after the tsunami. At this stage, as their experience was very traumatic and still recent, regular short informal contact was preferred to long structured interviews. The interviews were always conducted by the same member of the team who is also a nurse;
- Once the data reference framework had been developed, and a trusting relationship established with the PHNs, the wider project was able to begin. Once agreement had been obtained from the PHNs and their supervisors, structured interviews began;
- All data in this component of the project is primary, narrative and subjective.

### Public health recovery after disasters: general concepts

All disasters have an impact on the health sector either directly (through increased workload and/or compromised function), or indirectly (through population displacements, loss of livelihoods and loss of access to essential non-health services). This results both in immediate medical care needs and long-term public health needs\*, which translates to short term high work-load burdens, and long term health planning and heath financing burdens, in a sector that usually has insufficient capacity at the service delivery levels and an insufficient share of national financial resources relative to its obligations. Health is always the bottom line – when other sectors fail to do their job, there will be health implications.

Despite this, the health sector itself has not placed much importance in recovery. Very little published research is available on recovery (except for post conflict recovery) and the concepts, processes and components of health sector recovery are ill defined. Advice on recovery planning is largely limited to self-evident aspirational statements rather than evidence based practical guidance. UN publications also tend to focus on post conflict situations, and exhort governments to take the opportunity post disaster to 'reconsider the whole health sector and plan it on a comprehensive, rational basis'\*\*(WHO module 12) and "to take a health systems approach to address issues of coverage, access, equity and efficiency'\*\*\* (WHO Recovery Guide), but without providing much insight on how this might be done, let alone evidence that it actually can be done.

- \*\* WHO, Analysing Disrupted Health Sectors, A modular manual, 2009
- http://www.who.int/hac/techguidance/tools/disrupted\_sectors/adhsm\_en.pdf

<sup>\*</sup>Report of the Economic Community for Latin America and the Caribbean (ECLAC) on Recovery, 2005 http://www.eclac.org/publicaciones/xml/6/27306/sps123\_lcl2613.pdf

<sup>\*\*\*</sup> WHO Recovery Guide ; Guidance for health sector assessment to support the post disaster recovery process version 2.2, 17 December 2010



Photo: Koichiro Tezuka/The Mainichi Newspapers Co., Ltd/Aflo

### Historical seismicity in eastern Japan

- The disaster management system in Japan Legal framework Planning arrangements
- Financing arrangements
- Response arrangements
- Recovery and reconstruction arrangements

### The public health system in Japan Ministry of Health Labour and Welfare Prefectures and Public Health Centers Municipal level services Medical services Health services in emergencies

### Background of Miyagi Prefecture

Demography and social profile Selected health indicators Health services profile



# Background

# Historical seismicity in eastern Japan



Figure 2.1.Japan Seismicity Map -1900 to Present \*

The eastern coast of the Tohoku region of Japan, known as the Sanriku coast, has a well documented history of significant seismic activity. Earthquakes are generated in the Japan Trench Subduction Zone off the Sanriku coast, where the Pacific Plate that moves at a rate of 8 to 9 cm per year, meets the northern Honshu plate, periodically releasing large amounts of energy. There is geological evidence that there were several catastrophic tsunamis hitting the Sanriku coast within 6000 years.<sup>1</sup> Of them, five seismicities are historically known;

- 869 Jogan earthquake and tsunami
- 1611 Keicho Sanriku earthquake and tsunami
- 1793 Kansei Sanriku earthquake and tsunami
- 1896 Meiji Sanriku earthquake and tsunami, with 22,000 deaths
- 1933 Showa Sanriku earthquake and tsunami, with 3,000 deaths





Meiji Sanriku Tsunami

Earthquake broke the ceiling of indoor pool in Spopark Matsumori in 2005 8.16 Miyagi earthquake\*\*

Table 2.1	. Largest	Earthquakes	in	the world	***
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Location		Date UTC	Magnitude	Lat.	Long.	Reference
1	Chile	1960 05 22	9.5	-38.29	-73.05	Kanamori, 1977
2	Prince William Sound, Alaska	1964 03 28	9.2	61.02	-147.65	Kanamori, 1977
3	Off the West Coast of Northern Sumatra	2004 12 26	9.1	3.3	95.78	Park et al., 2005
4	Near the East Coast of Honshu, Japan	2011 03 11	9.0	38.322	142.369	Preliminary Determination of Earthquakes Monthly Listing, U.S. Geological Suvery, Golden, CO.
5	Kamchatka	1952 11 04	9.0	52.76	160.06	Kanamori, 1977
6	Offshore Maule, Chile	2010 02 27	8.8	-35.846	-72.719	Preliminary Determination of Earthquakes Monthly Listing, U.S. Geological Suvery, Golden, CO.
7	Off the Coast of Ecuador	1906 01 31	8.8	1	-81.5	Kanamori, 1977
8	Rat Islands, Alaska	1965 02 04	8.7	51.21	178.5	Kanamori, 1977
9	Northern Sumatra, Indonesia	2005 03 28	8.6	2.08	97.01	Preliminary Determination of Earthquakes Monthly Listing, U.S. Geological Suvery, Golden, CO.
10	Assam - Tibet	1950 08 15	8.6	28.5	96.5	Kanamori, 1977
11	Off the west coast of northern Sumatra	2012 04 11	8.6	2.311	93.063	Preliminary Determination of Earthquakes Monthly Listing, U.S. Geological Suvery, Golden, CO.
12	Andreanof Islands, Alaska	1957 03 09	8.6	51.56	-175.39	Johnson et al., 1994
13	Southern Sumatra, Indonesia	2007 09 12	8.5	-4.438	101.367	Preliminary Determination of Earthquakes Monthly Listing, U.S. Geological Suvery, Golden, CO.
14	Banda Sea, Indonesia	1938 02 01	8.5	-5.05	131.62	Okal and Reymond, 2003
15	Kamchatka	1923 02 03	8.5	54	161	Kanamori, 1988
16	Chile-Argentina Border	1922 11 11	8.5	-28.55	-70.5	Kanamori, 1977
17	Kuril Islands	1963 10 13	8.5	44.9	149.6	Kanamori, 1977

Updated 2012 April 11

Since 1973, there have been nine events of Magnitude 7.0 or greater in the Japan Trench subduction zone, of which four caused damage in Japan (there were no associated tsunamis). These were:

- 1978 Miyagi ken-oki earthquake (Magnitude 7.4);
- 1994 Sanriku haruka-oki earthquake (Magnitude 7.6);
- 2003 Sanriku minami earthquake (Magnitude 7.1);
- 2005 8.16 Miyagi earthquake (Magnitude 7.2);

Three of the top six earthquakes ever recorded worldwide, including the 2011 Great East Japan Earthquake, occurred over a six year period between 2004 and 2011; However, experts consider this a statistical anomaly. Although data shows that the consequences of earthquakes have steadily become more serious and more costly over time, this is a reflection of global population growth and gains in economic development. There is no evidence that the frequency or intensity of earthquake events is increasing.

# The disaster management system in Japan

The material in this section is extracted from a Cabinet Office Report of February 2011 on Disaster Management in Japan.

### Legal framework

Since the first disaster law on post disaster relief was enacted in 1947, there have been more than 50 additional, supplementary or amendments to laws enacted to date, covering all aspects and phases of Disaster Management. In 1962 national arrangements for the implementation of disaster laws were formalized, through the establishment of the Central Disaster Management Council, and the publication of the Disaster Management Basic Plan (1963). Since the Great Hanshin-Awaji earthquake of 1995, much has been done to improve the disaster management regulatory framework and their implementation arrangements, including the establishment of a Minister of State for Disaster Management in 2001.

In addition to the complex legal environment, there is also a complex operating environment. At present, 80 agencies have legally designated responsibilities in emergencies and disasters (24 government ministries and agencies, and 56 para-governmental and private agencies). The highest level of leadership is provided by the Central Disaster Management Council, whose decisions are implemented by the Cabinet Office of the Prime Minister's Office. Each designated agency operates at three levels, national, prefectural and municipal, meaning that the disaster coordination mechanism has to manage a minimum of 240 official components, not including the many advisory, scientific and technical committees that guide decision making at various levels. However, non-designated agencies, community organizations, private and commercial companies, universities and research institutes, NGO and international assistance also participate in various components of disaster

### Planning arrangements

There are three levels of disaster planning\* in Japan:

- 1. The Disaster Management Basic Plan is prepared by the Central Disaster Management Council, and covers prevention, preparedness, response and recovery for 5 natural hazard and 8 major accident scenarios.
- 2.Disaster Management Operations plans that are prepared by each of the 80 designated agencies, defining how they will implement their responsibilities under the Disaster Management Basic Plan.
- 3.Local Disaster Management Plan, prepared by prefectural and municipal governments, defining how they will implement their responsibilities under the Disaster Management Basic Plan.

Level two and level three plans are clearly derived from the level one plan, but level two and three plans are prepared independently and implemented unilaterally. In Miyagi Prefecture, municipal level officers reported that

management. Their roles and responsibilities are less clearly defined, especially in relation to local government, and therefore their presence poses additional challenges in coordination, regulation and control. Although formal roles and responsibilities are assigned to each of the designated agencies, there are areas of overlap or uncertainty (e.g. the Cabinet Office is legally responsible for "collaboration and cooperation" between partners, while the Minister of Disaster Management is legally responsible for their "coordination") and the limits of authority between national, prefectural and municipal levels of government is not rigidly defined.

<sup>\*</sup> Although the word 'plan' is used to describe the products from each of these levels, the documents are in fact contain a mixture of policies, strategies, guidelines, plans and standard operating procedures (SOP).

they were not completely aware of the details of the prefectural plan, and during the response to the tsunami, local staff reported that they were not always informed when prefectural or national agencies conducted activities in their municipalities.

### Financing arrangements

In 2010, the national budget for disaster management was 1.2 trillion Yen (approximately USD 150 billion), of which 17.6% was allocated for prevention and preparedness, 19.5% for recovery and rehabilitation, 62.4% for national land conservation (environmental protection and sustainable development) and 0.6% for research. For response, a national disaster fund is held and administered by the Bank of Japan. Funds are disbursed under the authority of the Central Disaster Management Council.

### Response arrangements

When a serious event occurs, Directors-General of agencies relevant to the type of event meet at the Crisis Management Center in the Prime Minister's office. They assess the preliminary information and advise the Prime Minister on the level of response required.

There are four levels of possible response:

- No disaster: local government can manage;
- Basic disaster: Governmental response can be managed at Director-General level;
- Major disaster: Governmental response should be personally led by the Minister of State for Disaster Management;
- Extreme disaster: Governmental response should be personally led by the Prime Minister.

In major and extreme disasters, the government may decide to dispatch information gathering teams to the affected areas, JSDF teams to assist local government and to establish its own headquarters\*\* (EOC)in the field, working in parallel with the local government EOC.

At the local level, resources and assets from unaffected prefectures and municipalities can be mobilized to provide operational support for Search and Rescue through pre-existing arrangements with the National Police Agency Rescue Units, Fire Service Rescue Teams and the Japan Coast Guard. The MHLW can dispatch DMAT teams to assist with the medical evacuation of the injured, upon request of the local government. Medical evacuation is supported by JSDF land, air and sea craft. The mission of DMAT teams is to providing acute medical care and transport serious cases, and it does not cover providing adequate assistance to people who need general medical care such as people with chronic diseases, the disabled and the elderly.

### Recovery and reconstruction arrangements

The key objectives of disaster plans are to provide affected populations with replacement housing, ensure their ability to maintain their livelihoods, to restore essential services and the local economy. These objectives are to be implemented in the context of a "disaster risk reduction and recovery" strategy, and not simply try to replace what was lost. Various financial measures are available to support individual and local government recovery and reconstruction plans, including insurance schemes, grants, loans, exemptions and incentives.

<sup>\*\*</sup> The Japanese term 'disaster headquarters' is translated throughout this report as 'emergency operations center' (EOC).

# The public health system in Japan

For a list of sources consulted in preparing this section, see the list of key references.

The public health administration system in Japan consists of three levels; central government, prefectures and municipalities. In the past, the MHLW in the central government has centralized decision making for establishing health system and prefectures have implemented health and welfare services to inhabitants while some productive services in maternal health and health check-up that were performed by particular local governments were expanded as national system. Declaration of Alma-Ata as well as 1st national health promotion plan in 1978 reinforced the service operation of local governments. The government has faced a financial deterioration since 1980s and promoted decentralization of government to local jurisdictions since 1990s. At the level of municipalities, municipal integration was addressed in early 2000s that led to vast administrative boundaries covered by a limited number of public officials. Principally, public health administration is now standardized with leaders of each local government in policy making and operations. However there are some practical gaps in performing public health services because of a complex mixture of centralized control, decentralized planning and resource allocation, and local autonomy.

### Ministry of Health Labour and Welfare

The MHLW make decisions about health policies as well as institute regulations and operational procedures at the national level. MHLW covers various areas related to health and welfare such as health policies, disease prevention and control, health for the elderly, social welfare, pharmaceutical and food safety, labour standard, health insurance and pensions. There are several national institutes under this ministry for technical support.

### Prefectures and Public Health Centers

The public health administrations at prefecture level is organized with departments of health and welfare in the prefectural headquarter, public health institute and center for mental health and welfare together with multiple PHCs, which cover certain area. Big cities also have PHC and same responsibilities with prefectures. Prefecture and PHC are responsible for specific public health services including health statistics, local healthcare planning, authorization of hospital establishment, infectious disease control, supervisory activities on environmental health and food safety, support of cases with diseases with treatment subsidized from the national health budget and supervisory activities to municipalities. They have authorized to enforce compulsory hospitalization for infectious diseases as well as psychiatric diseases. In food safety, prefectures have authorization to enforce a suspension of services in restaurants.

PHCs are basically set up by prefectures to cover areas combining several municipalities. Autonomous cities can also have their own PHCs. PHC system was first established by the Public Health Center Act of 1937, initially conducting medical services such as maternal and child health and tuberculosis control. The system was revised and expanded in 1947 by an amendment to Public Health Center Act, and again in 1994 by the Community Health Act, and public health risk management became one of main functions of PHC. PHCs are usually staffed by a doctor, PHN, and other health professionals such as pharmacists, veterinarians and nutritionists. There are 495 PHCs in Japan, staffed by over 28,100 public employees including over 8,000 PHNs as of April, 2011.

### Municipal level services

In 1978, following the Declaration of Alma Ata, the national government adopted a policy of decentralized health services delivery. Municipal governments were required to deliver a package of public health services directly to the people through a system of community based PHNs and nutritionists.

Amongst others, the Community Health Act of 1994, the Health Services for the Elderly Act and the Health Promotion Act extended the functions and responsibilities of local government to cover areas such as control of lifestyle-related diseases, care of the elderly, care of mothers and pre-school children (principally vaccinations and growth monitoring) and cancer screening. They require inter-department collaboration between health sectors and other sectors as welfare, nursing and national pension since a variety of over the counter services are listed. Councils of social welfare as semi-governmental organization are set up in municipalities to take responsible for providing welfare services as well as coordination and supports on community activities for local welfare including the managements of volunteers in disaster settings.

### Medical services

The Medical Service Act ordains the circumstances of medical clinics and hospitals. Clinics (less than 19 beds capacity) are usually established after notifying local governors through the PHC, while the establishment of hospitals requires formal authorization from the prefectural governor. This authorization needs to be consistent with local health planning. Hospital management is either governmental sectors or private sectors and these proportions are different area by area. Compulsory internship has been introduced since 2004 that lead to a skewed distribution of young physicians as a consequence of mobility towards metropolitan cities. Citizens in Japan are obliged to enlist in public health insurance and as such capable of consult in preferred health facilities.

### Health services in emergencies

After the 1995 Hanshin-Awaji earthquake a major revision was undertaken to improve the organization and delivery of medical and hospital services in disasters. Special hospitals for disaster base hospitals have been designated across the country and hospital capacities were strengthened. In 2005, the DMAT system was launched to ensure emergency medical care to the injured. Investments were also made to strengthen the capacity to provide mental health services in disasters. The MHLW established internal mechanisms to improve the direction and coordination of the national medical response in emergencies.

However, few such measures have been introduced to strengthen public health services in emergencies. There are no clearly assigned leadership roles at each level of government, no standardized post disaster assessment tools and no standardized reporting and information sharing system for public health issues interdisciplinary in emergencies. Although there is some training in emergency management provided to public health staff, and also the dispatch of public health professionals including public health doctors and PHNs to affected areas, it is neither comprehensive nor institutionalized in the way that it is for hospital staff and the mental health services.

# Background of Miyagi Prefecture

The Tohoku region is a center for the fishing industry, manufacturing, education and tourism. Like most of Japan, the population in rural areas is mostly elderly, and because of the rugged nature of the coastal terrain, they live in relatively isolated villages and towns. Tohoku has traditionally been underserved in public services due to difficulties in recruiting sufficient staff. The region is historically prone to earthquakes and tsunamis.

### Demography and social profile

Administratively, Miyagi Prefecture\* is divided into seven districts and 36 municipalities, of which 13 are

cities, 22 towns and one is a village. The most important industries are fishing and agriculture, manufacturing and higher education.

Demographically Miyagi Prefecture has a higher proportion of elderly (27.3%) than the average for Japan (23.0%), and in more isolated areas such Ogatsu and Oshika, the proportion in much higher (41.8 and 40.8% respectively). Ogatsu has significantly more females than males (m/f ration 86.2), but in Oshika, there are slightly more males (m/f ratio 103.1). The proportion of children under 15 in Ogatsu and Oshika are significantly below the average for Japan, and for Miyagi Prefecture itself.



Figure 2.2. Map of Tohoku Region

Figure 2.3. Map of Miyagi Prefecture

\*http://www.pref.miyagi.jp/english/

Parameters <sup>2, 3</sup>	Japan	Miyagi	Ishinomaki	Ogatsu	Oshika
(n/a = not available)		Prefecture	City		
Population	128,057,352	2,348,165	160,826	3,994	4,321
Area (km <sup>2</sup> )	377,950.10	7,285.76	555.78	46.09	72.96
Population density	338.8	322.3	289.4	86.66	59.22
Average age	45	44.6	47.4	n/a	n/a
	16,803,444	200.001 (12.02)		294	313
Population under 15	(13.2%)	308,201 (13.2%)	20,214 (12.6%)	(7.4%)	(7.2%)
D 1.1 154 (4	81,031,800	1,501,638	0( 207 ((0.19)	2,028	2,248
Population 15 to 64	(63.8%)	(64.4%)	96,297 (60.1%)	(50.8%)	(52.0%)
D I di CS	29,245,685	500 704 (00 00)	AD 747 (07 001)	1,672	1,760
Population over 65	(23.0%)	520,794 (22.3%)	43,747 (27.3%)	(41.8%)	(40.8%)
Total male population	62,327,737	1,139,566	77,143	1,849	2,193
Malas and a 15	8,602,329	159.024 (14.00)		n/a	n/a
Males under 15	(13.9%)	158,024 (14.0%)	10,263 (13.4%)		
Malas 15 to CA	40,684,202	750 516 (66 50)	48 206 (62 001)	n/a	n/a
Males 13 to 64	(65.9%)	750,510 (00.5%)	48,390 (03.0%)		
Malas anna (5	12,470,412	210 576 (10 50)	19 122 (22 677)	n/a	n/a
Males over 65	(20.2%)	219,576 (19.5%)	18,133 (23.0%)		
Total female population	65,729,615	1,208,599	83,683	2,145	2,128
Formalaa yurdan 15	8,201,115	150 177 (12 50)	0.051 (11.051)	n/a	n/a
Females under 15	(12.6%)	130,177 (12.3%)	9,931 (11.9%)		
Famalas 15 to 64	40,347,598	751 122 (62 5%)		n/a	n/a
remaies 13 to 64	(61.8%)	751,122 (02.3%)	47,901 (37.4%)		
Formalian aver 65	16,775,273	201 218 (25.00)	25 614 (20 707)	n/a	n/a
Females over 65	(25.7%)	501,218 (25.0%)	23,014 (30.7%)		
male/female ratio	94.8	94.3	92.2	86.2	103.1
% employed in primary industries	4.2	5.1	8.9	26.7	25.5
% secondary industries	25.2	22.6	29.7	20.8	26.3
% tertiary industries	70.6	72.2	61.4	52.5	48.2

Table 2.2. Demography and social profile of Miyagi Prefecture and Ishinomaki City 2010

### Selected health indicators

In terms of health indicators, Miyagi Prefecture in general and Ishinomaki in particular do less well than the average for Japan (Table 2.2.). For health services, the region is generally less well served (Table 2.3.).

Parameters <sup>4, 5</sup>	Japan	Miyagi Prefecture	Ishinomaki City
Crude birth rate	8.5	8.2	6.76
Male	8.9		
Female	8.0		
Crude mortality rate	9.5	9.4	11.12
Male	10.3		
Female	8.7		
Infant mortality	2.3	2.5	4.5
Neonatal mortality rate	1.1	0.9	4.62
Life expectancy:			
Male	79.64	78.6	
Female	86.39	85.75	

Table 2.3. Health indicators of Miyagi Prefecture and Ishinomaki City by age and sex 2010

Table 2.4. Health services profile for Miyagi Prefecture and Ishinomaki City 2010

Parameters (n/a=not available)	Japan	Miyagi Prefecture	Ishinomaki City	Ogatsu	Oshika
Hospital beds: total	1,730,339	27,636	1,718	40	80
:per 100,000	1244.3	1120.6	1213.0	1001.5	1,851.4
Doctors: total	295,049	5,235	334	3	3
:per 100,000	230.4	222.9	141.1	75.1	69.4
PHNs: total	45,028	922	62	3	3
:per 100,000	35.2	39.3	28.2	75.1	69.4

### Health services profile

Table 2.4. shows that all three affected prefectures were facing problems in providing adequate level of medical services pre-disaster due to shortages of doctors working full time (below the national average) and shortages of medical institutions. <sup>6,7,8,9</sup>

Table 2.5. shows that although Miyagi Prefecture does well compared to the national average for general and psychiatric hospital beds, they are concentrated in Sendai City and there is a shortage of beds for specific diseases.

Parameters*	Jaj	pan <sup>6</sup>	Iwate		Fukushima		Miyagi	
	Hospitals	Clinics	Hospitals	Clinics	Hospitals	Clinics	Hospitals	Clinics
No of medical institutions	8,670	99,824	96	927	142	1476	147	1578
No of institutions per 100 000 population	6.8	78.3	7.2	69.2	7.0	72.4	6.3	67.6
No of doctors full time per 100 000 population		149.9		139.9		125.4		132.4

Table 2.5. Number of medical institutions and clinics, and full time doctors in each of the main affected prefectures 2008-2010

Table 2.6. Number of beds available per 100 000 population, by selected specialties

Param	eters*	H				
	General Hospital beds	Mental Health	ТВ	Communica ble Disease	Chronic Care	Total
Miyagi	717.0	277.4	5.3	1.2	138.2	1139.0
Iwate	824.7	347.1	12.5	2.7	213.6	1400.5
Fukushima	806.6	362.4	9.1	1.8	219.9	1399.7
National Average	710.8	273.0	7.0	1.4	263.7	1256.0



The Great East Japan Earthquake of March 2011 National response operations Secondary events reported Reported damages and losses Impact in the Tohoku region Mortality by age and sex in Tohoku region Casualties in Miyagi Prefecture Damaged and destroyed houses Post event suicides Population living in evacuation centers in Miyagi Prefecture during 2011 Community health impact

Mental health Non-communicable diseases Public Health impact in Miyagi Prefecture Health system impact in Miyagi Prefecture

### Other great disasters in Japan

Comparisons in reported mortalities Changes in national disaster management policies and practices Changes in health sector policies and practices Comparisons with 2011 Great East Japan Earthquake


# Impact of the Great East Japan Earthquake

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### The Great East Japan Earthquake of March 2011



Collapsed building by tsunami in Onagawa

On 11 March 2011 at 14:46 local time, an magnitude of 9.0 earthquake occurred 120 km off the north eastern coast of Japan, at a relatively shallow depth of 24 km, causing severe ground shaking along the east coast of Japan for approximately six minutes.\* It was one of the most powerful earthquakes ever recorded. The earthquake caused Honshu, Japan's largest island, to move 2.4 meters east and the Earth to shift on its axis by an estimated 10 to 25 cm.\*\* In the 24 hours following the earthquake more than 50 aftershocks were recorded, and over the following six months, more than 600 were recorded, some leading to tsunami warnings. The ground shaking produced liquefaction in many areas, causing foreshores to sink. Surviving roads and buildings close to the sea now experience flooding at each high tide.

Approximately 15 minutes after the initial tremor, a series of tsunamis generated by the earthquake began to make landfalls along a 700 km stretch of the eastern coast of Japan. The first wave was not very powerful, and in many places was successfully contained by the tsunami protection walls. Unfortunately, this contributed to additional mortality, as once the first wave had passed, people began returning to their homes just as a much more powerful second wave arrived. The second wave had a recorded maximum height of 40 meters, with an average height of 10 meters at landfall.<sup>10</sup>



Cars washed away by tsunami around Sendai Airport



Tsunami affected community in Ogatsu, Ishinomaki City



The three-story building of the town's Crisis Management Department in Minamisanriku Town

\*http://earthquake.usgs.gov/earthquakes/eqinthenews/2011/usc0001xgp/#details \*\*http://earthquake.usgs.gov/earthquakes/eqarchives/poster/2011/20110311.php

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Figure 3.1. Inundation height and Run up height of tunami\*

The maximum inundation distance was 10 km inland. The most severe damage was in three north east coast prefectures of Fukushima, Iwate and Miyagi. In Fukushima Prefecture, the earthquake and tsunami caused cooling systems to fail at the Fukushima Daiichi nuclear power plant, precipitating the release of radioactive material, a mass evacuation of the surrounding population and raised considerable concern throughout Japan.

As of October 2012, the total number of victims for Japan is: 15,872 confirmed deaths and 6,114 injured, while 2,769 people remain unaccounted for missing .\*\* The number of people in temporary housing at the end of November 2012 is 113,956 people. The total displaced population from the affected areas, including the 30 km zone around the damaged nuclear reactors in the Fukushima Daiichi nuclear power plant, is estimated to have reached over 492,000.<sup>11</sup> More than 700,000 houses were damaged and over 130,000 were totally destroyed. Public and industrial infrastructure also suffered massive destruction, particularly schools, but also hospitals/clinics and local government offices. 380 hospitals of 20 beds or more were damaged, and 10 were completely destroyed .\*\*\* Over 90% of the Tohoku region fishing fleet was reported as damaged or destroyed. \*\*\*\*

The earthquake occurred in the afternoon during early spring. The weather was cold with light snow, and within an hour of the tsunami, night began to fall. The level of damage and the early nightfall severely limited the possibilities for communities to organize spontaneous search and rescue actions, and thus, those who survived the tsunami passed a long night exposed to the cold, without shelter or trapped in collapsed buildings, and in many cases, floating in the sea. For those in the sea, the few who survived reported there were no lights or sounds to indicate the direction to the shore, so they didn't know how far out to sea they were, or which way to swim. It is certain that many who survived the tsunami died from exposure to the cold, hypothermia and injury during that night. It has been reported that 90% of deaths were due to drowning<sup>12</sup>, although this figure is not always based on post mortem data. 1.1% died in post tsunami fires and 4.4% died of crush injuries.

<sup>\*</sup> http://www.coastal.jp/ttjt/index.php?plugin=attach&refer=FrontPage&openfile=surveyge.jpg

<sup>\*\*</sup>In Japan, a person who remains not to have been found can only be declared legally dead if the family consents. In addition, 74 sets of remains have yet to be identified.

<sup>\*\*\*</sup> http://www.mhlw.go.jp/stf/shingi/2r9852000002aa8v-att/2r9852000002aaf1.pdf

<sup>\*\*\*\*</sup> Japan Times 28 April 2011



Ishinomaki City Kadowaki Elementary School





Ishinomaki City Hospital

Ishinomaki City Ogatsu Hospital

### National response operations

Information in this section has been taken from a Cabinet Office report<sup>13</sup>, and from UN agency situation reports, which contain real time information provided by the Government of Japan.

The Prime Minister convened 3 meetings at the Disaster Council on that day, and thereafter they met twice a day. An immediate decision was taken to set up and staff a Central Government Emergency Operations Center\* to collect and transmit information from prefectures including Miyagi Prefecture as communications had broken down and the Prefectural Government could not receive reports from the affected areas. A decision was also taken to authorize the Bank of Japan to activate the national disaster fund to finance the response operations.

The following national assets and resources, contributed by prefectures and municipalities all over Japan, and were deployed over the entire response period:

- Over 27,000 Search and Rescue personnel;
- Over 300,000 National Police Agency staff;
- Over 100,000 Fire and Disaster Management Agency staff;
- Over 100,000 Ministry of Defence staff;
- Over 1,500 Japan Coast Guard staff, with over 4,400 boats and 1,500 planes;
- Over 12,000 health workers.

International support included search and rescue teams from 23 countries, relief supplies from 163 countries and 43 organizations and 17.5 billion Yen (approximately USD 200 million) in donations from 126 countries and organizations.<sup>14</sup> An emergency logistics system was established within two days, in conjunction with the private sector, which contributed trucks, boats, planes and facilities. The initial priorities were fuel supply, warehousing capacity, transport capacity, temporary communication systems and staff accommodation for the operation:

- •The number of people in evacuation centers went from a peak of 470,000 to 100,000 by the end of May 2011;
- •Supplies procured for evacuation centers included 26

million ready meals, 8 million liters of bottled water, 410,000 blankets, 16 million liters of fuel and 240,000 basic medical kits;

•As of 30 May 2012, 23,795 temporary houses had been established and 2,076 were waiting to begin construction.

### Secondary events reported

The following is a summary of secondary events reported during the first week.\*\*

### Table 3.1. Secondary events reported



Over 300 post event fires were reported in 11 prefectures, including 163 in Miyagi Prefecture. Post disaster fires caused 165 additional deaths.

<sup>\*</sup>Called a 'headquarters' in Japanese \*\*Source: Japan National Police reports (Japanese only)

### Reported damages and losses

The following is a summary of damage and losses to infrastructure and essential services reported during the first week.\*



Tsunami affected community in Kadowaki, Ishinomaki City



Landslide and ground uplift at observation deck in Oshika, Ishinomaki City



Boat stranded by tsunami nearby Old Kitakami River



Tsunami affected communities in Ayukawa, Ishinomaki City

\*Source: Japan Red Cross Six Month Report, ReliefWeb situation reports, WHO Situation reports

All photos on this page are © Center for Community Health, Tohoku University Graduate School of Medicine.

Table 3.2.	Reported	damages	and	losses
------------	----------	---------	-----	--------

Airports <sup>15</sup>	International: Narita and Haneda airports closed temporarily but reopened on 12 March. Domestic: Sendai, Iwate-Hanamaki and Ibaraki airports were closed. Sendai airport was completely inundated with water but re-opened 17 March for rescue operations only. Yamagata airport was temporary used for rescue operations from 12 March. Iwate-Hanamaki and Ibaraki airport re-opened on 14 March. Fukushima airport was temporary used for rescue operations from 14 March.
Ports16	All seaports on Pacific Coast from Hachinohe port to Kashima port were closed. 14 main ports were re-opened by 24 March.
Roads	Damaged roads were reported in Aomori, Miyagi, Yamagata, Akita, Tokyo, Ibaraki, Tochigi, Saitama, Gunma, Chiba and Iwate. Overall 1,233km of roads were repaired.
Trains	Shinkansen services in the Tohoku region were halted for 49 days. By March 18, Japan Railways was able to open some routes to allow delivery of bulk relief items such as fuel.
Gas	A total of 467,773 households lost access to gas supply. A gas tank caught fire in Ichihara City, Chiba prefecture.
Water	Water supplies to 1,794,964 households in 12 prefectures were lost or disrupted. The most affected prefectures were Miyagi, Fukushima, Yamagata, Iwate, Ibaraki, Tochigi, Chiba, Akita and Aomori.
Electricity	The whole Tohoku region (4.5 million households) lost power, as well as 4.05 million households in Kanto Region and parts in Niigata Prefecture. To conserve national supplies, scheduled limited power cuts started on 15 March.
Fuel	Fuel distribution and refinery systems were completely disrupted in Tohoku region. An emergency system to provide fuel to rescue and other essential services was established, and by 17 March this system had delivered over 1,300,000 liters of fuel to depots in Miyagi, Iwate, Fukushima and Ibaraki.
Telecommunication	Mobile telephone messaging services continued to function in some regions, although voice calls could not be made anywhere in eastern Japan. A maximum estimation of 1 million landlines and 14,800 mobile phone base stations were out of service.
Debris	The tsunami generated about 25 million tons of rubble and destroyed over 230,000 vehicles.

# Impact in the Tohoku region

The Tohoku Geographical Association used satellite maps of inundation zones and 2010 census data to estimate the number of people in Iwate and Miyagi Prefecture exposed to the tsunami.<sup>17</sup> Their findings are that the number of people directly exposed to the tsunami was approximately 64,000 in the 12 local government areas along the coast of Iwate prefecture (23.3% of the total population in 12 local

government areas, and 4.8% of the total population of Iwate), and approximately 235,000 in 17 local government areas along the coast of Miyagi Prefecture (19.4% of total population in 17 local government areas, and 10.0% of the total population of Miyagi).



Figure 3.2. Inundated areas of Ishinomaki City (Geospatial Information Authority of Japan)

### Mortality by age and sex in Tohoku region

The highest number of deaths in Tohoku region was in Miyagi Prefecture (9,325), and the majority of those (65.1%) were people aged over 60 (see also Table 3.8.).

Table 3.5. Wortanty by age and sex, Tonoku region
---

Parameters <sup>18</sup>	Iw	ate	Miy	agi	Fukus	Fukushima	
Age	Male	Female	Male	Female	Male	Female	
0-9	29	55	167	169	29	18	
10-19	41	39	136	148	23	30	
20-29	76	61	176	154	25	24	
30-39	132	111	278	256	44	33	
40-49	165	178	330	344	51	50	
50-59	294	302	512	583	103	93	
60-69	415	462	916	868	167	128	
70-79	548	597	1095	1147	172	231	
80-89	350	488	670	1013	146	188	
90-99	39	115	82	262	10	35	
>100	1	5	3	16	0	2	
total	2,090	2,413	4,365	4,960	770	832	
Deaths (total)		4,503		9,325		1,602	
Missing (total)		1,218		1,514		213	

### Casualties in Miyagi Prefecture

Using the exposure data from the Tohoku Geographical Association and the official death toll, a higher proportion of the residents of Miyagi exposed to the tsunami were killed compared to the average for all affected Prefectures, and although the survival rate in Ishinomaki City was slightly higher than whole Miyagi Prefecture, it was still significantly worse than the average for all affected prefectures. 18, 19, 20, 21

### Damaged and destroyed houses

Table 3.4. Population impact of the tsunami in Miyagi Prefecture and Ishinomaki City

Parameters*	Japan	Miyagi Prefecture**	Ishinomaki City***	Ogatsu <sup>22</sup>	Oshika <sup>22</sup>
Population directly exposed to tsunami	600,000 (estimate)	234,920	90,210	n/a	n/a
Number of deaths As % exposed population	15,859 (2.6%)	10,262 (4.4%)	3,428 (3.8%)	165 -	88
Number of missing	3,021	1,616	535	79	35
Number of injured	6,107	4,133	n/a	n/a	n/a

Table 3.5.	Houses	damaged	in N	liyagi	Prefecture
------------	--------	---------	------	--------	------------

Parameters <sup>19, 20, 23</sup>	Japan	Miyagi	Ishinomaki	Ogatsu	Oshika
Total collapse	130,429	85,410	22,357	1,304	921
Half collapse	262,818	151,362	11,021	95	176
Partly collapse	717,538	222,749	20,364	67	638

\* In June 2012, there were still 74 unidentified bodies in Miyagi Prefecture. There were also 63 earthquake related deaths recorded outside the Tohoku region.

\*\* Direct deaths (9,530) + post event deaths (732) \*\*\* Direct deaths (3,230) + post event deaths (198)

### Post event suicides

Statistics on suicidesafter the earthquake, tsunami and nuclear accidents in Fukushima are provided in a report published by the Cabinet Office in December 2012.<sup>24</sup>

	Parameters	Male	Female	Total
	June	11	5	16
2011 2012	July	9	2	11
	August	2	3	5
	September	4	2	6
	October	4	1	5
	November	6	0	6
	December	6	0	6
	Total	42	13	55
	January	1	0	1
	February	0	1	1
	March	3	1	4
	April	2	0	2
	May	1	0	1
2012	June	2	0	2
2012	July	0	1	1
	August	1	1	2
	September	0	0	0
	October	3	1	4
	November	3	0	3
	Total	16	5	21

Table 3.6. Suicides attributed to the earthquake, tsunami and nuclear accidents in Fukushima by sex and month 2011 and 2012

### Population living in evacuation centers in Miyagi Prefecture during 2011

An analysis of data provided by Miyagi Prefecture<sup>25, 26</sup> on people living in evacuation centers shows that although numbers were very high immediately after the tsunami, and

remained high for the month of March, the numbers of centers and residents fell significantly in April, and then fell much more slowly for the remainder of the year.



Figure 3.3. Graph of population living in evacuation centres in March 2011, Miyagi Prefecture



Figure 3.4. Graph of population living in evacuation centres by month in 2011, Miyagi Prefecture

### Story by Public Health Nurse B from Region A

At the time of the earthquake, there were three pregnant women. Among the three women, there was two women who were visiting Region-A. The evacuation center was not suitable for pregnant women to stay the night, and so next day of tsunami, I went out and found a household that could house them. However, on the way to the household, two pregnant women decided, "I should go home." (A husband came for a pregnant woman while we were walking to the household. Another pregnant woman was worried about her child staying at Region K where worst hit area was, and she made her way from Region A to Region K with another person.) The pregnant woman left right then and walked through the rubble to her home. The only thing I did was seeing her off. It is not as if there is a set procedure for caring for pregnant women during a disaster, but even now I wonder what code of conduct would have been proper or if my judgment then was appropriate.

There were many instances where mothers were busy serving food and thus left their children without supervision. Areas with many children around the same age were able to enjoy playing but I observed areas with few children that were unable to be attended to because the mothers were overly busy serving and preparing the rations. Some children in those areas with few children became ill and vomited throughout the night. We, public health nurses, wanted to treat those children but since the tsunami swept away cars and destroyed the roads, it was some time before we were able to attend to them. Answering to some of the adult's demands was given priority over the children's problems. The children could not directly appeal to help, without someone noted the slight change in them. The circumstances made us to be hard to notice the mothers and children. The mothers behaved with the attitude of reserve and so they could not response to their children's needs on the spot. I regretted that I did not provide the necessary support for those children and mothers, even though I was the person who perceived a need to the children's demands.

Because the nursery school in Region-A was damaged, we are currently borrowing a portion of another region's nursery and operating there. There are ten children, ages one to five, which are cared for by nursery workers who have to deal with the narrow halls and lack of space. This nursery school will close next year. I wanted a nursery school in Region-A. A survey for parents was conducted whether they would enroll their children in a nursery school, if built, in Region-A. Many answers came back as "uncertain", and there was no interest in continuing the current nursery school. Currently in Region-A, only 17 elementary school students remain with limited activities to do. Women with newborns will not return to the area because of the miserable nurturing environment. I feel that once people leave Region-A, they will most likely never return. If that were to happen, the number of children will decrease. A vicious downward spiral. I know it is difficult, but the focus of a restoration plan needs to be on the children or else there will be no future for Region-A.

# Conditions in evacuation centers/temporary accommodation

Assessments based on information collected by Tohoku University Graduate School of Medicine assessment teams showed that a number of key factors were lacking in evacuation centers (see below). It was observed that smaller evacuation centers seem to function better, perhaps due to less pressure on common facilities (toilets etc.) and less opportunities for individual needs to cause conflict, but mostly because smaller centers housed members of the same community, who knew each other well and whose sense of community and solidarity was not disrupted. It seems that evacuation centers that organized the quickest were those where the PHN took a strong leadership role. It was also reported that the evacuation centers that were the most difficult to manage where those with a significant proportion of highly dependent elderly people.\*

According to current international standards, the minimum requirements for an evacuation center include\*\*:

- •Sufficient quantities of safe drinking water, stored and served in containers that are easy to clean and easy for the elderly and young children to use.
- •Sufficient quantities of clean water and soap for personal hygiene, with proper provisions for privacy and gender needs (female hygiene kits).
- •Space allocated for social, communal and entertainment activities.
- •A clean and functioning waste disposal system, with proper provisions for liquid and solid wastes from personal and communal sources, including medical and hazardous waste.
- •Space designated for child care, play and physical activity, as well as privacy for personal needs such as breastfeeding and for medical procedures such as catheter care etc.
- •A clean food preparation system, with provisions for dietary- and age-specific needs.
- •Clearly identified leadership to assist with organizing participation in the day to day running of the centers and with conflict resolution, and to provide a consistent channel for authorities to transmit and receive

information and to help sustain a sense of community and solidarity.

•Policies and procedures for placing people in evacuation centers are based on their community and family ties.

In Miyagi Prefecture, not all centers were able to meet all these conditions, but many did achieve most of them over time. By the end of March, the PHNs in Ogatsu and Oshika were receiving fewer complaints about conditions, and more about a lack of activities and things to do.

### Community health impact

### Injury

Although the total number of injured is known, at the time of writing, the epidemiology of the injuries is not known. Although all hospitals and clinics have data, there is no requirement to collate and report injury information to disaster authorities. Similarly, at the time of writing, no data has been published on injury complication rates or new cases of disability arising from injuries due to the earthquake or the tsunami.

### Communicable disease control system

The MHLW is responsible for the analysis and dissemination of communicable disease information in Japan. On 14 March, the NIID Infectious Disease Surveillance Center (NIDSC) published its first risk assessment for communicable disease in the affected areas, and thereafter, regular updates were issued throughout the response. However, given that the disaster public health system is not as well established as the disaster medical system, it took almost 2 weeks to get a surveillance system designed and fully functioning. Even then it was not a mandatory or a "zero" reporting system and data gaps caused some early confusion.

In the early stages, acute watery diarrhea and acute respiratory infection were considered to have the highest public health risk. These were monitored through a syndromic surveillance system established in evacuation centers (see Chapter 6 for a discussion of the surveillance

<sup>\*</sup>From interviews with PHNs in Ogatsu and Oshika;

<sup>\*\*</sup>Adapted from The Sphere Project: http://www.sphereproject.org/

and reporting system).

Later vaccine-preventable and other diseases were added to the surveillance system. Given the absence of an organized national public health response in the first days as well as the poor hygienic conditions of many evacuation centers early in the disaster, the personal hygiene habits of Japanese people contributed greatly to preventing any serious outbreaks.

Most infectious diseases of international concern in natural disasters were considered not relevant to this event. Vibrio exists in most regions of Japan but V. cholerae is very rare and unlikely to be present in the region affected. Typhoid and leptospirosis occur rarely. Plague is not endemic in the country. Even with an increase in mosquitoes with warmer weather, it was thought unlikely that this will directly lead to increases in vector-borne disease incidence, as dengue and malaria are not endemic in Japan.

A systematic emergency communicable disease surveillance system for the affected areas took over two weeks to become fully established. In the early phase, PHNs and some universities collected information through site visits, but gradually, evacuation center staff began to collect and submit information by phone/fax, but it took some time for this to become comprehensive. Hospitals and mobile medical teams also began transmitting public health information as medical needs lessened and the communication situation improved. In some areas, public health staff had to walk to each evacuation center to collect information because of lack of transport/fuel, and disruption to communication systems. The media also reported some public health information as collected by mobile teams, or from their interviews with government staff and the public.

By mid May, 90% of the national sentinel surveillance sites were reporting, but the system still lacked an effective system for disseminating information. There was also some inconsistency in data collection. In the affected areas, some sentinel sites had already returned to the normal reporting mode, while others continued to use event-based or syndromic systems.

In Miyagi Prefecture, the reporting system was web-based, but not all health centers had access the health department intranet, so their staff had to travel to neighboring districts each day to file their reports. By July, the system was still

\*WPRO sitreps

syndromic and not zero reporting, and while covering 10, 000 persons, it was predominantly evacuation center based, and plans to extend the system to cover temporary housing and those living in their own homes were still being developed. However, the system did not capture information from all private providers such as NGO, private medical teams, and the JSDF medical teams.

### Communicable disease reports

Overall, few outbreaks of communicable diseases were detected in the affected areas.<sup>27</sup> Of note were reports of cases of influenza<sup>28, 29</sup>, norovirus<sup>30</sup>, tetanus<sup>31</sup> and legionellosis<sup>32</sup>. There was no increase in the incidence of tuberculosis relative to historic levels, although transmission of TB in one evacuation center has been reported.<sup>33</sup> No outbreaks of measles were reported from the tsunami affected areas.

The incidence of pneumonia increased after the earthquake (see reference above). Higher incidence of respiratory infections were also reported at Iwate Medical Center and the Ishinomaki Red Cross hospital. Early cases were related to inhalation of sea water during the tsunami (including the case of legionellosis). Sporadic cases were reported among the elderly by the evacuation centers, but these are thought to be due to poor oral hygiene and cold weather conditions, and not due to person-to-person transmission.

Limited data is available from the affected areas for the period 11 March to 10 April, when only 16 of the approximately 1,000 evacuation centers in Miyagi Prefecture provided information to NIID. No community data was collected in that period. These 16 centers ranged in size from 44 to 680 people. Eight of the centers reported cases of gastroenteritis over the period and 10 reported influenza like illness. This occurred at the same time as a resurgence in influenza like illness activity across Japan, mostly attributed to influenza A.

### Response to outbreaks

Early in the response, PHCs were provided with supplies of antiviral medications for influenza, influenza rapid diagnostic kits, test kits for pneumococcus and legionella, and tetanus toxoid.



Hand wash station in evacuation center, Shizugawa, Minamisanriku © 2012 Center for Community Health, Tohoku University Graduate School of Medicine

Low numbers of cases of communicable disease at evacuation centers may be attributed to the dedication of the staff, particularly PHNs, who were rigorous the enforcing infection control and providing public education. This was despite very cold weather, lack of heating and bedding, electricity, drinking water, functioning sanitation, poor personal hygiene facilities and safe food preparation areas during the initial stages.

In addition to education on infection control, other public health measures were also taken, such as ventilation control in evacuation centers, and use of face masks, alcohol hand hygiene and chlorine-based solutions for cleaning surfaces and bathrooms. The cold weather, pre-cooked meals and bottled water helped keep food safety risks low until refrigeration and running water became available. Posters, handouts and educational materials were provided to all evacuation centers. Japanese cultural norms also contributed to public safety, as the vast majority of people respected public health rules and used the protective measures that were provided.

### Mental health

The Tohoku region has some of the highest rates for mental health conditions in Japan<sup>34</sup>. The suicide rate in Miyagi Prefectures was 28 per 100,000 population in 2008, compared to 25 per 100,000 for Japan, with men twice as likely to attempt suicide as women. Tohoku residents are also known throughout Japan as being a characteristically reserved group of people who do not readily express their feelings. There is a significant amount of stigma associated with mental health conditions, so people are less likely to seek assistance, and in addition, prior to the tsunami, access to community level mental health services in Tohoku was limited compared to the rest of Japan.

The system for providing mental health care in disasters in Japan was strengthened considerably after the Hanshin-Awaji earthquake in 1995, and after the Great East Japan Earthquake, mental health care teams, consisting of psychiatrists, nurses and counselors were deployed early. In 2012, Miyagi Prefecture established a mental health center in Sendai City to provide long term outreach services to the affected areas. However, no service has been established for government staff who worked in the response and no information has been collected on any mental health issues they may have.

The accident at the Fukushima-Daiichi nuclear plant has also caused anxiety and other mental health concerns, particularly for people from the designated evacuation zones who were not directly affected by the tsunami. Not only were these people anxious about their prospects of returning to their homes and work and regaining their livelihood, they also face possible discrimination in the future.

At the time of writing, information from mental health surveillance systems established after the tsunami was not publicly available.

### Non-communicable diseases

People with non-communicable diseases (NCD) are particularly at risk after disasters, especially the elderly.<sup>35</sup> Those dependant on uninterrupted access to health facilities (such as dialysis, transfusion, oncology, oxygen therapy etc.), life sustaining medications (diabetics, respiratory and heart disease), electrically operated machinery, dietary regimes and/or environmental modification experience significant excess mortality rates after disasters.\*Home care interventions and procedures that require privacy are difficult to manage in a crowded evacuation center, and many of the emergency evacuation centers were not designed to accommodate people with physical disabilities. The Tohoku

Region has a large proportion of elderly people, many in long term care, and many with varying degrees of mental and physical disabilities.

Parameters**	(n/a = not available)	Iwate	Miyagi	Fukushima
High risk in disasters	Dialysis	2,872	4,753	4,705
	Type 1 Diabetes	n/a	n/a	n/a
	Respiratory support	-	-	-
	Post-organ transplant	5	36	17
	Acute coronary care	-	-	-
Medium risk in disasters	Type 2 Diabetes (figures included Type 1 and 2)	34,000	39,000	46,000
	Heart disease	15,000	25,000	32,000
	Asthma	1,100	2,100	1,700
	Cancer	17,000	24,000	25,000
	Chronic lung disease	3,000	4,000	4,000
Low risk in disasters	Hypertension	109,000	167,000	187,000
	Hypercholesterolemia	18 000	24,000	19,000

Table 3.7. Pre-existing non communicable disease health conditions in main affected prefectures

According to PHNs, the most common medical condition found in evacuation centers was new cases of hypertension. Although trend data on the incidence and prevalence of non communicable diseases in evacuation centers is not available from government reports, publication of studies on non communicable diseases carried out by research institutions after the tsunami are now appearing in peer review journals, although many are in Japanese only and they have yet to be abstracted in international databases such as PubMed.\*\*\*

### Diet and food safety

Food was a major concern in all evacuation centers at least for the first week. The Disaster Basic Plan only requires local government to plan food stocks for a few days, and the plan assumes that water and electricity systems will not be disrupted beyond the immediately affected area, and only for a short time in the affected areas. This planning provision clearly did not meet the needs of the 2011 tsunami, but even more seriously, the many spontaneous shelters that were set up had no food stocks at all. Under the present plan designated evacuation centers are only required to provide a

<sup>\*</sup>http://www.unisdr.org/we/inform/publications/19983

<sup>\*\*</sup>Source: adapted from reports from the Japanese Association of Dialysis Physicians, the MHLW and the Japan Transplant Network

<sup>\*\*\*</sup>A search for "2011 Japan earthquake" in PubMed on 26 September 2012 returned 331 articles of which 190 had abstracts, and 167 were published in English.

general diet, so special foods, such as for infants or people on special diets, are not stocked in advance.

With the electricity supply and vehicle access restored, refrigerators could be supplied and a wider range of fresh foods provided, but this took as long as 2 weeks in some cases. Once the situation was stabilized, public health nutritionists were able to make assessments and thereafter food supply was matched to actual needs.

### Sleep and physical activity

Disturbed sleep was commonly reported in evacuation centers, mostly attributed to crowding and lack of privacy but also stress, depression and anxiety were reported causes. Early in the response, fear of aftershocks was a common cause of sleep disturbance.

To encourage physical activity, evacuees were provided with opportunity to exercise, through group activities such as stretching exercises broadcast by a radio programme (radio taiso) and individually through participation in communal services such as cooking, washing and cleaning. This also had the benefit of improving mood and sleep problems.

### Environmental monitoring

Some evacuation centers reported numbers of people with an irritable cough, and this raised concerns for environmental contamination. However investigations found no evidence of any contamination, and it is believed the cause was dust generated by the demolition of unsafe buildings and debris clearance.

Environmental monitoring for asbestos was being done at those sites where it was known that asbestos is present in damaged and destroyed buildings.

### Medical supplies

The supply of medicines was affected due to damaged warehouses that disrupted distribution systems and the loss of electricity and telecommunications, not only in the worst affected prefectures, but also in the surrounding prefectures. Medical supplies were mobilized from all over Japan to compensate for shortages. To ease the burden on demand for essential drugs, routine prescription renewals were limited to 28 days resupply across all of Japan. To ensure the rational use of drugs, and to ensure health facilities maintained their stocks, pharmacists were deployed as part of the medical teams or stationed in the larger evacuation centers.

### Administrative arrangements

In the affected prefectures, acute and chronic care services were provided to all, without the need to present a health insurance card or certificate of physical disability. Some medications were also taken off the prescription list temporarily. The MHLW allowed the use of industrial oxygen gas for medical purposes as medical oxygen was in short supply.

### Patient information management

Many medical records were destroyed by the tsunami. This caused problems for clinics and mobile teams as many elderly patients did not know what they were being treated for, or what medications they had been taking. As well as the health records of pregnant women and the vaccination cards of children, many administrative records and computers were lost, making it difficult for health staff to record and report their work, and to provide the public with the services and welfare benefits that they were entitled to.

### Public Health impact in Miyagi Prefecture

### Mortality rates

The group with the highest mortality rate was men aged over 80 (1.48%), adjusted for their proportion of the total population. Overall the mortality rate was higher for females (0.41% vs. 0.39%), but the male/female distribution was not consistent across the age ranges. The rate was slightly higher for females in age ranges 0-9, 10-19 and 40-49 and significantly higher for women aged 50-59. It was slightly higher for men in age ranges 20-29 and 30-39 and significantly higher for men above 60. The rate for all people over 40 was significantly higher than for all people under 40. For children under 10, girls had a slightly higher rate than boys.

Mi	Miyagi baseline population			hs by age group	Mortality by age group (%)		
Age group	Male	Female	Male	Female	Male	Female	
0-9	103,577	98,302	167	169	0.16	0.17	
10-19	115,168	109,653	136	148	0.12	0.13	
20-29	137,057	135,568	176	154	0.13	0.11	
30-39	166,074	161,826	278	256	0.17	0.16	
40-49	146,629	144,711	330	344	0.23	0.24	
50-59	162,929	164,184	512	583	0.31	0.36	
60-69	148,531	154,374	916	868	0.62	0.56	
70-79	101,135	129,193	1,095	1,147	1.08	0.89	
80+	51,140	99,293	755	1,291	1.48	1.30	
total	1,132,240	1,197,104	4,365	4,960	0.39	0.41	

Table 3.8. Event fatality rates, Miyagi Prefecture

### Health system impact in Miyagi Prefecture

### Health infrastructure and staff

There was significant damage to health infrastructure and loss of life among health workers in Miyagi Prefecture.

Out of 147 hospitals in the prefecture, 98 were damaged and 6 totally destroyed, and 115 patients and 38 staff were killed. In addition, 654 private clinics and 384 dental clinics were damaged or destroyed. The cost of repairing and replacing health infrastructure has been estimated by the Miyagi Prefecture government at over 30 billion yen.

As of 11	Number of	Human damage			Infrastructure damage					
September 2011 <sup>36</sup>	Medical institutions		Nur deaths	nber of s/missing	Total collapse	Partly collapse	Tc	otal	Amount of damage (Yen)	
		Number of Institutions	Patients	Staff			Number of institutions	%		
Hospital	147	14	115	38	6	98	104	70.7	23,462,228,000	
Clinic	1,621				55	599	654	40.2	4,323,517,000	
Dental clinic	1,065				59	325	384	36.2	2,302,500,000	
Total	2,833	14	115	38	120	1,022	1,142	40.3	30,088,245,000	

### Other great disasters in Japan

The Great Hanshin-Awaji earthquake, also known as the Kobe earthquake, occurred at 05:46 on January 17th 1995 in the southern part of Hyogo Prefecture, Japan. It measured magnitude of 7.3 on the Japan Meteorological Agency magnitude scale and its tremors lasted for approximately 20 seconds. The epicenter of the earthquake was located 16 km beneath the northern end of Awaji Island, 20 km from the City of Kobe.

The official death toll was 6,434 and over 30,000 people were injured. It was Japan's second worst earthquake in the 20th century, after the Great Kanto earthquake in 1923, which claimed over 105,000 lives. The damage caused by the Great Hanshin-Awaji earthquake was estimated at ten trillion yen (USD 100 billion), which was 2.5% of GDP at that time.

# Comparisons in reported mortalities

There are no official definitions to be used in reporting mortality in disasters in Japan, and post mortems are not legally required in natural disasters\*, so comparisons of mortality data between events is difficult due to variations in terms used and uncertainty over attribution and sources.\*\*Although officially reported as "cause of death" data, this is not strictly accurate, given the absence of post mortem data. It might be more accurately to call the data "circumstances of death". The reports do not distinguish between dead bodies recovered by search and rescue operations, and those who died of their injuries after rescue. For deaths attributed to fire, reports do not distinguish between those who were already dead and those who were alive at the time a fire started (e.g. in a partially collapsed building); for drowning those who died of severe injury or exposure while in water from those who actually drowned.

Accurate information on cause and circumstances of death in disasters is important. It informs the design and construction of buildings, helps to make training of rescue teams and medical response teams more effective, and helps to improve supply and equipment lists so that the most appropriate items are provided to rescue teams and medical response teams according to the type of event. It also informs the design and content of public information and public education programmes.\*\*\*

### Changes in national disaster management policies and practices

The Hanshin-Awaji earthquake stimulated the Japanese government to initiate many changes in national policy and practice. Amendments were made to building regulations and construction codes. The JSDF was given authority to respond to earthquakes over a certain magnitude. Control over post disaster fire control was transferred from municipal fire departments to a central command, the FDMA\*\*\*\*. The Ministry of Land, Infrastructure and Transport defined a series of national disaster evacuation routes and reinforced them to a standard that will survive all but the most exceptional earthquakes. Prefectural governments have invested billions of yen building earthquake-proof evacuation centers. Across Japan, public drills and exercises are held frequently to ensure the public maintains a high level of awareness of earthquake safety.

# Changes in health sector policies and practices

The major outcome of the Hanshin-Awaji earthquake for the health sector was the establishment of the national DMAT system\*\*\*\*\* in response to the criticism of unacceptable delays in transporting injured people to hospital. After 10 years of consultation and preparation, the MHLW finally launched the system in 2005. The role of the DMAT is to treat and transport critically injured and ill patients to hospital in the immediate period after a disaster. A DMAT team consists of up to five doctors and nurses who must have completed special training. Since its launch, several changes have been made to the system as a result of formal evaluations. By December 2010, over 6,000 medical doctors and nurses were registered with DMAT as coordinators, trainers and responders\*\*\*\*\*.

\*\*\*\*\*http://www.yomiuri.co.jp/dy/national/T120122004108.htm

\*\*\*\*\*\*The core of the health sector disaster response is the DMAT system for managing severely injured people (at present there is no equivalent health sector mechanism for managing the public health aspects of disasters). Over 1,800 doctors and nurses served in DMAT teams in Tohoku – its largest operation ever

<sup>\*</sup>Certification of death (through identification of remains by relatives or DNA records) is required for insurance and legal purposes, but does not establish cause of death \*\*The data from the Kanto earthquake is from a study by engineers, while that for the Hashin Awaji earthquake is from Police records

<sup>\*\*\*</sup>For example, it is a popular myth that standing in a doorway is good practice in an earthquake.

<sup>\*\*\*\*</sup>http://www.fdma.go.jp/en/



Figure 3.5. Comparison of mortality in three major earthquakes in Japan<sup>37,38,39</sup>

### Comparisons with 2011 Great East Japan Earthquake

The March 2011 earthquake and tsunami had a much higher death toll (15,850 vs. 6,434) than in 1995 but the injury toll was much lower (6,100 vs. 30,000). There were many patients with serious and complicated injuries in 1995 but not in 2011 as injuries were mostly minor. These differences are typical of known epidemiology of tsunamis and of earthquakes.

The major difference in terms of the effectiveness of the response was that in 1995, the affected area was relatively small, with a highly concentrated population, whereas in 2011, the whole of eastern Japan was affected in some way. This seriously compromised the rapid response the disaster management system, which relies on adjacent prefectures helping each other. The damaged area was so large that there was no possibility that all affected areas could be reached in a few hours, as is envisaged in the national plans.

Given these differences, the system designed to meet the needs of the 1995 scenario did not function as well as hoped in 2011. The most significant differences for the rescue, medical and welfare services were the proportion of elderly victims and the numbers injured. The system in place was designed to move large numbers of injured people along earthquake resistant highways to fully functioning earthquake resistant hospitals just outside the affected area in a very short time, and to accommodate self-supporting survivors in earthquake resistant shelters stocked with enough food and water to last several days. This was not the reality in 2011, as the system had difficulties coping.

Table 3.10. The social differences between the populations affected by the two events

Indicator	Нуодо	Tohoku
Urbanization	above Japan average	below Japan average
Economic development	above Japan average	below Japan average
Population density	above Japan average	below Japan average
Coverage of health services	above Japan average	below Japan average
Proportion of elderly	below Japan average	above Japan average
Prevalence of life style diseases	below Japan average	above Japan average



### Public health response to the earthquake and tsunami

Overview of actions taken

National level actions

Non government health actions

Prefecture level: Miyagi Prefecture

### Overview of the response by Miyagi Prefecture government

Miyagi Prefecture response operations Ishinomaki Public Health Center

### Current status of recovery planning in Japan

Overview Government of Japan recovery and reconstruction plans



# Public health response

All photos on this page are ©Center for Community Health, Tohoku University Graduate School of Medicine

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### Public health response to the earthquake and tsunami

### Overview of actions taken

The public health response became operational two weeks after the event. At the local level, although PHNs were fully aware of the importance of continuing their public health functions, they were overwhelmed with the immediate needs of the sick and injured, and of setting up and running evacuation centers.

Four months after the disaster, the MHLW reported that the public health system was fully functional in all areas except the most severely affected. In the affected areas, loss of health infrastructure and the insufficient transport were the main challenges in providing services to remote communities and islands.

### National level actions

Within an hour of the disaster, the MHLW activated its Emergency Operations Center, and in the next day established offices in all of the affected prefectures.

Initial public health actions were limited to collecting information from prefectures on the situation in evacuation centers. By the end of the first week, the MHLW reported that 100 teams of PHNs were in the field, with another 70 on standby. By the end of the March, almost 50 mental health teams were also in the field.

For public health managers, the biggest constraint was lack of information. During the first week, use of vehicles was restricted to first responders (fire fighters, emergency medical services, JSDF) to conserve limited supplies of fuel. This meant that public health officials had no means to collect information in the field. Local public health staff took between four to seven days to confirm the safety of their staff, and to provide some idea of the public health situation in the affected areas.

### Non government health actions

Over 140 private sector organizations provided assistance to medical institutions and services to the public in Miyagi Prefecture, including the Japan Medical Association, the Japanese Nursing Association, the Japan Pharmaceutical Association and the Japanese Society of Hospital Pharmacists.

### Medical supplies

- The JSDF began distribution of medical supplies by land on March 12, by air from March 19 and by sea from March 20;
- The medical logistics system was established in all prefectural capitals by March 19;
- Items supplied included pharmaceuticals, vaccines, medical devices, wheelchairs, portable toilets, sanitary products, meals, water and fuel.

### Mother and child care

- Health education material for pregnant women and infants and handbooks on mental health for children were prepared and disseminated;
- Over 180 child welfare staff were dispatched to support the prefectures in providing services for children. Over 1,300 children lost a close family member, and 240 children became orphans;
- UNICEF Japan provided support to mother and child care in all the affected municipalities of Miyagi Prefecture\*. Their work included provision of emergency relief supplies for mothers and children, support for services for psychosocial care for children, assistance with repairing and re-opening damaged schools and purchasing materials and equipment for schools.

### Administrative arrangements

One of the major problems faced by the public and health care institutions was payment for services. The government issued exemptions in the following areas<sup>40</sup>:

- No requirement to show health insurance and disability certificates when seeking medical care;
- No user fees for those receiving chronic care, plus food subsidies and living expense subsidies were extended to everyone receiving chronic care.
- No payment of health insurance and nursing care insurance premiums, for up to one year.

\*http://www.unicef.or.jp/kinkyu/japan/en/pdf/1year\_report\_en.pdf

Table 4.1.	. Staff deployme	nt reported by	MHLW to 30	September 2011 <sup>41</sup>

Medical/health professions deployed	Accumulated total
DMAT	193 teams
Other medical teams	12,385 in 2,720 teams
Pharmacist	1,915
Nurse	1,394
Dentist	307
Physical therapist	223
Public Health professionals (doctors, PHNs, managers, dieticians)	11,266 in 230 teams
Mental health teams	3,498 in 57 teams
Physician for radiation screening test to reduce fear of radiation exposure	421 in 40 teams
MHLW officials	4,509

### Table 4.2. PHN teams deployed at evacuation centers and public health centers

	25 March		2 April	
	Number of teams	Location	Number of teams	Location
Responding	95	Iwate(27) Miyagi(39) Sendai City(27) Fukushima(2)	113	Iwate(39) Miyagi(49) Sendai City(20) Fukushima(5)
Mobilizing	4	Iwate(2) Miyagi(2)	3	Miyagi(2) Fukushima(1)
Standby	6	Iwate(4) Miyagi(2)	7	Iwate(1), Fukushima(6)
Total	105	Iwate(33) Miyagi(43) Sendai City(27) Fukushima(2)	123	Iwate(40) Miyagi(52) Sendai City(20) Fukushima(12)

### Prefecture level: Miyagi Prefecture

In Miyagi Prefecture, 14 of the 147 hospitals are designated disaster base hospitals. A week after the tsunami, however, eight of these hospitals could no longer receive referrals due to over loading.<sup>42</sup> The prefecture has a manual and training activities on medical assistance for the injured in disasters but it was still in draft form and uncirculated at the time of the tsunami. The prefecture does not provide enough disaster training for public health staff, and local public health services are not required to make disaster plans.

By 25 March, local medical associations were still reporting limited capacity of the health facilities. Out of 231 hospitals and clinics in the most affected prefectures of Iwate, Fukushima and Miyagi, 121 (52%) were not accepting new patients, of which 33 (14%) were unable to accept any patients due to lack of resources rather than lack of beds.

### Communicable disease surveillance

On 18 March Miyagi Prefecture implemented a syndromic surveillance system for the evacuation centers.\* This system continued until 6 November 2011, during when it was revised twice.

### Syndromic surveillance system in the early phase

#### 18 March to 3 April

- The system covered 634 evacuation centers in 34 municipalities. The information collected included: number of evacuees, daily incidence and cumulative incidence of acute respiratory and acute gastro-intestinal infections;
- Initially, the system used hand written reports from visits by staff of local PHC, but this was changed to electronic reporting once it became possible;
- Frequency: daily
- Consolidation: Miyagi Prefecture health department:

### 4 April to 13 May

- Information required changed to incidence of acute respiratory infection, influenza and acute gastro-intestinal infection
- Frequency: weekly
- Consolidation: Miyagi Prefecture health department:

### Syndromic surveillance system in the later phase

### 10 May to 6 November

- Using a syndromic surveillance system developed by National Institute of Infectious Diseases (NIID)
- Coverage reduced to 256 evacuation centers in 27 municipalities.
- Information required changed to add incidence of acute exanthematous disease, skin infections, injury related infections, jaundice and deaths.
- Methodology changed to internet based self reporting, submitted directly to NIID.
- Frequency changed to daily, weekly and fortnightly (depending on which information was being reported).

\*From a report by Tohoku University Graduate School of Medicine (Japanese only)

## Overview of the response by Miyagi Prefecture government

### Miyagi Prefecture response operations

In 2012, Miyagi Prefectural government published a report on its medical operations to respond to the earthquake and tsunami<sup>43</sup>, and the following sections of this document have been extracted from that report.

### Medical response operations

For an overview of the structure of health services in Miyagi Prefecture, see Chapter 7.

The Medical and Health Preparation Division (MHPD) of the Health and Welfare Bureau (HWB) of the Miyagi Prefectural government is responsible for coordinating the medical response to disasters in the prefecture, as part of the national DMAT system.

Over recent years, the MHPD has invested in improving medical disaster preparedness. Major prefectural hospitals are connected with the DMAT Headquarters by a disaster resistant communications system, and agreements have been made with mobile telephone service providers for priority access during emergencies. DMAT teams and coordinators have been trained and are on 24 hour standby, and an electronic Emergency Medical Information System (EMIS) is in place to collect data from all major hospitals in the prefecture during emergencies.

Immediately after the earthquake, HWB called in emergency staff and established an EOC. The emergency communications system initially failed after the earthquake, but was re-established within 30 minutes. At 5pm, the prefectural government decided to centralize all coordination efforts and HWB staff were assigned to join the EOC at the Prefectural Government office. An expert advisory committee, called the Disaster Health and Medical Advisory Committee, was set up with representatives of departments in the prefectural office, Tohoku University Graduate School of Medicine, the Japan Committee for UNICEF, the Japanese Red Cross Miyagi Branch, Miyagi Medical Association, the JSDF and Sendai City government. This committee met every day until March 30.

Although the emergency communication system was quickly re-established, less than half of the reporting hospitals were able to connect to the EMIS to enter data. For those that could not connect to the system but were still functioning, the information management team obtained data by landline and mobile phone, and manually inputted it into the system. By the end of March 12, regular communication with all hospitals that were still able to function had been established. The major referral hospitals in Sendai City were placed on standby, and were asked to cancel routine procedures and prepare for a large number of casualties. As the earthquake had disrupted the electricity system, the major need for all hospitals was fuel to run generators, and the means to store it safely in large quantities. Maintaining supplies of water and food were also early concerns, as were blankets to keep patients warm given the lack of heating in hospitals.

In terms of medical supplies, the principle problem was procuring and delivering medical gases, particularly oxygen, as four of the 11 local manufacturers were destroyed and the rest had no electricity. Although the Miyagi Red Cross Blood Center was able to continue to function with an emergency power supply, processing of donated blood and preparation of blood products at the local level was disrupted due to a loss of electricity. Fortunately a major pharmaceutical warehouse in Natori City was undamaged and requests for supplies could continue to be processed, particularly urgent requests for tetanus toxoid.

The Prefecture did not have the logistics capacity to meet all these needs, so arrangements were made with the JSDF to ensure that the fuel, food and water needs of hospitals could be met.

Although the national DMAT system was activated immediately, teams did not start arriving in Miyagi Prefecture until the second day. Since information on the physical conditions in the affected coastal areas was still not available, there was no way to prioritize the deployment of DMAT teams based on medical needs. Early deployment decisions were made only on whether roads were open, and access was possible. For this reason, DMAT teams were sent to Sendai City Hospital and the Japanese Red Cross Ishinomaki Hospital to wait on standby until access information became available. It took until the end of the third day to get all the DMAT teams to the field. An early priority was to transfer patients from Ishinomaki City



Evacuation center in Yamamoto



Aid station in evacuation center in Yamamoto

Hospital and Shizugawa Public Hospital, which were both badly damaged by the tsunami.

To facilitate DMAT operations, a staging care unit (SCU) was established at Kasuminome Air Base, where rescued patients were triaged and given initial care before air transport to referral hospitals in Sendai and nearby prefectures. The SCU also functioned as a rest area and coordination center for DMAT teams.

### Public health activities

The Health and Welfare Administration (HWA) of the Health and Welfare Bureau (HWB) of the Miyagi Prefecture government is responsible for coordinating the public health response to disasters in the Prefecture. The HWA works with local governments through seven regional PHCs, which are in areas of Sennan, Shiogama, Ohsaki, Kurihara, Tome, Kesennuma and Ishinomaki. The only one unable to function in the early days of the disaster was the Ishinomaki PHC, which was damaged by the tsunami.

In 2010, the HWA began preparing an operational manual on Public Health in Disasters. However it was still incomplete at the time of the disaster. One of the first actions of the HWA after the tsunami was to distribute the current version of the manual to PHCs. In conjunction with preparing the manual, the HWA established an emergency deployment system to allow staff to be quickly transferred to affected areas. This system was activated soon after the tsunami, in conjunction with requests to the MHLW and the Association of Prefectural Governors for additional support. The first public health teams began work in Iwanuma on the third day. By the end of October 2011, over 14,700 PHNs, and over 7,500 other public health professionals from 33 prefectures had been deployed to assist 14 municipalities, two PHCs and one branch office in the affected areas. Initially external teams were required to report to the EOC to be briefed and assigned an area of work, but once the relief operation was established, local governments were able to request and receive teams directly. In April 2011, the HWA established a "disaster victim livelihood support team" to coordinate planning by the prefecture's public health, nutrition and exercise / rehabilitation teams. The Support Team focused on improving conditions in evacuation centers, and worked in close collaboration with the Health Promotion Division and the Infectious Disease Control Office. The Prefecture report states that although the initiative worked well within the HWA, coordination with other government offices, especially management authorities in evacuation centers were less successful.

The major activities of Miyagi Prefecture's public health programme were:

- Monitoring of the hygiene conditions in evacuation centers;
- Provision of supportive devices to assist the elderly and disabled in evacuation centers, temporary housing and in their own homes, and equipment to support organized physical exercise programmes, in collaboration with the Miyagi Physical Therapy Association and the Miyagi Association of Occupational Therapists;
- Surveys of health status, consultations, counseling and referral for those living in evacuation centers;



center by staff of Tohoku University



Hand sanitizer and purified water for gargle

- Surveys of health status, consultations, counseling and referral for those living in their own homes;
- Surveys of health status, consultations, counseling and referral for those living in temporary housing;
- Support to local government to plan and implement their own public health activities;
- Coordination of external public health teams.

### Infection control measures

The Miyagi Prefecture HWB worked with Tohoku University Graduate School of Medicine to design and publish leaflets and flyers on disease prevention and personal hygiene measures for residents of evacuation centers. These were provided to municipal health authorities on March 18 for distribution.

The HWB contracted with suppliers to ensure that all evacuation centers had sufficient supplies of face masks, alcohol-based hand sanitizers and dispensers, and surface disinfectants. Deliveries began on March 18.

Tohoku University Graduate School of Medicine supported the HWB to form an "evacuation center infectious disease risk mitigation team". This team developed a survey instrument that identified 19 potential risk factors for outbreaks in evacuation centers. The team used this instrument to survey evacuation centers throughout the prefecture and their findings were discussed with the management of the centers.



Notification and precaution in evacuation center

### Welfare centers in disasters

Japan Disaster Control Basic Law requires all municipalities to designate and prepare in advance two kinds of emergency center: ordinary evacuation centers for the temporary accommodation of the general population, and welfare centers for people with special needs, such as continuous nursing care or serious disability. The costs of caring for people in the designated welfare centers are fully covered by public funds. In Miyagi Prefecture, the responsibility for managing and coordinating welfare center issues is with the Aging Society Division (ASD) of the HWB, in collaboration with the Division of Welfare Services for Persons with Disabilities (DPD).

A national survey by the FDMA in 2010 found that only 14 of the 35 municipalities in Miyagi Prefecture had designated locations for the establishment of welfare centers in disasters. Although the rate of implementation of the law in Miyagi Prefecture was low, it was better than the national average. However, after the tsunami it was found that some of the designated buildings were unsuitable, and some had been damaged, and therefore could not be used.

Those municipalities that had not designated welfare centers at the time of the tsunami found it very difficult to manage survivors in need of constant medical care, as it took time to find suitable buildings, and then staff and equip them. It also caused financial difficulties, as new centers were not automatically eligible for public financial assistance under the existing disaster welfare laws, and it also took some time to become officially recognized as a welfare center for medical insurance purposes. In the first month after the tsunami, 152 welfare centers were operating in 24 municipalities of Miyagi Prefecture, providing care to over 2,300 residents. The total number of beneficiaries served is still being calculated as some municipalities have not reported their final data. By July, the number had fallen to 40 and there were still 12 open in September, but by November 10, all welfare centers in Miyagi Prefecture had closed. The majority of the residents were elderly. However, 10 centers had been established specifically for disabled people. Although pregnant women and women with infants were eligible for residence in welfare centers, very few of them reported providing this kind of support.

As the welfare centers were closed, the Prefecture encouraged municipalities to open advice and support centers in areas where people from welfare centers were moved to temporary housing, and to provide space for their community activities such as meetings, exercise classes and entertainment. The prefecture provides administrative and practical support to these centers, including staff training. By mid 2012, over 100 advice and support centers were providing services in 13 municipalities.

Soon after the tsunami, the ASD communicated with all municipalities to begin implementing welfare center arrangements, and assisting those municipalities that had damaged welfare centers, or had not yet designated any centers. The ASD informed local authorities that they were legally authorized to increase the occupancy of welfare centers up to 10% above their registered limit, but still this proved insufficient to meet the needs. To help ease the situation, the ASD arranged for 185 people to be transferred to neighbouring prefectures and for 338 people to get nursing care in their homes. However, once municipalities recovered their administrative functions, the ASD withdrew from supporting disaster victims individually, but continued its support through the local welfare centers. This included distribution of donated medical equipment, such as wheelchairs and mobility aids, coordination of external support teams and coordination with the private sector.

To help cope with the burden, private nursing homes were also allowed to increase capacity to 10% above their registered limit. Most of them experienced difficulties with obtaining fuel and providing heating, but the Prefecture was able to provide assistance. The prefecture also provided information to the public and private sectors on the regulations covering medical and nursing care insurance in the context of the disaster. Financial measures have been included in the Prefectural supplementary budget to support disaster recovery projects for private nursing homes and private home nursing care organizations.

### Psychological care and support

The Japan Disaster Control Basic Law requires all local governments to provide psychological care and support to people affected by disasters. By the March 17, the HWB was reporting that 33 teams from various prefectures, private organizations and medical institutions were providing psychological services in Ishinomaki City, Kesennuma City and Minami-Sanriku Town. Initially bi-weekly meetings were held to provide coordination and direction, but by July this was reduced to bi-monthly.

The Miyagi Mental Health and Welfare Center in Sendai is a tertiary level mental health institution. The Center was active in providing services and technical support to the affected areas. From March 14, staff began field visits to assess damages to mental health services. Mental health teams consisting of staff from private associations, other prefectures and NGOs were sent in response to requests from local government. Services provided by the Center included:

- Ensuring psychiatric patients and their families had access to clinical care, welfare services and medications;
- A telephone hotline to provide advice and counseling to the public;
- Technical support on mental health issues to PHCs and municipalities;
- Collection of information on mental health issues in the affected communities;
- Development of a mental health recovery plan for the Prefecture;
- Establishment of a network of mental health care providers to encourage mutual support and learning;
- Support to municipalities to re-establish psychiatric services;
- Training programmes for mental health staff;
- Support services for disaster personnel with mental health issues;
- Publication and distribution of mental health information material to the public.

Based on the experience of the tsunami, the Miyagi Mental Health and Welfare Center has formulated a series of recommendations to improve mental health services after disasters in Japan, and these have been included in the overall recommendations made in the report on health response to the disaster prepared by the Prefecture.

To ensure continued long term community care and support for residents of the tsunami affected areas, the Prefecture established the Miyagi Psychological Care Center in December 2011, with funding allocated from the national supplementary budget.

#### Pharmaceutical and medical supplies

The Prefecture has a standing arrangement with the Miyagi Union of Pharmaceutical Wholesalers to maintain a stock of 51 emergency pharmaceutical products in 30 locations across the prefecture. However, even though this event exceeded all expectations and many medical institutions were damaged, demand for the items on the emergency list was much less than expected. The principle demand was for treatment for chronic diseases, which were not included in the emergency list. In fact, only 13 of the 51 items on the emergency list were actually needed.

# Published commentary on response operations in Miyagi Prefecture

The private foundation, Disaster Reduction and Human Renovation Institution, Hyogo Earthquake Memorial 21st Century Research Institute has published a report containing many observations on health response in Miyagi Prefecture. Some of the key points include:

- Despite still being in draft form, the Disaster Public Health Manual was found to be useful by those municipalities that had copies, where public health staff reported that it provided them with effective guidance for their work. However, the severely affected areas of Ishinomaki lost their office copies of the manual in the tsunami and so did not have it to refer to;
- The guidance on the management of evacuation and welfare centers, design and construction of temporary housing and support for people remaining in their own homes needs to be reviewed and revised;
- Data collection forms and guidance on conducting health surveys after disasters needs to be reviewed and revised;

- A standardized national post disaster communicable disease surveillance and reporting system needs to be developed;
- Prevention of accidents and functional deterioration of residents of evacuation centers and temporary housing is an important public health need. Mechanisms to identify and deploy qualified staff during disasters need to be developed;
- Current guidance on deployment and coordination of external teams and specialized support e.g. for occupational therapy and mental health, needs to be reviewed and revised;
- Mutual support agreements between prefectures, and between municipalities in different prefectures, with trainings and briefings for staff, should be considered as a measure to make external teams more effective in disasters;
- The Disaster Public Health Manual needs to be completed and disseminated with training support as soon as possible.

### Ishinomaki Public Health Center

The Ishinomaki PHC is one of a network of seven centers operated by Miyagi Prefecture. It provides public health support to the populations and local governments of Ishinomaki City, Higashi-Matsushima City and Onagawa Town. In March 2012, the PHC published a report on its activities since March 2011.\*

The situation at the PHC was extremely serious after the tsunami. For the first four days, the staff was trapped by flooding of the ground floor, and they were unable to leave the upper floors of the building. Although not officially an evacuation center, over 300 people were given shelter in the PHC. They had no food and no heating, and were only able to get drinking water from what was collected in water tank in the damaged building. Over this time, the staff was only able to have half a cup of water per person per day and no food at all.

After the flooding went down, the staff was able to set up an office in an undamaged building. Over the next few months they had to change buildings four times. Many requests for assistance began arriving but the staff had difficulty to log and process them quickly due to lack of basic office materials. On March 18, the Center was able to begin dispatching staff to the affected areas, but progress was severely constrained by lack of fuel for vehicles, damaged roads and limited staff. Staff was also assigned to strengthen the health offices in Ishinomaki

City, Onagawa Town and Higashi-Matsushima City, and the remaining PHC staff was organized into teams, covering public health, nutrition and environmental health. The initial objectives of these teams were:

- To assess the overall public health situation;
- To assess the damage and needs of local health services;
- To provide support to local health offices (staff);
- To share information with local authorities on decisions made and actions taken by the Prefecture;
- To advise local authorities on appropriate outbreak prevention and control measures in evacuation centers.

In the early period the PHC attended daily meetings organized by the Ishinomaki City government. However, there was no clear chain of command and the PHC found that it was being given conflicting instructions by different government authorities.

Once the situation analysis was completed, the PHC developed a Disaster Public Health Plan. Under the plan, teams of PHNs were placed in all municipalities covered by the PHC, and they focused on the following areas:

- Sanitation and hygiene in evacuation centers;
- Nutrition in evacuation centers;
- Removal of waste and rubble;
- · Services for breast feeding women and their babies;
- Services for residents of welfare centers;
- Coordination with nursing homes and private sector health services;
- Communicable disease surveillance reports, submitted to NIID;
- Medical referrals for people in evacuation centers when they fall sick;
- Transfer of welfare center residents to new temporary housing;
- Dissemination of health information and health promotion messages through leaflets, flyers and radio announcements;
- Dissemination of information on health services and welfare support available to the affected communities.

This plan continued until the end of July 2011, after which it was agreed to withdraw the external teams from the municipality offices. Support to local government public health activities continued through twice weekly meetings with the municipal health and welfare offices. At this stage the priority activities were:

- Management support to Ishinomaki City and Higashi-Matsushima City health offices.
- Staff support to Onagawa health office twice a week.
- Provision of psychological and mental health services to the public and health staff;
- Support for local public health staff to attend meetings and trainings outside the Prefecture.

One of the biggest problems after the emergency situation had stabilized was insufficient numbers of clerical and administrative staff to process all the claims from the public for benefits and bureaucratic requirements of the government. Between April to September, the staffing of the Ishinomaki PHC was supplemented by teams from other prefectures including Oita, Ishikawa, Yamagata and Tokyo, which helped relieve this problem.

### Nursing care and rehabilitation

Ishinomaki City was one of the 21 municipalities in Miyagi Prefecture that had not yet designated disaster welfare centers as required by law. Soon after the disaster, the city government established two welfare centers at Yuugakukan and Monou. This took some time as the buildings had to be prepared, staffed and equipped. The centers were providing residential care to people needed full time nursing care, and also rehabilitation, occupational and physical therapy services. From May, surveys of temporary housing were undertaken to assess the needs of residents in terms of physical and occupation therapy support. Support for the rehabilitation, occupational and physical therapy services were provided by the Miyagi Prefecture Rehabilitation Support Center, which also served as a hub for the procurement and distribution of devices and aids.

#### Psychological care services

Initially psychological care services were provided by external teams, under the coordination of the Prefecture. In June 2011, Ishinomaki City took over the local coordination role and began hosting regular coordination meetings with all service providers.

# Current status of recovery planning in Japan

### Overview

National, prefectural and local government recovery and reconstruction plans have been completed but for many reasons, implementation has been slow and patchy. At a fundamental level, there are no national standards and guidelines to direct recovery planning, and existing government disaster training programmes do not teach knowledge and skills in recovery planning. For the specific situation of Tohoku, there is a lack of clarity about when/if people can return and to where, which services/industries will be recovered (and which will not) and what is the strategy for disposing of the mountains of debris and waste. There are also unresolved issues over land ownership, property boundaries and land prices, as well as deadlocks over responsibilities for debris removal and waste disposal.

All these issues impact on people's decision to return or not. But unless they know how many people will return, it is difficult for authorities to plan rebuilding and recovery of services such as schools and hospitals.

There are major systemic issues in developing and implementing long term recovery plans. The population in the area is ageing rapidly, with 40% of the population aged 65 or older, and 7% aged 85 or older. The demographic situation is exacerbated by the fact that after the tsunami, many young people and families left the area for school, work and other needs, and it is not certain how many will return. There are also regional variations; a larger proportion of people Ogatsu expressed a desire to leave the area than in Oshika.

A major challenge is the difficulty to recruit and retain public health staff. Ishinomaki City is the second largest city in Miyagi Prefecture, but there is no public health doctors employed by the city government (only nurses). Tohoku University is assisting Ishinomaki City with the recovery plan; recovery plans for health should be integrated as part of the overall recovery plan.

# Government of Japan recovery and reconstruction plans

The latest information on government recovery and reconstruction planning can be found at http://www.reconstruction.go.jp/english/. This site has links to the recovery planning sites of all Ministries and local governments.

At the time of writing this report, published plans consist only of overall vision statements and a broad set of goals. Detailed implementation plans with activities, budgets, timeframes etc. are not publicly available.

In April 2011, the Cabinet authorized the establishment of an advisory panel of prominent figures called the Great East Japan Earthquake Reconstruction Design Council (RDC). Its purpose is to provide technical and strategic advice to the Government on the planning of the reconstruction. The RDC submitted its first set of recommendations to the Prime Minister on June 25, 2011.

On June 24, 2011, the Cabinet authorized the establishment of a Reconstruction Headquarters in Response to the Great East Japan Earthquake (RH), headed by the Prime Minister, and allocated a supplementary budget grant for its function. The purpose of the RH is to lead the reconstruction process by coordinating the policies and measures of Government Ministries and agencies, as well as supporting reconstruction plans of the local municipalities.

On July 29, 2011, the RH issued a document called Basic Guidelines for Reconstruction, a blueprint for Government actions in the reconstruction process. The Guidelines are based on seven principles\* that were formulated by members in the Reconstruction Design Council in May 2011, and were prepared in consultation with the RDC as well as the affected prefectures and municipalities.

Miyagi Prefecture published its recovery and reconstruction planning vision in October 2011 and Sendai City published its planning vision in February 2012. They have a strong component on rebuilding the hospital system, but very little is planned for public health services.

\*Seven Principles for the Reconstruction Framework, Reconstruction Design Council, May 2011 http://www.cas.go.jp/jp/fukkou/english/pdf/7principles.pdf



The experience of PHNs in Ishinomaki City Ishinomaki City government Oshika branch office Ogatsu branch office



# Experiences in Ishinomaki City

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Figure 5.1. Map of Ishonomaki City

# The experience of PHNs in Ishinomaki City

Ishinomaki City, in the north east of Miyagi Prefecture, was one of the areas most affected by the tsunami. The principle livelihoods of the people are fishing and manufacturing that were particularly devastated by the tsunami. Several waves, with a maximum height of 40 meters and an average height of 10 meters, hit the entire coastal area directly. The waves travelled inland along riverbeds and waterways, damaging and destroying buildings and infrastructure for a distance of up to 10 kilometers inland. The death toll in inland areas was unusually high as people living so far from the coast did not expect to experience a tsunami, and did not evacuate to high ground even though most had heard the warnings. About 46% of the City of Ishinomaki was inundated by the tsunami. In Kadonowaki ward of the city, structures that survived the tsunami were later destroyed by fires, caused by ruptured oil storage tanks. The elementary school in Okawa was completely destroyed, killing 70 of 108 students and nine of 13 staff. The earthquake shifted Ishinomaki City southeast and downward by as much as 1.2m in some areas, causing parts of the municipality to become flooded at each high tide.



Tsunami affected community in Ogatsu, Ishinomaki City ©Center for Community Health, Tohoku University Graduate School of Medicine

Destroyed monument by tsunami in Onagawa ©Center for Community Health, Tohoku University Graduate School of Medicine




Tsunami affected community in Okawa, Ishinomaki City ©Center for Community Health, Tohoku University Graduate School of Medicine

The ferry terminal at Ayukawa, Ishinomaki City ©Center for Community Health, Tohoku University Graduate School of Medicine

In April 2005, a reorganization of local government boundaries merged six towns, Kahoku, Kanan, Kitakami, Monou, Ogatsu and Oshika into Ishinomaki City. This added 60,000 people to its population, and quadrupled its land area. Although the merger occurred 6 years before the tsunami, integration of services and functions has been slow, so after the tsunami, the local government struggled to provide leadership and direction beyond its former boundaries.

Ogatsu and Oshika are coastal communities in the east of Ishinomaki district. They are rugged, mountainous

### Ishinomaki City government

The impact of the disaster on Ishinomaki City was particularly severe: 3,428 (2.1%) of the 160,826 inhabitants were killed (June 2012). The Ishinomaki City Hospital (200 beds) was so badly damaged and it had to be demolished. It will not be replaced and most of its functions will be delegated to other health facilities, included the Ishinomaki Red Cross Hospital, which became the only provider of curative care services after the tsunami. The Kodama Hospital was flooded but was able to resume services after major cleaning.

By December 2011, 20% of the original population moved outside of the city and among remaining 80%, many of them were staying in temporary housing. Issues in priority for the municipality in planning recovery are the high numbers of peninsulas, with limited road connections. Most of the population lives in small fishing communities. The tsunami devastated all of the shoreline, but due to the steep hilly terrain, damage generally did not extend far inland, except along riverbeds. Both areas were completely isolated for many days. During that time, local officials had to respond to the disaster without any possibility of support from the municipality or the prefecture, and without knowing what was happening in the rest of Tohoku.

elderly in the population, the social impact of the disaster\*, a high number of people with dementia, large numbers of people with depression and providing services to people in long term temporary housing.



Ishinomaki City Hospital\*\*

\*There are anecdotal reports of an increased incidence of domestic violence, alcoholism and gambling since the tsunami, but no data is publicly available \*\*http://media.cabrain.net/www.cabrain.net/premium/12705.jpg



Figure 5.2. Map of Oshika Peninsula, Ishinomaki City and location of Oshika branch office.

### Oshika branch office\*

Oshika is located on a coastal peninsula to the east of Ishinomaki main city. It has an area of 78.92 square km and is divided into 22 administrative districts. The population in 2010 was 4,321 with 1,831 households. Oshika faced the concern of aging society with fewer children (40.8%:over 65 years old, 7.2%:under 18 years old). Most of the population lives primarily via fishing.

Due to the tsunami, three administrative districts in Oshika



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were fully destroyed. One clinic named Yoriiso had been flowed out, however, the Oshika hospital (80 beds, two full time doctors) did not suffer any damages by the tsunami. One elementary school out of four and two nursery schools was completely destroyed. Total death toll from the tsunami was 88, with 35 missing, and 56.2% houses were damaged. On the day of the tsunami, 2,932 people fled temporarily to 22 evacuation centers.



Oshika branch office of Ishinomaki City (white arrow head) ©Center for Community Health, Tohoku University Graduate School of Medicine

\*Information in this section is extracted from a report (Japanese only) prepared by Ms Mari Sato of the Department of Women's Health, Tohoku University Graduate School of Medicine.

## First 3 days

At the Oshika branch office of Ishinomaki City, the health and welfare section is in a separate building from the rest of the administration. None of the administrative buildings were damaged by the tsunami, but there was no electricity, water or telephones, and initially, Staff of health and welfare section had no means to collect information from the rest of Oshika.

During the aftermath of earthquake, many people fled to the health and welfare section of Oshika branch office named Seiyu-kan. The administrative officers and a PHN stayed outside of the Seiyu-kan. with them, and some of them saw some ships that were engulfed by the tsunami from their place. A little later, the staff prepared blankets and stoves, and helped people take rest inside the Seivu-kan. The PHN cared for the people who were mental unstable and elderly. The staff gathered in the middle of the entrance hall and spent sleepless night shivering with cold. On day 1, over 400 homeless people who lost their homes found refuge in the Seivu-kan, so the staff decided to convert the building into an evacuation center. The head of health and welfare section of Oshika branch office who was on duty travel walked back to the office in the morning of the following day. Immediately after returning, he instructed the staff to prepare a work plan and role and responsibility in the plan were given to each person. He also attended regular meetings of the Oshika branch office everyday.

On March 11th, there were two full-time doctors and one part-time doctor in the Ogatsu hospital. Fortunately, as the hospital had less damaged, the hospital staff were able to provide services to the injured and sick under the formidable condition. On Ajishima Island, three evacuation centers were set up and the Amisho clinic was the one that provided medical treatment to all the residents in the island.

The first JSDF team arrived in Oshika on day 3. They brought supplies of small amount of water and ready cooked meals. By day 3, some of the roads had been cleared, so Oshika health and welfare section staffs travelled to Ishinomaki City to report their situation and collect supplies. There were three PHNs assigned to Oshika health and welfare section, but two of them were on long leave\*\*. Only one PHN worked regularly for 6 months before the tsunami occurred. On the day of the tsunami, the PHN in Oshika took a day off, and only the acting PHN from Ishinomaki City Hall was working. That PHN worked cooperatively to organize the evacuation center in the health and welfare section and started preparing the meal with nutritionist from day 1. She again took elderly and the mentally unstable persons under her care. On day 2, she arranged to take the severely injured and severe sick patients to the hospital outside Oshika area by JSDF helicopter. Many of the residents of the evacuation center had very demanding medical conditions such as dementia and restricted mobility, so in the early days, her time was fully occupied providing basic nursing care, cleaning bathrooms and preparing meals.

On day 2, nursing staff came straight to help her to the evacuation center, and on day 3, Oshika PHN started back at the office despite fully damaged house. During this time, the PHN and other staff could not confirm the safety of their family members.

At this time, the main issues that concerned PHNs were:

- 1. Lack of information what was happening outside Oshika;
- 2. Lack of information about her own family;
- 3. Lack of time to find out what was happening in the community as managing the evacuation center took all her time;
- 4. Unclear chain of command and decision-making processes due to difficulties in communicating with Ishinomaki City Hall;
- 5. Lack of running water, which made keeping bathrooms clean very difficult;
- 6. May the elderly were anxious and disturbed, and providing the care they heeded took up a lot of time.

\*\*One was on long term maternity leave and the other on regular leave.

## From days 4 to 10

The PHNs tried to visit other evacuation centers to make assessments, but running the Seiyu-kan evacuation center and responding to the demand from other evacuation centers took up 80% of their time, as most of the residents were elderly with health problems, and they needed assistance with meals and personal hygiene. Eventually they managed to reach all the evacuation centers in the community, as well as make contact residents who stayed at their houses with help from relevant agencies. They prepared reports on the health needs of the people, and provided consultations and referrals for those who needed medical treatment.

The PHNs were sometimes under stress receiving several complaints from people. However, the PHNs found that the community people stood up for themselves with an inventive approach, and PHNs also felt encouraged and brightened up with the encouragement "Fear out!" from community.

Although a lot of time was spent meeting with visitors and officials and answering their questions, not all medical teams that visited the area made contact with the health and welfare section, so the PHN were not always aware of services being provided in the community. Time was also needed to listen and respond to problems and complaints from residents of the evacuation centers. It was over a week before the PHNs got any information about their families and two weeks later when they were able to return to their homes for the first time.

The JSDF delivered supplies to Ajishima Island on day 4, and from day 8, they started delivering regular supplies to the Oshika administration office. From day 9, external medical teams began working full time in evacuation centers, although PHNs did not receive any information of it. At this stage, there was no medical supply system organized by the municipality, so Oshika hospital was designated as the focal point for the area, and each evacuation center contacted the Hospital whenever they needed supplies.

Although the PHNs collected public health data whenever they could, the nurses did not find the information very useful, as they did not have the resources to respond to most of the needs. There was no organized system to share their information with external medical teams, which did have resources.

At this time, the main issues that concerned PHNs were:

- 1. Even though PHNs implemented the actual condition survey, it was difficult to be used, as with relaying the information to the medical team;
- 2. Elderly people and people with mental health issues needed a lot of assistance and reassurance, which took a lot of time and attention of the staff;
- 3. Lack of information of the medical teams and other volunteers;
- 4. As PHNs were caught up in managing the evacuation center, they could not precede other public health activities;
- 5. Difficulty of sharing information with Ishinomaki City Hall and Oshika branch office.



Evacuation center (Seishin-en) in Oshika, ishinomaki City

## From days 11 to 30

Many evacuation centers operated by the community leaders, but the staff in the health and welfare section needed to manage it at Seiyu-kan. A system was set up where residents elected leaders to draw up community rules, to deliver their requests and complaints to officials, and to disseminate information from officials. The community meetings were held each morning and/or evening. At Seiyu-kan, these self-governing arrangements could not be implemented effectively as there were so many highly dependent elderly and sick, so the PHNs continued to have a major role in running the center.

Throughout March the main activity of PHNs was running the Seiyu-kan. During this period, there was no organized system to receive visitors and provide information, so the nurses spend a lot of time responding to phone calls and meeting visitors who wanted information.

Institutions providing support to Oshika during this time included the Department of Ophthalmology of the Tohoku University Graduate School of Medicine. Tohoku Welfare University also provided support for antenatal care, and mental health teams organized by Ishinomaki City Hall started visiting from March 29.

Although it took at least 10 days to establish regular communication with the Ishinomaki PHC, there was good coordination with the Center once communications were established. Over the following months, the PHNs of Ishinomaki PHC visited Oshika regularly to share information with the local staff and conduct joint visits to evacuation centers and communities.

On April 4, 2011, a household level survey was undertaken with support PHNs from other prefectures arranged by Ishinomaki City Hall, to assess the medical problems of those not living in evacuation centers, and to identify people in need of home nursing care. This survey was repeated every two weeks over the next several months and the results reported to the PHC. The first survey covered 109 people, of whom 41% were over 65 and 19%, were under 18 years.\* The survey assessed physical and mental health information and assessed the situation of people who were in need of nursing care. The most common medical condition found in adults was hypertension (the survey report did not draw any comparison with the baseline rate) and in children, the major problems reported by care givers were psychological issues such as persistent feelings of unease and anxiety. \*\*

At this time, the main issues that concerned PHNs were:

- 1. Lack of basic information about the external medical team (where they worked, when they came in, and environment and condition of the people);
- 2. It challenges and difficulties to take over the evacuation center's work to the residences. PHNs were still needed to manage the evacuation center;
- 3. Many volunteers and visitors who came to help also took up a lot of time in briefing and support.



Staff of Tohoku University interviewed PHN(right side) in evacuation center (Seishin-en).

\*The pre-tsunami baseline rates for Oshika are 40.8% over 65 and 7.2% under 15 (see Chapter 2. Table 2.1). Even with the different age group parameters (<15 vs. <18), it seems that the number of young people identified in the survey is higher than the baseline rate for the general population, although the survey provides no explanation of why this might be so;

\*\*The report is available in Japanese from Ishinomaki PHC;

## From 2 months to 6 months

The elementary school and junior high school were re-opened, and the education department resumed health screening services for the children. In the evacuation centers, the residents had very little to do, and they complained more frequently of depression and anxiety. The national and prefectural governments began organizing longer term services for the survivors, including providing cash for daily living expenses, support to re-establish businesses and livelihoods and assisting people to move from evacuation centers to temporary housing. On July 20, the first discussion of reconstruction plan was implemented.

Over this period, the number of evacuation centers was reduced to four by September, with 34 residents, and all evacuation centers were closed by October 7. About 400 families were moved to temporary housing in 18 locations. However, in July, there was heavy rain with some flooding, and some people had to be moved to evacuation centers again for a short while.

Most public external support ended by June, therefore NGO and universities continued to provide support. For example, ophthalmic services were provided twice a week by Tohoku University Graduate School of Medicine, and a bus service was provided to take people for their medical consultations and bring them home again. Medical home visit that were conducted by a doctor and nurses by one of the NGO was handed over to another NGO to be continued by nurses only. The second survey that conducted at the temporary houses covered 756 residents. 34.7% were over 65 years, 20 had an identification booklet as physically disabled, and there were 11 who had the certification of need of long term care. Among the people who needed the assistance, the rate of those who living alone was 10.1% and only 0.3% had mental issues.

From May 7, PHNs started home visit, for elderly, mental or intractable disease patients. They also visited newborn babies. The PHNs had been having regular discussions on resuming their regular public health activities with Ishinomaki City Hall and PHNs in Ishinomaki PHC. The public health plan covers\* three main areas: 1) management of the evacuation centers; 2) routine public health activities; and 3) home nursing care.

Some of the key issues identified in the recovery plan include:

- Mother and childcare: the day care center was damaged so there is nowhere to provide routine childcare services. People were referred to Ishinomaki City Hall but they preferred the service to be provided in their own community. In the recovery plan, priority will be given to establish a new day care center;
- Care for the elderly: there is no building available to provide outpatient nursing care and health education classes. Once people moved into temporary housing, a programme of home care will be organized to provide services until a building can be constructed;
- 3. Cancer screening: there is no properly equipped facility available to conduct screening and it is difficult to reach Ajishima island to provide screening services. Seiyu-kan will be used until a suitable place can be found for screening services.

The PHNs prepared the regular activities and started baby medical check-up in July, and conducted adult medical check-up in August, which was conducted with Ishinomaki City Hall.



Figure 5.3. Map of Ogatsu and location of Ogatsu branch office (pre and post tsunami) and Ishinomaki City Ogatsu Hospital

### Ogatsu branch office\*\*

Ogatsu is located on a coastal peninsula to the east of Ishinomaki City. It is a rugged area with few roads. Most of its small villages are built along the shores of the bays and inlets. It has an area of 46.12 square km and is divided into 20 administrative districts. The population in 2010 was 3,994 with 1,637 households.\*\*\* There is a lot of fishing and aqua farming in Ogatsu, and the primary industry was 26.7% and the secondary was 20.8%.

After the tsunami, about 300 bodies were recovered from the area and it was initially assumed that there were many deaths or missings in Ogatsu. However it was later found that many of the bodies were not local residents. The final death toll was 161, with 77 missing, and 1,467 out of its 1,637 houses damaged. In total, 22 evacuation centers were established, and the maximum number of people living the evacuation centers was 2,116 persons (recorded on March 15). By reason of inadequate places inside Ogatsu, around half of residents needed to move to nearby Kahoku district and they were divided into 19 centers in Ogatsu and three centers in Kahoku. By the end of 2011 all evacuation centers had all been accommodated in temporary housing.

Ogatsu was formally an independent town, but in 2005 it was merged with Ishinomaki City. This created some problems after the tsunami as they were completely isolated from the



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municipality for some time, but still they were dependent on them for decision-making and resources. At the time of the tsunami, there were 10 health and welfare staff assigned to Ogatsu: Four PHNs (three were full time and one was part time), a nutritionist and five administrators. However on the day of the tsunami, three PHNs and two administrative staff were on duty.

Ogatsu had a 40 beds government hospital with two doctors but it was completely destroyed and 24 staff including two doctors and 40 patients died. The two private clinics, one medical and one dental, were swept away by the tsunami.

\*\*Information in this section is extracted from a report (Japanese only) prepared by Ms Mari Sato of the Department of Women's Health,

Tohoku University Graduate School of Medicine

## First 3 days



Tsunami affected community in Ogatsu, Ishonomaki

Clean Center (incineration facility), and were then able to start a systematic collection of information on the situation and the condition of the people. There was no communication and the roads were blocked, and staff had to work without knowing what had happened to their families.

The Ogatsu hospital had been completely destroyed and all of its medicines and equipment lost. Consequently there were no medical services available at all to the affected population. The staff had to provide assistance with feeding and toileting for disabled elderly who remained.

On day 1, JSDF visited the Ogatsu branch office, collected information and returned to Ishinomkai City. On day 2 JSDF arrived in the area by helicopter and took the severely injured and sick. The staff went to Ishinomaki City Hall to arrange cars and brought a small amount of supplies. On the same day, the Kyoto Red Cross medical team visited the branch office. However they just

The Ogatsu branch office of the Ishinomaki City government was destroyed by the tsunami. A lot of people evacuated to the branch office after hearing the tsunami alarm. The staff guided them to rooftop terrace. The male staff who protected the female and elderly saw houses and people being swept up by the tsunami. The staff sheltered in the damaged building for three nights, without heating and light. Throughout that time, it was snowing and very cold. After the tsunamis were subsided, the staff prepared an evacuation shelter by collecting plastic sheets and blankets. And they assured the safety of the people and took care of the severe cases. The staff slept overnight covering their bodies with the plastic garbage bag. On the night of the third day they moved the branch office to the



Completely destroyed Ogatsu branch office



JSDF's depot at Elementary School in Ogatsu, Ishinomaki City

collected medical information from PHNs and provided only a small amount of medicine.

The principle activities of PHNs carried out over this time were "activities to survive" finding secure places for people to seek shelter, helping survivors to find food and water, and to keep warm. PHNs collected food and the cooking equipment from rubble, and started preparing meal from Day 1. As there were not enough dining tools, the staff and community people needed to use their hands for eating rice porridge.

The most serious patients were suffering from hypothermia, fractures and unstable chronic diseases. PHNs provided care for them and they were brought to the hospital by helicopter. Several people had strong demand of medicines for chronic diseases, anxiety and sleeplessness. However, PHNs had difficulty to handle with it as they had lost all the medications even though the sphygmomanometers. PHNs began compiling lists of the supplies and equipment they needed and sent them via their staff to Ishinomaki City Hall. The major issues that concerned PHNs in this time were:

- Lack of information on what was happening outside Ogatsu, and uncertainty on how long they had to manage by themselves before help can arrive;
- 2. Inability to communicate with Ishinomaki City Hall, which made decision making and coordination with other sectors difficult;
- Inability to provide care to the sick and injured as all the medical infrastructure had been destroyed and medical supplies lost;
- 4. Lack of transport and fuel, and damaged roads, meaning that they could not reach many areas to assess the population;
- 5. Elderly people and people with mental health issues needed a lot of assistance and reassurance, which took a lot of staff time and attention;
- Meeting the needs of pregnant women was a particular concern;
- 7. Decision-making took a long time as they had no disaster plan and no public health guidelines;
- 8. The staff were also victims, living and working in damaged buildings without electricity or water, and unable to contact their families. Some of the staff also lost family members.



Tentative kitchen in Ogatsu branch office

## From days 4 to 10

Ogatsu branch office established an EOC after moving to the Clean Center. As one mini bus with a generator was supplied, computer and printer could be used. PHNs began compiling and making a list of survivors, tried to help people find missing family members and submitted a list of medicines and other supplies requested by evacuation centers to Ishinomaki City Hall. A facility for caring for disabled people was also heavily damaged, so the residents were moved to their family and relatives located away from Ogatsu. Everyone worked 24 hours a day, and it was only after the 10 days that a rotation was established, which allowed people a day off to return to their homes.

From day 4 to day 7, the nurses visited each evacuation center and those still at home. On each visit, they collected data, provided consultations to people who were sick, referred serious cases for evacuation, cleaned and dressed injuries assisted with resupplies of prescription medicines and assisted families with arrangements for the dead. Many people complained of anxiety and inability to sleep. In addition, because of lack of access to psychiatric drugs, the mental state of some chronic patients became unstable and epileptic patients reported increased frequency of seizures. The first external medical team did not arrive until day 8, although some medical supplies started to be received from day 4. On day 9, the PHNs received the first call from Ishinomaki City Hall and they were asked about the damage and nurses' conditions, medical team activities, and the evacuation centers' situation. From day 9, the nurses started regular liaison meetings with external medical teams. In the meetings, problematic cases identified in the daily survey visits were discussed and their care allocated to one of the medical teams.

Two key areas of concern for PHNs at this time were:

- At first, the nurses were overwhelmed by the huge needs, the lack of resources to meet them and the difficulty of making decisions without sufficient information, but this was relieved after day 8 when external medical teams started to arrive. However, these teams only provided definitive treatment, and left assessment and care of sick or cases of disease and other problems to the PHNs.
- 2. The priority was given to severe cases and it was not possible to provide public health services to other groups who were not sick, but needed monitoring, such as pregnant women, young children, and the elderly and disabled being cared for at home by their families.

Evacuation center in Ogatsu, Ishinomaki City



PHN (third from left) in Ogatsu gave briefing to dispatched staff



## From days 11 to 30

During this period, some of the elderly who needed constant care began to be moved from Ogatsu to nursing homes in unaffected areas of Miyagi Prefecture and also to other prefectures. In each evacuation center, committees of residents were formed to oversee the day-to-day running of the center. Some administrative responsibilities were handed over to the residents and tasks were assigned to volunteers.

On day 15 a temporary prefabricated building was set up as an office for staff. It had a photocopy machine and two satellite telephones. The nurses took over the role of coordinating the work of the external medical teams and began hosting daily coordination meetings. Tohoku University sent out a dental team for home visit twice a week. There were many artificial dentition problems as most of residents were elderly. One NGO sent doctors who could stay at the biggest evacuation center in Ogatsu.

The part-time PHN resigned in early April, reducing the PHNs to three. They were able to take one day leave per week, and after day 28, those staff whose houses were undamaged were able to move out of the temporary accommodation in the Clean Center and return to live at home.

On day 11, a survey form was developed, and by using this, the nurses conducted a full survey of homes and evacuation centers, which took three days. After day 14, there were between three and eight medical teams working in the area, and each was assigned a specific area to work. Meetings were held every day with teams and the PHNs were to resolve problems and plan services. For the dying people at home, some PHNs provided death care with the medical team.

After the disaster, there were many people who complained of anxiety and, insomnia, and who were in difficult mental state. However, the PHNs did not have appropriate medication and did not have enough time to listen to them. On day 11, the PHN requested the dispatch of mental health team to Ishinomaki City Hall, and the first mental health



PHN in Ogatsu attempted a call for rescue by a satellite phone

team was sent to Ogatsu on day 14 and they continued working on a regular basis. The PHNs mentioned that they most were pleased with the support as they were relieved from these concerns.

By the end of March, there was a lot of external support for curative care and the evacuation centers were running smoothly, so the nurses began planning to resume some of their normal responsibilities.

#### The main issues that concerned PHNs at this time were:

- 1. Many medical teams visited one by one and took a lot of time for briefing;
- 2. The many volunteers who came to help also took up a lot of time in briefing and support;
- 3. The heaviest health burden was people with psychological problems, as each one needed a lot of time to talk, but it was difficult to give any practical help to them;
- 4. Given all these burdens, they had no time to perform their normal public health duties.

## From 2 months to 6 months

The search for the dead and missing formally ended on day 51, and it was only then that the JSDF teams started removing rubble. During this period, the system of certifying victims for benefits and compensation purposes was finalized and the administration began issuing certificates. This helped to reduce the number of people reporting psychological problems.

After April, schools resumed operation. Due to the damage to the schools, two elementary and one junior

high school moved to Kahoku district, and the regular bus for sending the students to high schools started to operate. The Ogatsu bus system also resumed its regular services on day 36. In early May, the branch office moved to the special elderly nursing home named Yushinen.

A household survey was carried out on April 12. The nurses interviewed 942 people who were living in their own homes, of which 54% were found to be over 60



Temporary house in Ogatsu, Ishinomaki City ©Center for Community Health, Tohoku University Graduate School of Medicine

and 10% under 18.\* The main health problem found in adults was hypertension, which was consistent with data from the routine health checks before the tsunami. Only 1.9% of people living at home reported sleeplessness and anxiety as significant problems. The survey found no significant health problems in children.\*\*

A second household survey was carried out from July to August. PHNs interviewed 416 people who were living in the temporary houses, of which 36.4% were found to be over 65.\*\*\* The people who had identification booklet for physically disabled were eight, and people who had the certification of needed long term care were four. The main health problem was hypertension, diabetes, heart disease, and depress and anxiety. 27% lived alone.

After day 60, temporary housing became available and as people moved out, evacuation centers began to close. People were encouraged to move back to their own houses if possible. Eight locations in the district were allocated for the construction of temporary houses. For those remaining in evacuation centers, PHNs planned and implemented consultations on nutrition and health.

On May 16 a medical aid station was established in Yushinen. This became the center for medical care, and for organizing the work of medical teams and outreach work. In July a nutritionist returned to the office and resumed her routine activities, and the staff, though still living in the office and on duty 24 hours a day, were allowed two days off a week. From August, on call shift were introduced, and the staff moved back to living at home.

During this period, PHNs had to go to Ishinomaki City Hall or other branch offices due to lost records and inability to access to the intranet. When preparing for resuming routine activities, the condition that they could not get necessary information in their office added further burden to the work of PHNs in addition to securing new equipment and necessary human resources.

<sup>\*</sup>The baseline rate is 41.8% and 7.4% under 15, see Chapter 2. Table 2.2.

<sup>\*\*</sup>These survey reports are not publicly available;

<sup>\*\*\*</sup>The baseline rate is 41.8% and 7.4% under 15, see Chapter 2. Table 2.2.



Key determinants of early morbidity and mortality Key determinants of later morbidity and mortality Public health system issues Recovery planning issues General issues



## Discussions and observations

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### Discussions and observations

Given that there is currently no national guidance on recovery planning, and no national standards that can be used in monitoring and evaluating recovery, this report does not attempt to evaluate the quality of recovery after the Great East Japan Earthquake and does not formulate any specific recommendations. However, from the information that is presented in this report, many observations can be made and conclusions may be drawn.

### Key determinants of early morbidity and mortality

- The disaster occurred in mid-afternoon in early spring, the weather was very cold and snowing. Nightfall occurred about an hour after the event.
- An unknown number of people spent the night trapped in debris or in freezing water, many with injuries that would have limited their ability to help themselves. Survivors reported hearing cries for help coming from the sea, but these diminished during the night as they succumbed to hypothermia and/or their injuries and eventually, drowned. Even if lightly injured victims could swim, they would have difficulty knowing where the shore was in the complete darkness, as visibility was poor due to falling snow and all the lights and sounds of towns that normally indicate a shoreline were missing.
- The tsunami came in several waves. Many people who had heard the warning returned to their homes after the first wave. The second wave was much bigger than the first wave.
- The tsunami travelled far inland so those who heard warning did not respond as they believed they were too far from the coast.
- The disaster area covered a very large area, with a mix of densely populated urban areas, and sparsely populated rural areas with very limited access even in normal times.
- There was a complete loss of access to communications,

electricity, water, food and fuel, not only in the tsunami affected areas, but across eastern Japan. Search and rescue and medical services had a very severe challenge to even reach most affected areas, let only provide services.

The breakdown in commodity delivery systems, especially for food and water, caused severe shortages across the whole region. The loss of electricity restricted abilities to store consumable commodities safely.

### Key determinants of later morbidity and mortality

- The resilience and courage of Japanese people and society in adversity is well recognized and is a strong asset for disaster management in Japan. The selfless dedication of local government staff, and the level of mutual support found in affected communities contributed greatly to the low rates of morbidity and mortality in the post disaster period despite the terrible conditions that people had to endure in the early days.
- Local government plans for search and rescue, evacuation centers were unable to be implemented effectively due to loss of leadership. Many local government decision makers were killed, isolated or incapacitated.
- Many designated evacuation centers such as schools were destroyed or inaccessible, and the number of people needing emergency shelter was far beyond what was

planned for.

- It was very cold and there was no electricity, so even people who did find evacuation center had difficulties keeping warm.
- In the most severely affected areas, much of the health infrastructure was destroyed or damaged, and health staff were killed, injured, isolated and displaced. In these areas, first aid and primary care for the injured could not be provided.
- Ambulances and medical transport could not function due to the loss of vehicles and fuel, together with killed and injured staff and damaged road systems.
- Much of the affected population was elderly (40% of the population of the region was over 65 years old), and many were living in small coastal communities with limited road access. They could not be reached because of the damage to the roads and landslides.
- Most of the elderly suffered from chronic diseases and were dependent on medication. The current emergency medical supply system for disasters is designed to meet the needs of hospitals and acute injuries.
- The Disaster Management Basic Law requires municipalities to plan for evacuation centers to be open for a few days only, and it assumes that electricity and water will be available, and that local staff can work normally. Planned food stocks and other resources were not sufficient for the much longer periods in evacuation centers experienced in the 2011 disaster.
- The nutritional content of relief foods was initially poor, being high in carbohydrates, sodium and calories, and low in protein/fiber/vitamins and minerals.

# Public health system issues

- Local level public health staff lack training in disaster management and they were uncertain of their responsibilities. Many felt lost and overwhelmed. There were many things to do but a lack of direction and leadership to guide them. Decision-making took a long time so they adopted an ad hoc/reactive approach to day to day problems, rather than adopt a more strategic approach.
- Much of the existing health sector disaster management system is based on the experience of the Hanshin-Awaji Earthquake. However the Great East Japan Earthquake was quite different and the current systems, which are designed primarily to transfer severely injured people to hospital, did not work as expected, since there were few injuries in the 2011 disaster and most were minor.
- Although strong on acute injury care and support for hospitals, the health sector disaster management system is weak on public health issues. There is no mechanism to undertake standardized rapid assessments of the public health situation after a disaster, lack of clear descriptions of the roles of public health staff in disasters, lack of Standing Operating Procedures (SOP) for public health agencies, no national public health reporting system for disasters and no oversight of the public health components of local government disaster plans. Some training in disaster management is provided for public health staff, but it is not standardized and it is not institutionalized.
- There is no standardized system for reporting causes of death and reporting the epidemiology of injury in disasters. This makes comparison between events difficult, and weakens the evidence base for each event. Accurate epidemiological information on causes and circumstances of injury and death in disasters, by age and sex, is important. It informs the design and construction of buildings, helps to make training of rescue teams and medical response teams more effective, helps to improve

supply and equipment lists so that the most appropriate items are provided to rescue teams and medical response teams according to the type of event. It also informs the design and content of public information and public education programmes.

- The public health system in Japan is complex and does not have a single line of authority or a unified command system in disasters. There is not always a clear distinction of the specific roles and responsibilities of the MHLW, Prefectures, PHCs, municipalities, the private sector, international and local NGO, volunteers, the Japan Self Defence Force medical teams and academic sector in disaster situations.
- The sentinel surveillance system normally used to monitor infectious diseases was severely disrupted both physically due to loss of staff and infrastructure, and operationally, due to frequent relocation of people in evacuation center to another site, then temporary housing and then back to their homes again. There are some fixed sites at clinics, but most data is collected by visits by PHNs to evacuation centers and temporary housing on a periodic basis.
- At municipality level, the prefectural PHC, the city government departments, NGOs and the private sector all operated independently of each other especially in the early stage. Collaboration and coordination is expected but there are no formal mechanisms to ensure it happens.
- Although evacuation centers are the responsibility of municipal governments, the role of the PHC in managing them is not clear. This resulted in delays in addressing issues such as sanitation and hygiene, as information was collected and submitted but not acted on.
- There is no formal system to control and coordinate health sector volunteers and voluntary agencies in disasters, so it was impossible for managers to take a strategic approach to use volunteers more effectively. Local managers, while appreciative of the support given by volunteers, commented that the volunteers also placed an additional burden on them as they needed a lot of briefing, supervision and support, and they only stayed a short time.

- PHNs reported feeling very isolated during the post tsunami period. They were not sure what was expected of them, they did not know what the city government and the Prefecture were planning for the affected populations and they did not know what information they were supposed to be collecting. Most of them became fully engaged in providing medical care to residents of evacuation centers, both because there was no one else to do it and also because they were not given any instructions on their public health responsibilities.
- The public health system is dependent on the internet for reporting, but it can only be accessed through government issued computers and when electricity is available. A gap in disaster planning is the lack of an alternate reporting system, and lack of backup systems for pyblic health records at local level.

# Recovery planning issues

#### General issues

- Community level recovery planning is a local responsibility but local governments have low capabilities to plan, and insufficient resources and limited authority to implement their plans. Technical guidance on recovery planning is not available and training programmes on recovery planning are not provided for local government staff (in contrast to the training provided in preparedness and relief). No national processes are in place to monitor and evaluate the progress and effectiveness of local recovery programmes.
- There is great variability in the recovery status by region; while some regions noted development and implementation of recovery plans with steady reconstruction activities, other areas that were moreseverely affected are just beginning to develop or implement such plans. Such differences in the current

recovery efforts will likely affect long term recovery over time also for the medical system and public health capacity.

- People who left their communities after the disaster are uncertain about returning, due to lack of job opportunities, loss of traditional industries and lack of services. Local government finds it difficult to plan services when they do not know the number of people who are planning for, but people will not return unless they know they will have a job and access to services.
- Local governments are experiencing difficulties in recruitment. Existing staff report suffering stress from heavy workloads that contributes to fatigue and further loss of staff.
- Disasters create complex management problems. Each issue involves many actors and stakeholders, each with a tendency to work independently. Establishing and supporting effective coordination mechanisms is an important component of recovery planning.

#### Public health issues

- There is no clear leadership role assigned to any one agency or department for overall strategic planning for health sector recovery after a disaster. There is no system in place to monitor and evaluate the appropriateness and effectiveness of local recovery plans, or to monitor and evaluate progress in recovery.
- Disasters create complex social problems. The resolution of many public health problems needs action by agencies outside the health sector. Establishing and supporting effective coordination mechanisms is an important component of recovery planning.
- Mental health continues to remain a priority due to
- increased levels of social problems such as alcoholism and gambling,
- 2) lack of job opportunities for working age people,

- isolation of those who prefer to stay in their own homes, particularly elderly people living alone,
- the stress of living in temporary accommodation and not knowing the future, and
- 5) high numbers of people with special needs such as orphans, the socially isolated and newly disabled people.
- NCD remains a concern:
- the prevalence of chronic diseases is generally high given the demographic profile of the Tohoku area. Younger age groups may be less likely to return, exacerbating the prevalence and incidence of NCD;
- excess risk attributable to the disaster such as continued lack of exercise, poor diet, high stress levels and limited access to appropriate care.
- The period of residence at temporary housing is likely to be a minimum of two years, up to four years is some areas. If the majority indeed take residence for a longer period of time, that may become a determinant for the speed and extent of recovery and reconstruction.
- The social determinants of health such as employment will be key determinants of the quality and duration of health sector recovery. These issues are more complex and challenging than physical reconstruction. Without a stable income source, provision of mental health care services and replacement of buildings will not address the root problems that the victims are facing. Many of the affected populations were fishing communities and industries serving the fishing industry. These livelihoods have been completely destroyed and will take many years to recover if at all. This creates a vast need for social, welfare and public health services for the foreseeable future.



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Key data source

Key government documents

Other technical documents consulted

Other important information sources

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### Annexes

All photos on this page are ©Center for Community Health, Tohoku University Graduate School of Medicine

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### Administrative structure of Miyagi Prefecture health services



% This organization structure shows only public health related bureau/devision/section at the prefectural, municipal and district level which is described in this report.

### Administrative structure of Ishinomaki City government



### Numbers for people living in evacuation centers in Miyagi prefecture

Day/Month	3		4		5		6		7		8		9		10		11		12	
	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC	NoE	NoEC
1			70,020	550	38,075	412	25,489	389	15,626	321	9,202	239	3,413	128						
2			69,168	521	37,897	413	25,395	389	15,471	319	8,895	236	3,293	125			191	12		
3			66,881	512	37,591	412	24,802	383	15,442	319	8,690	229			1,266	73				
4			64,606	506	36,441	406	24,588	380	15,405	318	8,436	221			1,122	71				
5			62,963	495	36,365	405	24,531	379	14,889	320	8,344	218	2,896	119	910	67				
6			58,291	491	35,754	404	24,060	373	14,265	312			2,888	118	789	59				
7			56,386	484	35,365	409	23,985	373	13,950	309			2,853	117	743	52			20	2
8			56,186	492	34,984	407	25,532	371	13,889	308	8,035	211	2,711	116						
9			54,697	490	34,792	407	22,902	369	13,735	305	7,950	210	2,698	115			47	3		
10			53,368	450	33,207	402	22,695	368	13,573	305	7,361	203								
11	41,212	199	50,399	435	32,854	402	22,286	368	13,482	303	7,299	201			549	38	47	3	20	2
12	102,058	559	48,303	433	32,849	402	22,127	368	13,235	297	7,173	199	2,624	115	339	20				
13	108,603	697	47,695	432	32,573	404	21,730	367	12,932	297			2,611	115	332	19				
14	320,885	1,183	47,383	431	32,442	405	21,420	363	12,874	297			2,385	103	332	19			20	2
15	309,833	1,212	45,884	421	32,261	405	19,828	357	12,623	290	7,007	197	2,375	102						
16	231,248	1,152	45,078	418	31,878	404	19,266	355	12,375	288	6,808	198	2,264	98			47	3		
17	222,361	1,109	44,909	415	31,688	402	18,955	352	12,375	288	6,711	194			311	19				
18	210,500	1,158	43,622	419	30,997	400	18,616	351	12,275	286	6,709	193			277	19				
19	154,774	959	43,303	414	30,739	404	18,573	351	12,140	283	6,315	181			268	19				
20	148,566	891	42,063	410	30,647	404	18,262	345	11,966	278			2,122	98	247	19				
21	113,029	780	41,554	415	30,239	403	17,878	336	11,427	274			2,122	97	245	16			16	2
22	111,273	759	41,425	419	30,076	403	17,573	335	11,103	263	6,306	180	2,072	97			44	3		
23	133,450	692	4,084	417	29,785	401	17,353	337	11,025	259	6,137	177								
24	90,325	657	40,838	417	28,269	393	17,278	332	11,021	259	6,038	177			244	16				
25	86,919	644	40,807	420	27,753	392	16,920	330	10,904	257	5,799	166			220	16				
26	85,039	622	40,838	437	27,574	389	16,842	329	10,719	255	5,749	164	1,931	95	214	16				
27	281,592	601	39,941	429	27,434	392	16,743	329	10,699	256			1,892	93	214	16				
28	77,582	586	38,875	427	26,687	397	16,340	327	10,282	252			1,745	90	212	16			1	9
29	74,404	569	38,513	416	26,621	397	16,000	326	9,842	248	3,958	145	1,712	88						
30	74,069	564	38,462	415	26,418	397	15,871	323	9,767	247	3,930	143	1,594	83			31	3		
		i		1				1									1			

NoE: Number of Evacuees

NoEC: Number of Evacuation Centers

#### Public Health Recovery after the Great East Japan Earthquake Experiences in selected areas of Miyagi Prefecture

#### March 7, 2013

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The resilience and courage of Japanese people and society in adversity is a strong asset for disaster management in Japan.

Public Health Recovery after the Great East Japan Earthquake

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