



**International symposium
on disaster management and recovery
for children and communities 2016**

-History of the five years of the Soma Area-

Record Magazine



International symposium on disaster management and recovery for children and communities 2016

Date	Saturday May 7 - Sunday May 8 , 2016
Venue	Soma Civic Center -Large Hall Kitamachi 51-1 Nakamura, Soma City, Fukushima 976-0042, Japan
Visitors	1,300 people (May 7 700 people 、 May 8 600 people)
Organized by	Soma Area Council of Local Governments
Collaborated by	WHO Centre for Health Development
Hosted by	Executive committee of International Symposium on Disaster Management and Recovery for Children and Communities
Honorary Supporter	Japan Medical Association
Honorary Collaboration	Soma Central Hospital
Supporters	Fukushima Prefecture International Atomic Energy Agency(IAEA) Foundation for Global Children Yomiuri Shimbun Fukushima-Minpo Fukushima Minyu Shimbun Soma-gun Medical Association
Sponsors	Kowa Yakuhin Co. LVMH Moët Hennessy-Louis Vitton Japan S.A. Toho Bank Ltd. IHI Co. Soma Kyodo Power Company Ltd. Sun-Ei Nori Co., Ltd. FRESCO Kikuchi Co. FUJIMOLD Industry Co., Ltd. El Sistema Japan F-COM. Co., Ltd.



Executive Committee

Chief of the executive committee

Sae Ochi Director of Internal Medicine, Soma Central Hospital

Member of the executive committee

Kenji Shibuya Professor, Department of Global Health Policy,
Graduate School of Medicine, The University of Tokyo

Masahiro Kami Director of Medical Governance Research institute

Yukie Osa Professor of Rikkyo University, Director of AAR Japan

Yasuo Miyazawa Chairperson of SEISA Group

Secretary general

Masaharu Tsubokura Attending physician, Soma Central Hospital

Staff

Symposium (May 7) 123 people

Soma Area Council of Local Governments 8 people

Soma city official 65 people Soma Central Hospital 18 people

SEISA Group 12 people Shibuya laboratory student 9 people

Kami laboratory student 11 people

Symposium (May 8) 123 people

Soma Area Council of Local Governments 8 people

Soma city official 65 people Soma Central Hospital 18 people

SEISA Group 12 people Shibuya laboratory student 9 people

Kami laboratory student 11 people

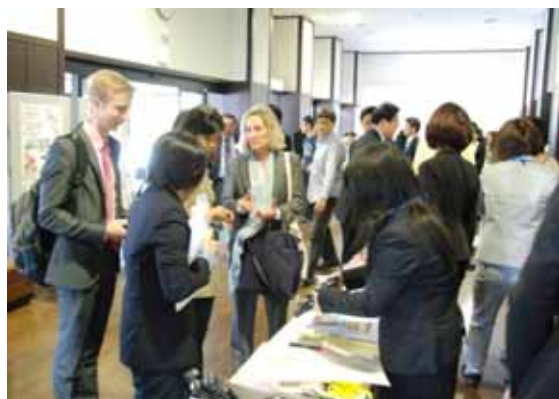
Lunch time lecture (May 8) 30 people

Soma city official 11 people Soma city woman fire brigade 11 people

Shinchi town official 1 people litate village official 2 people

Panel display cooperation co. 5 people

Total 276 people



CONTENTS

Saturday May 7,2016

■Welcome speech

Sae Ochi

Chief of the executive committee



P 1

■Opening remarks

Shinjiro Nozaki

Senior consultant, WHO Centre for Health Development



P 2

■Congratulatory speeches by guests of honor

Satoshi Imamura

Japan Medical Association Vice President



P 4

■Reports from local government mayors

Norio Kanno Mayor of Iitate Village

Singularity of nuclear disaster among disasters



P 7

Katsunobu Sakurai Mayor of Minamisoma City

From Minamisoma city to the world:
Our vigor for reconstruction



P 9

Norio Kato Mayor of Shinchi Town

Shinchi Town : Disaster and recovery



P13

Hidekiyo Tachiya Mayor of Soma City

Human care in the period of disaster recovery



P16

■ Session 1 :
Children and disaster recovery

Chair **Yukie Osa**

Professor of Rikkyo University,
Director of AAR Japan



Tomohiro Morita Soma Central Hospital, Physician

The 3.11 Triple Disaster:
Health Effects on the Residents of Soso District,
and Possibilities for Health Promotion



P27

Masaaki Abe Director, Seisa Nagoya Junior High School

Activities of the Follower Team:
prevention of PTSD among children



P33

Asako Sugioka Lawyer, Japan Legal Support Center,
1st Operation division

Recovery from the Great East Japan Earthquake and lawyers,
and the role of Japan Legal Support Center



P39

Yutaka Kikugawa Executive Director, Friends of El Sistema
Japan

Strengthen Lifeskills through Music : Recovery, Regional
Revitalization, international Exchange through Art and
Culture



P43

Yukio Shibuya Professor of Tokyo University of Agriculture

Recovery in agriculture in Soma area : Support by the Tokyo
University of Agriculture (TUA)



P47

Yujiro Watanobe Soma Fisheries Cooperative

Fishing trial; The present situation



P53

Sunday May 8, 2016

■ Opening remarks

Masayasu Kitagawa

Emeritus professor of Waseda University



P57

■ Session 2 :
Health impact by radiation

Chair **Shinichi Suzuki**

Professor and Chairman,
Fukushima Medical University School
of Medicine Department of Thyroid and
Endocrinology



Hiroki Shimura Department of Laboratory Medicine,
Fukushima Medical University

A progress report of Thyroid Ultrasound Examination
program in Fukushima Health Management Survey



P59

Gerry Thomas Department of Surgery and Cancer,
Imperial College London

Thyroid Screening – the Global Perspective



P66

Sae Ochi Director of Internal Medicine, Soma Central Hospital

Health impact of a disaster on physical performance of
school children and elderly people



P73

Masaharu Tsubokura

Attending physician, Soma Central Hospital
Part time physician at Minamisoma Municipal General Hospital

Current situation of internal and external
radiation exposure in Soma region



P77

■ **Session 3 :**
**Social impact by the earthquake
and the nuclear accident**

Chair **Tomoyoshi Oikawa**
Associate director of Minamisoma
Municipal General Hospital



Peter Johnston Director, Division of Radiation,
Transport and Waste Safety,
Department of Nuclear Safety and Security, IAEA

International Radiation Protection System: **Protecting
Children in the Community**



P85

Shuhei Nomura PhD Candidate Department of Epidemiology and
Biostatistics, School of Public Health, Imperial
College London

Post-nuclear evacuation and health risks
in Fukushima



P91

Ryugo Hayano Professor, Department of Physics,
University of Tokyo

Empowering the young
- radiation protection in Fukushima -



P98

■ **Keynote Lecture**

Chair **Kenji Shibuya**
Professor, Department of Global Health
Policy, Graduate School of Medicine,
The University of Tokyo



Shinjiro Nozaki Senior consultant,
WHO Centre for Health Development

Lessons for Disaster Management and Recovery



P105

Claire Leppold Minamisoma Municipal General Hospital,
Researcher

The Minamisoma Babies Study:
Health at Birth in the Four Years Following the 3.11 Triple
Disaster



P113

Moderator**Kenji Shibuya**

Professor, Department of Global Health Policy,
Graduate School of Medicine,
The University of Tokyo

Panelists**Gerry Thomas**

Department of Surgery and
Cancer, Imperial College
London

**Peter Johnston**

Director, Division of Radiation,
Transport and Waste Safety,
Department of Nuclear Safety and
Security, IAEA

**Shinjiro Nozaki**

Senior consultant,
WHO Centre for Health
Development

**Shinichi Suzuki**

Professor and Chairman, Fukushima
Medical University School of Medicine
Department of Thyroid and
Endocrinology

**Hidekiyo Tachiya**

Mayor of Soma City

**Katsunobu Sakurai**

Mayor of Minamisoma City

**Claire Leppold**

Minamisoma Municipal
General Hospital,
Researcher

**Kana Yamamoto**

Minamisoma Municipal
General Hospital,
Physician

**Chikako Hokotate**

Parent-teacher association
of Soma

■Closing remarks

Masaharu Tsubokura Secretary general



P143

■Photograph digestP145

Sae Ochi Chief of the executive committee



Good afternoon, ladies and gentlemen. On behalf of the executive committee members, I would like to welcome you to this International Symposium on Disaster Management and Recovery for Children and Community hosted by the Soma Area Council of Local Governments and in collaboration with WHO Center for Health Development and the Japan Medical Association. First of all, I express my

gratitude to the guest speakers, Dr. Shinjiro Nozaki from the WHO Kobe Center, Mr. Peter Johnston from IAEA, Professor Gerry Thomas from Imperial College, London, and Ms. Claire Leppold from Minamisoma Municipal General Hospital as well as all the speakers, chairs, and moderators for attending this symposium in busy schedule.

Last month, a huge earthquake struck Kumamoto and Oita Prefecture killing around 50 people. And several days after the disaster, more than 600 people in Republic of Ecuador were killed by an earthquake. I'd like to express my sincere condolences to the families of the victims. Now, the world is facing increasing intensity and frequency of disasters. With this, there is an increasing need in sharing experience and knowledge about how to prepare for, mitigate, and recover from such catastrophic disasters.

Fortunately, during these 5 years, we, the residents and researchers in Fukushima Prefecture have achieved a significant progress with regard to community recovery and we have accumulated many important knowledge. All the speakers here today and tomorrow have made enormous contribution to the recovery of this area. Learning from their activities will have an impact on all of our lives, provide a legacy for the children, and ultimately will benefit the entire world.

So, I have no doubt that we are having really interesting 2 days. Before I hand over to Mr. Shinjiro Nozaki, I'd like to thank Fukushima Prefecture IAEA, Foundation for Global Children, Yomiuri Shimbun, Fukushima Minpo, Fukushima Minyu Shimbun, and Soma-gun Medical Association for your support. And all the staff of Soma Area Council of Local Governments, Seisa Group and University of Tokyo for setting up and organizing the conference.

Finally, I'd like to thank all the participants here today. Welcome, and please enjoy this symposium along with us. Thank you.



Shinjiro Nozaki Senior consultant, WHO Centre for Health Development



Good afternoon, ladies and gentlemen. I have to say very sorry for our Director, Alex Ross couldn't come here because of the family emergency problem. But I would like to read his message on behalf of WHO.

Honorable Mayor Hidekiyo Tachiya, Mayor Norio Kanno, Mayor Norio Kato, Mayor Katsunobu Sakurai, Dr. Sae Ochi, Executive Director, organizing

committee of this symposium, Professor Masayasu Kitagawa, Waseda University, Professor Kenji Shibuya, University of Tokyo, Professor Geraldine Thomas, Imperial College of London, Mr. Peter Johnston, Director of IAEA, distinguished speakers and honorable guests, on behalf of the World Health Organization, WHO and the entire staff of the WHO Kobe Center, it is my great honor and pleasure to welcome you to this important international symposium.

My sincere congratulations to Mayor Tachiya and organizing committee for organizing this robust conference that will explore many of the lessons and challenges that Soma City, the Tohoku region, and Japan have experienced during and after the Great East Japan earthquake, tsunami, and the nuclear accident. The innovations that you have created over the past 5 years, particularly in supporting the community to recover from these events, and mitigating the long term psychosocial impact of the disaster provide inspiration to others in Japan and around the world.

As we recently have seen in Kumamoto, the risk of natural disasters and their significant impact on people and economics are constant. Although tragic, the number of deaths from the Kumamoto earthquake was far less than that experienced during the Great Hanshin Awaji earthquake or the Great East Japan earthquake. This points to the benefits of constant learning from past experience and implement improvement in preparedness. Across the world, we are seeing a significant increase in the frequency and severity of natural disasters, many hazards, and communicable disease outbreaks. We have been watching the emergence of new diseases such as Ebola, Zika as well as the spread of existing ones such as dengue and malaria.

WHO has a very important role to play to support countries and communities across the disaster health emergency, risk management, continual preparedness, response, recovery, and ensuring resilient health systems and communities. WHO and its many partners have various instruments and mechanisms to do this including the international health regulations and the providence of the Sendai Framework for disaster risk reduction.

WHO is emphasizing supporting countries to build resilient health systems that can detect and respond to any health emergency and to better assess risks and vulnerable populations.

WHO Kobe Center is a global WHO research center that focuses on UHC, Universal Health Coverage, innovation, and aging populations. Since its beginning, the center has also focused on supporting and sharing lessons and policy research for health emergency management.

Led by Japan, there is an increasing interest in learning about how to support long term survivors of disasters, especially older populations. We look forward to learning from this symposium and to working with you to disseminate the many important lessons globally. Thank you very much once again for being with us today and for your kind attention. *Arigatou gozaimasu.*



Satoshi Imamura Japan Medical Association Vice President



Good afternoon, ladies and gentlemen. May I add my warmest congratulations for the opening of the International Symposium on Disaster Recovery for Children and Community. I am really honored to offer some words of welcome on behalf of JMA, in front of many VIPs who are present here.

On April 14th, there was an earthquake in Kumamoto Prefecture

where lots of people have perished, and I would like to offer my heartfelt condolences to all of them. I think that many of you who are present today may be dedicating yourself to help the people there, and I'd like to say my heart is always with those who were affected and who are still living in the shelters. As for JMA, we have dispatched JMAT or Japan Medical Assistance Team to the affected areas. We do hope that these medical assistances would help the residents there return to their normal life with security and peace of mind as quickly as possible.

Now, I'd like to offer my congratulations to the organizers including Dr. Ochi, the Executive Committee Chair, and Dr. Tsubokura, the General Secretary for their dedication to recover from the triple disaster in the past 5 years. Ever since the accident occurred at the power plant, the JMA have dispatched the JMAT comprising medical doctors and other health professionals from all over the nation to Soma City, Minamisoma City, Koriyama City, and Iwaki City amongst others. And on September 2011, we have made the proposal to the Governor of Fukushima, Mr. Sato, on recovery and construction from the disaster. Particularly after the nuclear power plant accident, we were worried about the health impacts on the pregnant women and children. That was why we have declared the importance of their assistance. Our other supports include development of the guidelines for intake of antidote iodine, conducting research on the emergency exposure effect on health, and so on. I hope that these efforts was of a help for your recovery activities.

Considering disaster and children, we will have to start with reconstruction of communities. Particularly, it is true in the aging society in Japan, that medicine- and nursing care- centered economy is essential to develop a community where people can live with mind of peace. Medicine and nursing care also can create new job opportunities in the affected areas, so it may leverage recovery of communities from the disasters. In other words, we need to create societies where children grow up, find their jobs, and then have their own families within the same community.

Tomorrow, Dr. Shibuya, professor of the University of Tokyo, will chair a keynote lecture and panel discussion. He was the Chair of a committee that issued 'Japan Vision Health Care 2035', which, by reversing our way of thinking, aims at taking adverse situations such as stagnation of economic growth and financial crisis as a big opportunities to add values to the healthcare of Japan so that it can lead the world.

Disasters do not only happen in Japan and nuclear power plants exist throughout the world. I believe

this symposium on children and disaster recovery will be beneficial to not only Japan but also to the world. In closing, I do hope for the success of the 2 day symposium. And also, I'd like to wish for the health and prosperity for all the participants here. Congratulations on this symposium. Thank you.



Congratulatory speeches by guests of honor



Singularity of nuclear disaster among disasters

Norio Kanno Mayor of Iitate Village



In spite of safety myth of nuclear power plants, the accident did happen. Six thousand residents in my village was forced to evacuate from their hometown and 5 years have passed since then. We are now entering in the 6th year of evacuation.

In order to evacuate the villagers I told myself that I should maintain good sense of balance in looking at things which was really unfolding in front of me. At that time, I had little

knowledge about nuclear power plants or radiation. But according this philosophy of 'afraid radiation in reasonable way', we set out risk communication as a pillar of the village operation. Since July 2011, we have set up a number of projects along with this idea of the risk communication.

As for evacuation, we had to balance risks of radiation exposure and those of displacement, which resulted in a drastic change in life and lifestyles, at the same time. We could not just evacuate everyone as far as possible. So with much thought, we decided to set an evacuation center within 1 hour drive from the village. Currently 90% of the residents are living within this area and now new communities are being created at the shelter houses there where the villagers are now having their lives.

There is an instruction from the national government that the annual radiation exposure dose should be less than 20 mSv. So we had made some kind of negotiation with the national government saying that if the indoor levels of radiation exposure are less than 20 mSv, we can work within the evacuation zone. Thanks for this negotiation, there are several special nursing homes for the elderly and major enterprises companies that continue operation in the village. This, again could not be achieved without the sense of balance. We have to leave the judgement of our choice up to our descendants. Later, a historian will find that.

As time goes by and people are gradually exhausted, fatigued, heartbroken, and down and out by the busy days. It is not easy to manage the situation. What I learned in the very bitter way was that the nuclear power plant accident and the radiological disaster is somewhat totally different from other natural disasters. Natural disasters include earthquake, typhoons, tsunami, and eruption of volcanic mountains. Talking about severity, disasters that killed more and destroyed more houses are considered as more severe. I agree with that, but the nuclear disaster has a singularity and specificity of its own way.

Because in other natural disasters, people may lose their properties, but after a few years they can accept the situation and decide to restart their lives from the scratch. But our combat to the nuclear disaster is different. Nuclear victims should strive to get to the scratch, which means, eliminate the contamination. This takes a long time, maybe we have to take generations. We have to struggle with our life with contaminated land, job losses and anxieties about the future. So we do not start from the scratch, but start to the scratch.

Another characteristic in a nuclear disaster is the people's perception of risks related to radiation exposure is quite different. Some people may say that this air dose rate is far from satisfactory. Others may say that this is the level at which we can start living. As each decision is 'right decision' for each person, it is quite difficult to unify diverse opinions or get to consensus.

The difficulties we are facing are the fact that our village was divided into three zones according to air dose rate: less than 20 mSv; 20-50mSv; and more than 50mSv. Each area differs in the time at which evacuation order is lift, and the amount of compensation. So, the people in those three different zones have different perceptions. And that kind of division of village may lead to the division of the minds and heart in the people.

And the most serious problem we encountered in the village is that young people or young families and children are living away from the village. 90% of our villagers are now evacuated, living in the area 1 hour away from the village. Last year 57% of the school children were attending our village schools last year but this year, the number decreased to 36% this year. Allegedly, there are some villages where only 2-10% of school children are attending the village schools. Making villages to which no young people or children would like to return is the responsibility of the national government.

But there are some kind of bracing we are able to get from that disastrous experience we had.

Because back then, when we were weary, the Mayor of the Soma city extended us the helping hand and gave us water and temporary housings, which we needed. Also the friendship extended to the various parts of Japan and from the world is so heartwarming. This expanded ties among people. This gratitude of us should be actually used as an engine for disaster recovery. So we can use this adversity against itself and may create a community which we could not create without such disaster.

Swamped with daily chores, we often forget important things- What lessons we have learned? What we have to hand down to the next generation?

Currently, 2.6 million vending machines are working in Japan. Fifty thousand convenience stores are doing business for 24 hours a day. That is the convenience of modern days. But does this convenience actually lead to our happiness by lighting up everywhere and reducing places where we can enjoy starry sky? If you seek blindly for more happiness, more convenience, and richness, we need more electricity and energy. When we use up all the energy resources, including regenerated energy, Japan will end up with a nation with mindless debts, which became a heredity that we hand down to our future generation.

There is a Spanish old saying that goes 'the poor are not those who have less, but those who want more'. In other words, 'He is rich that has few wants'. In Denmark, it goes like: 'the sin of elderly should be repaid by young people'. This might be actually the situation we are facing now.

Now we need to look back on the past and re-think whether growing economy is the only way to happiness. We are in mature society, so we have to think what to be hand over to our generation. This is what I have learned from the nuclear disaster.

There is an article in the newspaper, we need two earths if we continue living like that. In 2030, we need resources worth two planets. But the earth is only one planet in the universe. You really have to adjust yourself to the earth. This is a learning I had never thought before the disaster and there is another learning I learned the bitter way and I'd like to share this with you. Thank you very much indeed.



From Minami-Soma city to the world : our vigor for reconstruction

Katsunobu Sakurai Mayor of Minamisoma



I'd like to share with you the current state of Minamisoma city by looking back at what has happened in the past 5 years. Particularly, as this symposium is on children and disaster recovery, I'd like to focus on children.

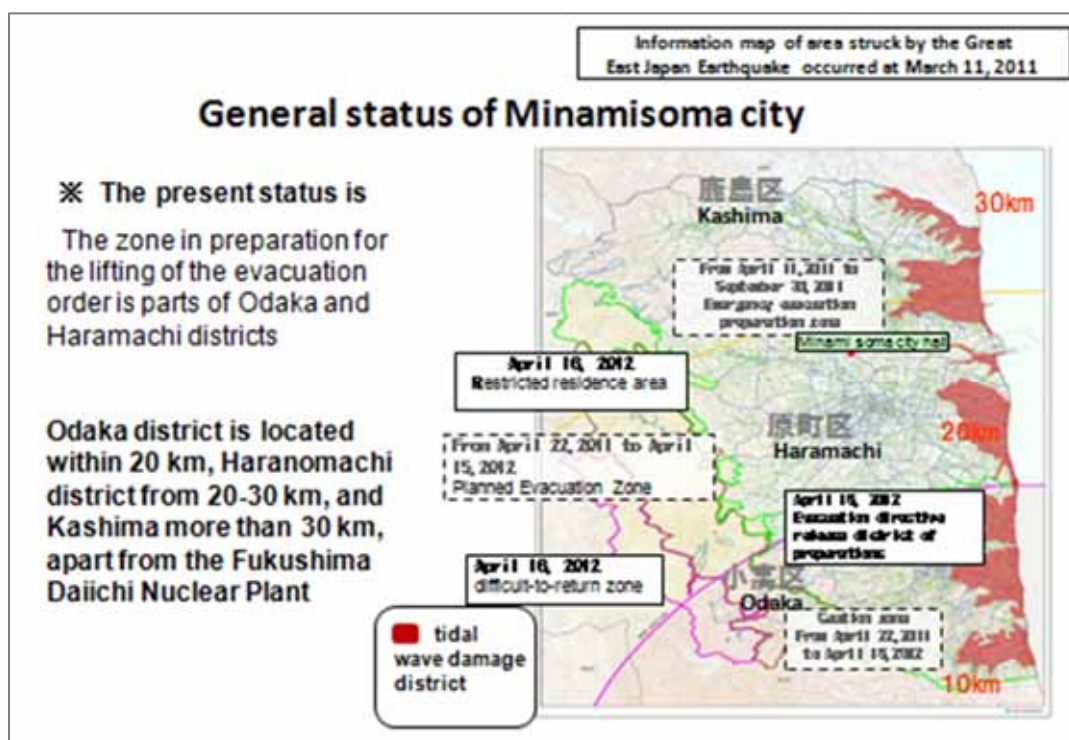
Minamisoma city was struck by the big tsunami of 21 meters high, which reached about 4 kilometers from the shore.

This disaster was followed by a nuclear power accident.

Minamisoma city was separated into three areas: no-entry zone; in-door evacuation zone; and other areas. The gymnasium of Haramachi Daiichi Elementary school was due to be completed on March 31st but instead of the completion ceremony, the venue had to be used as a shelter.

Although the Japanese national government gave no instructions to us, Izumida Hirohiko, the Mayor of Niigata prefecture decided that the prefecture would accept the evacuees from Minamisoma city. Thus we could evacuate our citizens to Niigata.

After decontamination works, the elementary schools within the in-house evacuation zone were reopened in October and children went back to school. They are playing in the swimming pool and the playing grounds. And in the following year the school held entrance ceremony.

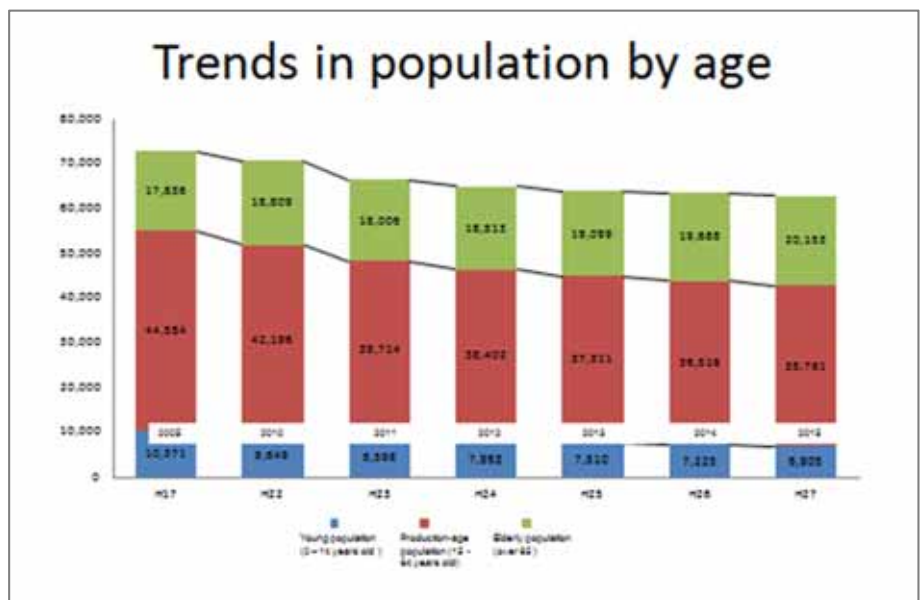
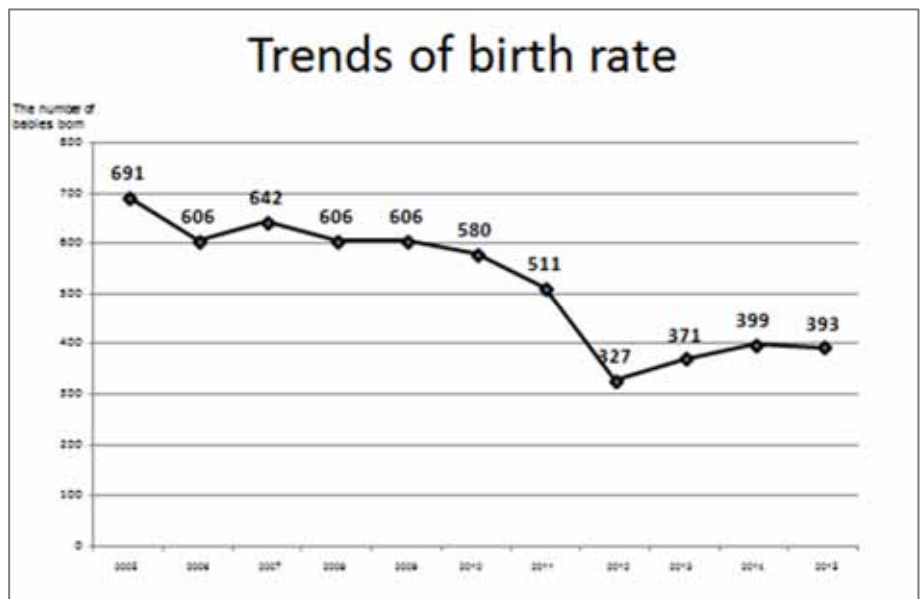


Before the disaster, the number of birth per year in this city was 582, and then there was a sharp drop after the disaster. The number has gradually recovered to about 400 now.

Looking at the age distribution, there appears a decrease in the number of children.

Just as the Mayor of Iitate said in this session before, many younger people are leaving this area. The number of elementary school children and junior-high school children dropped to about 70% in 2016 compared to that before the disaster. The number of children entering kindergarten and nursery school also sharply dropped, but it is gradually recovering. The numbers of kindergarten children in 2014, 2015, and 2016 are 960, 1126, and 1188, respectively. This is partly because Minamisoma city made the fees for the kindergarten and nursery schools free.

What about the radiation exposure including both the external and internal irradiation? Actually, 99.7% of the children are falling into the category of 'not detected', which means their internal radiation contamination level is under a detectable level. From this measuring using individual dosimetry, it is clear the radiation exposure levels have massively decreased. After the measurement, children started playing outside.



Minamisoma city are creating indoor playgrounds for children so that they can play without fear of radiation exposure. The playground donated by the 'Everyone's playground project' will be completed soon. The Cheerful kids!! Net. is an internet website providing information for those who are raising children. The 'Welcome baby project' is a project that presents diapers and milk powder for newly-born babies.

But there are lots of things that still remain to be done for children. Because of the evacuation, many families had to be separated, which made it difficult to raise children. Loss of young generation made the residents pessimistic to their future.

Now regeneration of the community is an urgent issue for us. One of the challenges Minamisoma city is facing is to create the environment in which the parents feel at ease in raising their children and giving birth to babies. That is the most important thing and that is what we are exactly doing here.

I'd like to offer my deepest condolences to the victims of the disaster in Kumamoto. As Minamisoma received much help from that prefecture so we would like to return the favor, and five medical staffs were dispatched to Kumamoto Prefecture. People there allegedly were surprised by the support from Minamisoma. Nearly 50 people died in Kumamoto. However in Minamisoma, 636 people died by Tsunami. And 485 people lost their lives due to the disaster-related death after the nuclear power plant accident. So, this number is unfortunately the number one in Japan. I'd like people outside of Japan to know this fact, although the life is equal and it should not be boil down to the simple numbers.

As the Mayor of the litate village mentioned, the families are separated and communities are disappearing. And this problem is getting to be worse every day. Because of the nuclear power accident, recovery and reconstruction are very difficult and this fact is not well known by people outside. Although I repeat the message, it seems that people outside of this area don't seem to really understand.

A web site supporting of raising children in Minami-Soma city

Cheerful kids !! Net



17

Subsidy project for well come gift for baby birth

The coupon worth of JPY 20,000 is provided to buy disposable diaper, paper wiper, milk powder at the stores registered in the city



The first recipient was subsidized by the Mayor



The mass media were amongst the first to flee after the nuclear power plant accident. I know there are many journalists here today, but no one was in Minamisoma at the time of the disaster. There was not a single reporter remaining and the national government didn't come. TEPCO and the national government promoted the nuclear power generation by saying that the nuclear power plants are safe. However, they were the first to evacuate themselves. After the accident, I stayed in a tent for 50 days without changing my underwear for 11 days. Nobody came to support us. By drawing the circle of 20 kilometers, 30 kilometers, people were prevented to visit us. Policemen built barriers to prevent people to enter into the area. That was the reality in Japan.

That is why I speak up that nobody needs nuclear power plants. And I am saying that message to Japan, to the world. However, the Japanese government decided to resume the nuclear power plant operation. However, still there are earthquakes occurring throughout the country as if they are laughing at us. The world is watching us, whether this return to the nuclear power plant policy is the right thing or not. Just as the mayor Kanno mentioned, money do not compensate the losses of family members and separations of communities. Money do not people rich in the real meaning. This is the most important message that we ought to learn from the nuclear power plant accident.

I, as a citizen of Minamisoma City, and as a family member, have to send message of what we have to do for the disappearing communities. It is not just only for us, but for the sake of the country as a whole. That's our mission, because we have the responsibilities for our children. Our children are feeling anxiety. So are their patients. No matter how many inspections we conduct and how many times we say it's okay, still 70% of the residence purchase PET bottle waters instead of tap water. Even though we have been conducting a radiation inspection every other day, they do not trust the tap water and blindly trust bottled water. Many people also refuse to eat the produce from Minamisoma City.

Why nuclear power plant accident destroyed the mental health of the residents? The nuclear power plant policy make people lose their mind. Can we accept such policy? And my message, my answer is no, it's not the right policy. We need to create the environment where people can feel at ease in raising children. We need to protect the environment including clean air and water. The nuclear power accidents, we made a sin once but we shouldn't repeat the sins. It is my responsibility to send this message all over the world.

Therefore, I am continuously sending on-site report to the leading party, regardless it is Democrats or the Liberal Democratic Party. I make a local input whether mothers can live without anxiety, and if not, what is needed. I contact every day to those bureaucrats in Kasumigaseki, because at the forefront the situation is changing every day.

Currently the major challenge in Minamisoma city is how to make a 'soft landing' when evacuation order the evacuation order is lifted in the area of 20km radius from the power plant. We have had meetings and were scolded by the residents for hundreds of times. However, we keep toiling ourselves because Minamisoma City is a city that has one of the brightest histories in the past.

So, we want to rejuvenate ourselves. We want to deliver the forefront messages from the Soma area, a historic city since the Edo period. We want to maintain this prestigious name of Soma. And for that we will have to join forces so that we can together deliver our messages to the world.

Let's keep toiling ourselves for the recovery of the region and for the sake of our children. Thank you.



Shinchi town: Disaster and recovery

Norio Kato Mayor of Shinchi town



First and foremost, I'd like to express my sincere condolence to the people of Kumamoto, who are continually suffering from the aftershocks. Five years ago at the time of the great earthquake, we were recipients of the great love and care from the rest of Japan and the world. So we want to support other disaster areas to repay what we have received 5 years ago.

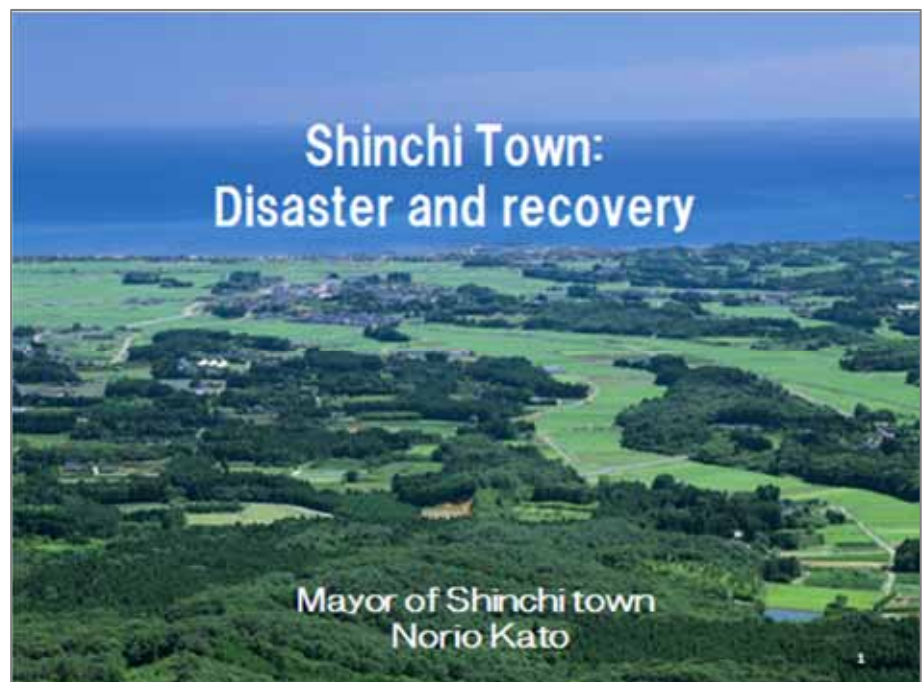
Last week, we handed ¥3 million of donation to Mayor

Araki, the chairperson of Kumamoto Council of Municipality. Mr. Araki said 'we have gotten enough grubstake. What we need most now are human resources, especially officers who can assess damaged houses and municipal staff who can issue disaster damage certificate.'

The Fukushima Council of Municipalities is going to provide whatever support we can offer while appealing the needs of staff whom we are able to dispatch to assist the recovery work in Kumamoto.

Mr. Sakurai, the Mayor of Minamisoma mentioned that the city was separated by the 20 km or 30 km radius from the nuclear power station. Shinchi town is 50 kilometers over away from the nuclear power plant. Even so, more about a half of the children disappeared on March 2011, because their parents decided to make voluntary evacuation away from the town. After much thought, as the Mayor of the township, I did make the daily measurement of the air dose rate of radiation. The dose was announced 7 am every day via community disaster management radio so that every household in the township would know the dose amount. And I continued that announcement every day for 4 months.

The second thing we did at the township is to raise the knowledge of the radiation because virtually we had no or little knowledge about radiation. We invited specialists, experts, and the university professors and provided basic lectures on radiation and radio-activities targeting municipal staff members, parents, PTAs and school teachers.



I think these measures partly paid off. School entrance ceremony, usually held in early April, delayed but was held on 14th April for elementary schools and 15th April for junior high school. Until that time, thankfully 80% of the school children had returned to the town. After summer holidays most of the school children came back to the schools because the air dose rate had been reduced enough. We measured external and internal exposure levels of the children using glass badges and whole body counter, respectively. And the result was no abnormal levels of radiation contamination found. I heaved a sigh of relief.

For a while, there were claims from PTAs and parents that the local vegetables, rice, and water shouldn't be used for school lunch. However, after intensive inspection of radiation, which proved our products were safe enough, we started to use the local products since 2 years ago. And children are really enjoying their lives and they are so active.

Now I move on to the situation of the disasters and recovery of Shinci town. Shinci town is a small coastal town facing the Pacific Ocean with a population of about 8,000. At the time the Great East Japan earthquake disaster with the magnitude of 9.0 on 11th March 2011, the tsunami with the height of 15 meters struck our township and 119 residents lost their precious lives. A train stopping at Shinci JR station was swept away and broken, but luckily, passengers were able to evacuate from the train and everybody was safe. Now the municipal staff members, the members of municipality assemblies, and the residents are all engaged in



the recovery of the damages and losses of disaster. Our motto is 'team Shinchi'.

Now, 5 years have passed since the disaster struck us and the affected residents have started their new lives at houses and apartments newly built in inland hills.

We are so grateful for your warm supports during this recovery process, from Japan as well as overseas. 70% of the affected agricultural fields have been recovered and in this season farmers are now busy planting rice in that paddy field. The majority of lifelines and infrastructures also have been recovered. Highways have reopened and JR railway with a new track will resume its operation in upcoming December.

A plan is in progress to build a new townscape centering around new station. The stock base for LNG gas is under construction at Suma port, on which much hope is pinned for future alternative energy resources.

The big tsunamis and disasters hit us hard, but we have tried to turn the difficulty into opportunities. Together with all the residents, assemblies and administration, we are heading to a new form of community.

I am going to close my presentation with words of thanks to all the friendship and supplies and supports extended to us. Thank you very much indeed



Human care in the period of disaster recovery

Hidekiyo Tachiya Mayor of Soma city



Good afternoon. The three mayors have spoken representing their municipalities. I am the chair of the region's municipal government council. On behalf of the council, I'd like to offer my heartfelt appreciation to all of you who are present here.

This symposium is looking back the past five years' efforts. I think it is our duty to summarize what we have gained and learned and to send a message for the

future. When we planned for this symposium, it was not expected the huge earthquake in Kumamoto, which occurred just 3 weeks ago. Because we were given the assistance from Kyushu 5 years ago, many municipalities in Soma area want to return the favors. The regions' effort during past 5 years is very precious because we experience the unprecedented events. But the more important thing is to make use of what we have learned for the generations in the future. That's the most important thing for this symposium.

First, I would like to look back at the Soma City's efforts in the past 5 years. But there are many things I won't introduce because they are left to the speakers in the next session. But I will talk some experiences in which what we learned could be applied for the Kumamoto earthquake.

We have a panel discussion tomorrow, but this is not the ideology or political statements that we would like to make. Our aim is only to make the science-based recommendations.

This (Picture 2) is Soma City and this is a picture immediately after the tsunami in Haragama, Soma city. You may see the damage was extensive.

This (Picture 6) is a picture of



vulnerable people including pregnant women or the elderly who had just recovered from the disease or the newly born infants. Our first priority was to identify such vulnerable people and rescue them from this foul living conditions at shelters. Second priority was to prevent indirect deaths caused by disaster-related damages. In disaster management, we have to keep thinking whether there is any possibility of death in each setting.

This is Soma City Disaster Management Office (Picture 7) at 3 a.m. on 12 May. You may think 'the Mayor is missing', but it is because I was taking this photo using my cellular phone. We categorized what we ought to do into two: one was the things to be done immediately, and another was the things that we will have to embark on for the restoration of the community over a long-term period. First and at most priority was, as I mentioned, to prevent the unnecessary deaths after the disaster. For example, there were a number of isolated people in the tsunami-struck areas. When the ground floor of a house was washed away, people still saved their lives by staying on the second floor. But they could not evacuate in the middle of muddy rubbles. These people had to be rescued as soon as possible. And when they arrived at shelters, there was a problem of securing water and food. For this purpose, what we needed was to grasp the current situation. How many people are living in which shelters? Without that number, we do not know the necessary volume of water for instance. These were the immediate measures.

Next thing to think of was building temporary housings. The tsunami destroyed coastal areas not only in Fukushima but also in Iwate and in Miyagi prefectures. And in each prefecture, hundreds of thousands of people were in the shelters. We needed to construct temporary houses for this number of people. So I thought that there would be a competition for the materials for the temporary housing. I am the Mayor of Soma City, so I was not allowed to lose this competition. So, I ordered 'let's begin the work on temporary housing construction now. Find land for the houses. Draw a blueprint. Then send in an



And I also thought there would be a competition for coffins. So I ordered 'when morning comes, order coffins.' Another thing to be considered was to rescue vulnerable people from the shelters.

They needed to be housed in apartments, for instance, to secure their privacies. So I also made an order 'Get hold of all the vacant real estates in the next morning.' These immediate measures did work.

Then the next morning came. Thankfully, on the following day, rescue supplies were sent in from friendship cities. That was not only Toyokoro-cho, Taiki-cho, and Nagareyama City that we had had the sister city affiliation, but also many other cities that we unofficially made friendship with offered help to us. We really appreciate the favor of these cities, and this made us realize the importance of keeping good relationships in usual settings.

A basic registry of residents was really helpful in the disaster management. Because we were on the government side, we count residents based on the residents' registry. As the tsunami killed many people, this residents' registry changed drastically. So we had to confirm the change of the registry. We decided to give ¥30,000 for each survivor immediately because they evacuated without any possession. Due to the nuclear power plant accident and following disruption of infrastructure, we ran short of cash. But fortunately, the Toho Bank kindly offered help. Actually, most of the staff at the bank evacuated, but Mr. Ando, the manager of the branch bank, collected cash and distributed the money himself. Another important thing - when we give the cash, we made sure to give the money on a face-to-face basis. For example, if a person came and said 'I have 5 family members, so give me ¥150,000, we gave s/he only ¥30,000. By doing so, we could confirm the number of survivors and updated the basic residents' registry at the same time. Soma is located at 40 to 50 kilometers from the nuclear power plant. On March 12th, the first report was given to us. We had extensive damage already with the earthquake and tsunami and this was the third disaster, the nuclear power plant exploding. And my initial reaction was, no way, we do not want any more disaster. And the fear of radiation was coming to the people in Soma City. As we needed some kind of standards, I decided that we follow the national government's instruction. If the government really instructs us to evacuate, we just follow it. If we have to evacuate, it should be done systematically, because there are very vulnerable people who need help to evacuate.

The risk of the evacuation and risk of the radiation exposure needed to be compared. And we had to do it on a long-term basis, several months or maybe years. But at that juncture, I thought the risk of the hasty evacuation would be riskier than that of radiation exposure.

This (picture 13) is a picture of me saying 'you don't need to evacuate now'. However, an unexpected problem emerged: supplies were totally disrupted. Minamisōma City suffered most, but the situation is similar in Soma City.

Especially medical supplies

were in shortage. A hospital claimed 'water for dialysis will run out within 3 days.' This was a life-threatening situation for the patients, so we formed a truck team, which went to Tokyo and brought water for dialysis. If supply doesn't come in, we have to go out to get it. But of course it was apparent it

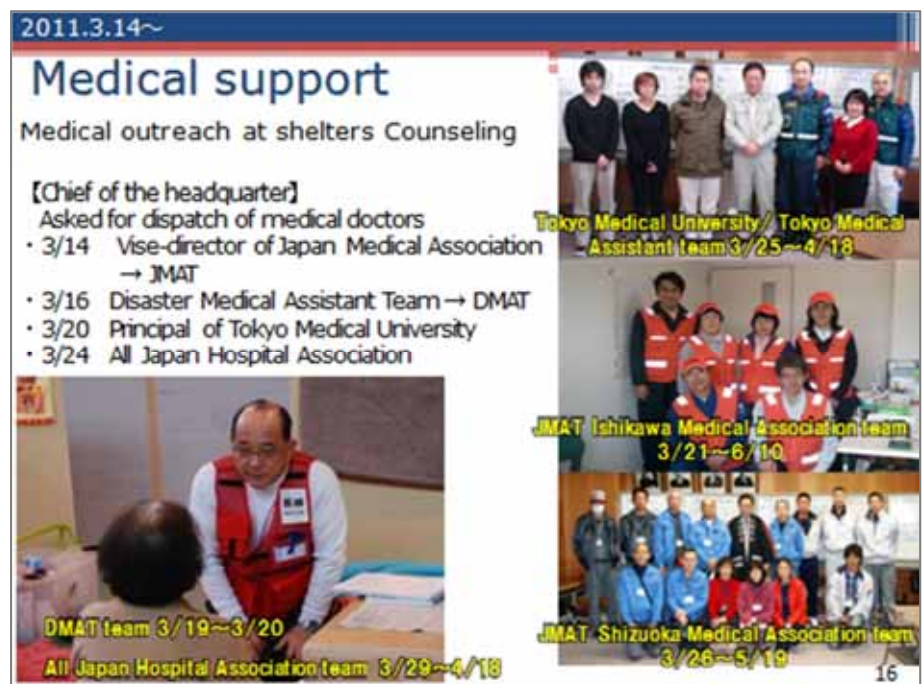


Pharmaceuticals, to open up a temporary branch office of pharmaceutical companies or pharmacies in Soma City. Mr. Takita, thank you very much for your help – with your help, we were able to really get the supplies enough for the city of Soma as well as Minamisōma. And also, they actually gave us a lot of donations to make this symposium possible. Thank you very much at the same time.

There were many medical support teams coming to help us. But accepting these medical teams was a bit challenging. I am a physician myself, so I know the situation. When you go to the evacuation centers and if you hear some noise by auscultation, perhaps that person is suffering from pneumonia or maybe bronchitis. If the person is suffering from severe pneumonia, he or she needs to be hospitalized. But the judgment cannot be made just by auscultation. You need to have the X-ray, a medical device to make a thorough diagnosis. Therefore, medical support should also be conducted in a systematic way. We saw the same kind of confusion in Kumamoto this year.

We had a number of supporters dispatched from the Tokyo Medical University, the Ishikawa Prefectural Medical Association, the Shizuoka Prefectural Medical Association, and the Japan Medical Association (Picture 16) to give us systematic and consistent team services. As all these people are highly specialized persons, so there were a lot of debate among the physicians. Also, the situation of the evacuation shelters was changing every day. So we held a morning meeting every day to make it sure that all the members of the support teams share the overall direction. For example, when there was an influenza outbreak in a shelter, we had to isolate the person, but we did not have enough space for these people. Therefore, we made a special evacuation center for influenza patients. When the patients recovered, they went back to the original shelter. In order to manage such situation, we needed to have meetings and made a database of evacuees as well as patients. Mr. Okawada, who was the director of the Health and Welfare office, worked really hard to manage such difficult contribution.

At the evacuation center, meals were supplied by soup-run. Rice balls were the



many food supplies from outside. But these meals were not supervised from a nutritional perspective. So we decided to use the school kitchens to provide meals for the evacuees (Picture 18). The SHIDAX Corp, one of the food companies, agreed to dispatch dieticians. In addition, we temporarily employed female evacuees as cook. The school kitchens were for the school children in the day time. But in the morning and in the evening when the children are back, the school kitchen was vacant so we served food for evacuees in the mornings and in the evenings using the kitchens. Lunchtime meals were still dependent on catering service, but we became able to get nutritious management for evacuees, though not thoroughly. This enabled us to systematically supervise the health of evacuees in alliance with dieticians and doctors. We would like to apply this method to the evacuation centers in Kumamoto. Another measure taken at the evacuation shelters was building partitions between households. Veneer boards were actually in short supply but the Yoshino Gypsum, a gypsum board company in Soma city, kindly donated the boards. We made partitions like that (Picture 19). By doing this, we not only made privacy spaces for the evacuees but also were able to give temporary addresses, like '3-1 of Nakamura, the junior high school evacuation village, Soma city'. This idea of applying the temporary address to those partitions could be used at Kumamoto.



And as Ms Sugioka will present later, the Japan Legal Center has constantly dispatched lawyers to Soma. Judicial scriveners, administrative scriveners, and real-estate surveyors also gave us precious support. Soma city established a charge-free law center. As of today, more than 3000 consultations were raised, and thanks to these activities, there was no economic suicide in Soma city.

The temporary housings were under construction during this period. Then the time came for the evacuees to move to temporary housings. Now the shelter houses, everything can be supplied like medical services and the food is prepared and delivered. But once they move away from the evacuation shelter to their temporary housings, they have to be self-sustainable. So Soma city provided 100,000 yen per household to prepare for their life. Japan Red Cross kindly donated TVs, refrigerators, and washing machines. And AAR, the Association for Aid and Relief also donated kitchen utensils and other daily necessities for each household. Those kitchen pans and cooking pans were really indispensable for life.. I would like to thank Ms. Osa, the president of AAR. She will chair the next session. And 30 kilograms of rice are delivered to each one of the citizens.

In Soma city, all the evacuees moved to the temporary housings (Picture 21) until June. One of the challenges is to prevent solitary deaths, in which a person dies alone and was found several days later. Unnecessary deaths we tried to prevent was disaster-related deaths in the acute phase, economic suicides, and then solitary deaths. To prevent solitary deaths, we have to invent management system to organize those people in such a way. One compartment comprised of 5 houses, and 20 compartment share one assembly house, which could be seen as a unit. We nominated compartment leaders and unit leaders.

We had 15 units in the city of Soma, and those 15 unit leaders regularly had a meeting, at which they exchanged information, their views, and ideas. In this way, we could make some kind of community network.

While making such network, we delivered dinner to every resident, which was a good opportunity for us to check the health status of the residents. The problem was it cost ¥320 million per year. Some members of parliament who came over to visit us and encouraged us like 'This is a good project, you should continue.' However, nobody was assistive for us to give us a special budget. Instead, Synapse Co. donated us a kitchen car. This kitchen car is now on lease to Kumamoto Prefecture. And those people who are not able to go out shopping, we have the peddlers with carts. While providing necessities, we could prevent solitary deaths.



Another problem was PTSD among children. We recruited clinical psychotherapist all over the world and dispatched 5 of them to the schools. Later in the symposium, there will be a presentation on the results. We owe Mr. Miyazawa, the president of the Seisa group for this management. We appreciate all the staff members of Seisa Group.

In Soma, 5,400 were affected by tsunami and 458 were killed. This means 90% of the people survived. It was thanks to the firefighters who went to the shoreline to call on people to run away to the higher ground. Ever since Meiji Era, 150 years ago, nobody was killed by tsunamis in this area. So some of the people did not intend to evacuate saying 'I don't think tsunami will hit this area'. The firefighters persuaded such people to evacuate. However, 10 firefighters lost their lives due to this action. These 10 firefighters had their families and they had their own children. We decided to give each child ¥30,000 every month until the children become the age of 18 years old from the donation we received. As other children also lost their parents, so we counted the number of bereaved children, which turned out to be 51. So we made a new law so that we can give these children ¥30,000 every month.

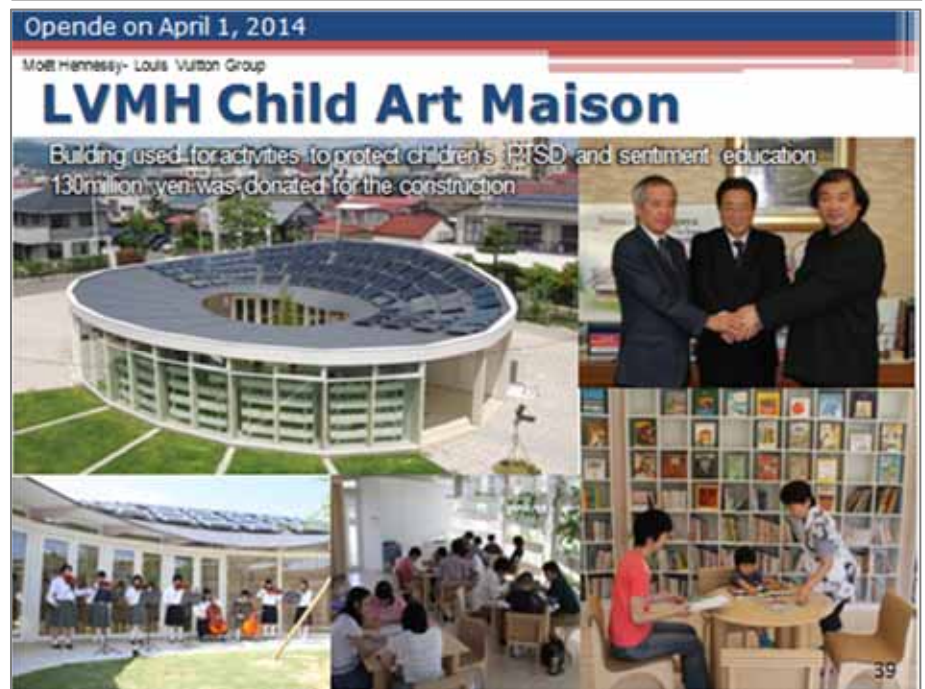
We further thought of what the firefighters wanted for their children the most - probably, a good education for their children. So, we decided that we will support all of these children to go to universities. As there is no university in Soma, these children will have to go outside and they will need fees for the dormitory. Therefore, we decided to cover ¥76,000 per month for their life cost if they go to universities. And that means ¥10 million per year for one university student and that would mean ¥510 million altogether. Fortunately, we were able to get all of the money in 2 years' time. On July 2011, I personally handed over the first supply to the children (Picture 35)

with the words 'please study hard and go to university without any worry. All the finances would come from Soma City.'

Reports from local government mayors

Now that enough donation were collected, but will these children go to universities? Well, they need good education to pass the entrance exams. So we introduced new types of education e.g. drills using iPads. In addition, the Tokyo University, the bright students began the Terakoya, the cram school, the private school scheme. They also helped the children in Soma.

Another help came from Louis Vuitton Co. Louis Vuitton Co. agreed with what we were doing and LVMH Child Art Maison was built in Soma City (Picture 39). This is designed by the world-renowned architect, Mr. Shigeru Ban. This is Ban and he decided to design on a volunteer basis for free. This artistic building is doughnut-shaped and much sunlight come through the window. Tomorrow, the staff of Louis Vuitton will come and join us. In the envelope of the symposium, you will find a memo pad. This is specifically made and donated by LVMH, so if you see them tomorrow, please thank them.



Mr. Abe, now the Prime Minister of Japan, visited Soma a year after the disaster. At that time he was not yet a Prime Minister and he was a Member of Parliament. He brought with him Members of the Shinto Political League to pray for the victims. At that time Joban Line was interrupted due to the damage by the tsunami, so children in Soma could not commute to Sendai. So I asked Mr. Abe, 'please make bus services from Soma to Sendai, at least 10 shuttles a day so that the children at Soma can commute to Sendai.' He fulfilled his promise although he was still not yet a Prime Minister at that time. I really appreciate his effort.

We also held a meeting on prevention of solitary deaths after the evacuees at temporary housings have moved to recovery housings. For the most vulnerable elderly, we decided to make the row houses. About 12 households live in the same building under the same roof with a private space for their own (Picture 43). The strength of this share house is that the elderly people can look after each other. In

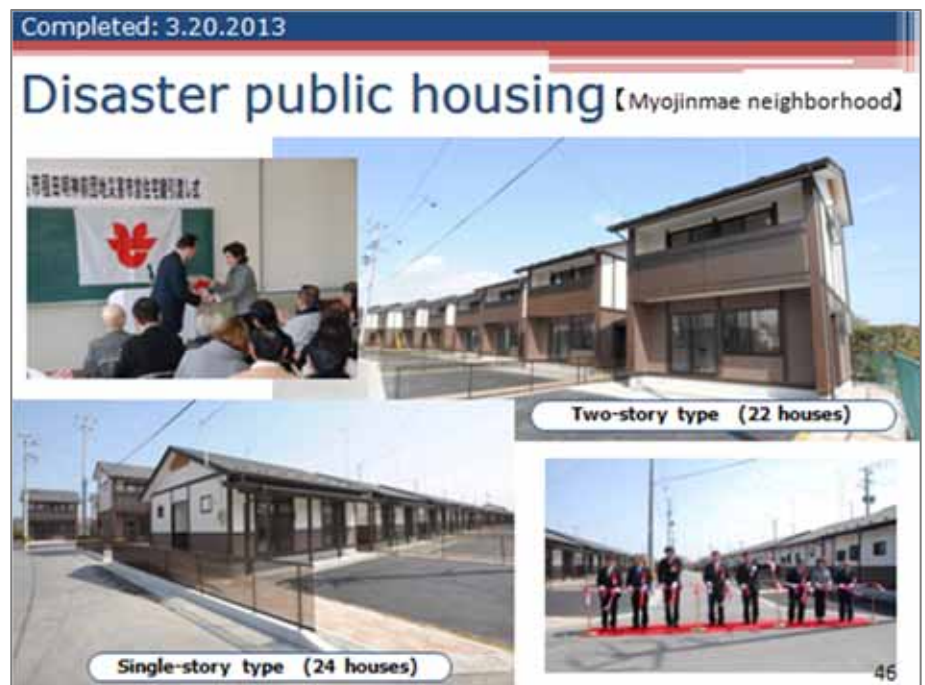
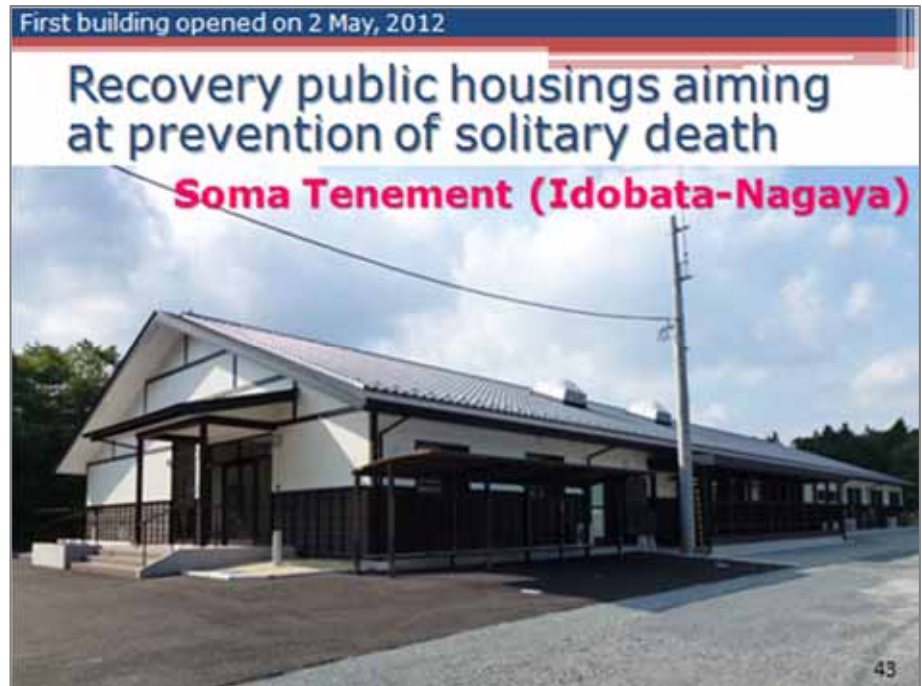
visits the residents every month for health consultations. He is still 28 years old, so he is about the age of their grandson of the residents, and the 'grandmothers' at the share houses love him so much.

Another thing that required the most energy was building recovery housings. Unlike the disaster area struck by an earthquake, like that in Hanshin-Awaji earthquake, we cannot construct buildings in the area struck by the tsunami, because there still is a hazard of tsunami. So, the reconstruction houses had to be built on the elevated ground. That was easier said than done. How can we ensure the plot of lands there? The strength of the City Hall was not sufficient. And so, the local people mad an action group so that they can help us to obtain the land space.

Then we held study meetings together with the residents. They had a variety of opinions. Some people said that I would like to live in a flat-type housing, others said they would build houses by themselves so they just need land spaces, and others said they would like two-story houses and would purchase them later. We discussed repeatedly at the meeting to reach an agreement.

But finally, the reconstruction houses were completed (Picture 46). In total, we freed up about 290 hectares of land and constructed 514 housings, including rent houses and house for sales, were constructed in nine locations. The construction started in September 2011, and last year, 26th of March, all of the construction was completed.

However, another problem emerged: elderly people do not have cars, so they were not able to go out for shopping. Therefore, with the subsidiary from the Ministry of Economy, we provided mobile catering service. Mr. Kikuchi, the President of Kikuchi Super Store, took up this service without expectation of profit. Mr. Kikuchi further gave us a donation to make this symposium possible. Thank you so much, Mr. Kikukawa.



Then we built a storage warehouse for disasters. If the municipalities who assisted us in the time of difficulties got faced with disasters, we will quickly deliver stockpiles such as water from this warehouse, in recognition of the favor they gave us. So this warehouse is not only for the people in Soma city but also for our friends.

Five football courts were built: four by FIFA and JFA, the Japan Football Association; and one by Soma city (Picture 58). A club house called 'a special recovery support center' was also built in front of the courts. And the Rakuten Eagles, a professional baseball team, constructed a baseball dome called 'Soma Children Dome' for the children in Soma city. This dome actually gave the children hope for future and now the children are doing exercise in the dome. We really appreciate it.



The owner of Rakuten, Mr. Tachibana, asked us to be the fans of Eagles and kindly said he will offer free shuttle bus to come to see the game of Rakuten. But I said 'sorry, I cannot take the offer, because I am a great fan of Takahiro Suzuki of the Yomiuri Giants, who was born and grew up in Soma city.' Actually, I am the associate of the fan club of this person.

The new civic hall was completed in October 2013, 2.5 years after the disaster. We wanted to build this civic hall as soon as possible in order to lighten up the feelings of the citizens. So to speak, the civic hall as a symbol of recovery. Next to the hall, we have the special history museum with all the artifacts related to the history of Soma. If you are interested, please visit the museum.

Another serious problem of flooding was ground subsidence by 80 centimeters or so in the coastal area. With this subsidence, we have a higher risk of flooding. We equipped mechanical pump to bail out water (Picture 64). We need two units of pump-houses and one pump has been completed. We designed the pump house with a beautiful exterior like historical



And for the bereaved people, people who lost their lives in the disaster, we have the memorial monument (Picture 66). There are two monuments in different zones, Isobe and Haragama. Next to the monuments at Haragama, a memorial hall was also built so that people will never forget this huge disaster.

A new municipal government office is due for completion in upcoming September. It's very similar to the Civic Hall design. Architecture is very Japanese taste so that people feel nostalgia when they visit the office. Whenever you come over to City Hall, you may feel that you are coming back to your old family home. That kind of familiarity should be attached to the City Hall. The City Hall can serve as a meeting place or a place you can enjoy a cup of coffee or tea. Now some people are still evacuating out from the city and others are coming back, but both of them need to have a spiritual hometown. So, I hope that the Soma City and the city hall becomes the icon of your special hometown. Then I move on to our experience at the time of the Kumamoto earthquake. Every time disaster comes over we actually look at the record of who helped us at the time of difficulty. We got a support from Tamanashi region, Yamato-machi region of Kumamoto. It was around 10 o'clock PM on 14th April when we knew a huge earthquake struck Kumamoto prefecture. The next morning I made an order to send water to those two municipalities based on the experience of what we had needed the most soon after the disaster. But 28 hours later, there was another major



of April. In that morning I made an order to send water and blankets from our stockpile warehouse to the 12 municipalities of Kumamoto.

Also, I remembered the kitchen car I mentioned before. Anticipating that people in Kumamoto would need a kitchen car, I talked with the municipality head of Takamori and so we sent the kitchen car to Takamori City (Picture 71). And the kitchen car is now serving food for the evacuees in an evacuation center. As one kitchen car is not sufficient, I hope that other municipalities will copy our idea.

Yesterday morning, we found there are 150 sheets of gypsum board which you used as partition at the shelters 5 years ago (Picture 72).



They were sent to Takamori municipality yesterday in joint consultation with the assembly member of Kumamoto. But the municipal staff at the disaster area do not understand why these partitions are important until we explain our situation. So it will be good to start from Takamori city and then spread the idea to the surrounding areas. But in Kumamoto, people evacuate at the time of aftershocks and then come back to their home soon. So it is difficult to identify how many of those partition boards are required. This management problem could be solved by making a database of the damage of each house, but it is easier said than done.

That's all from me, and we want to deepen our discussion further on various topics. When I saw the situation in Kumamoto, I was so shocked. It's something to do with what Mr. Sakurai mentioned. Five years ago, we learned bitter lessons but that bitter lessons were not actually shared and applied in Kumamoto. I sincerely hope this international symposium will be a good opportunity to achieve better preparedness for disaster. Our knowledge, especially those data about radiation protection, will be of great value for future use. Thank you very much indeed for your attention. I'd like to conclude my presentation now.



The 3.11 Triple Disaster:
Health Effects on the Residents of Soso District, and Possibilities for Health Promotion

Tomohiro Morita Soma Central Hospital, Physician



Thank you for the introduction. My name is Tomohiro Morita from Soma Central Hospital. I am a physician. Now, I'd like to begin my presentation.

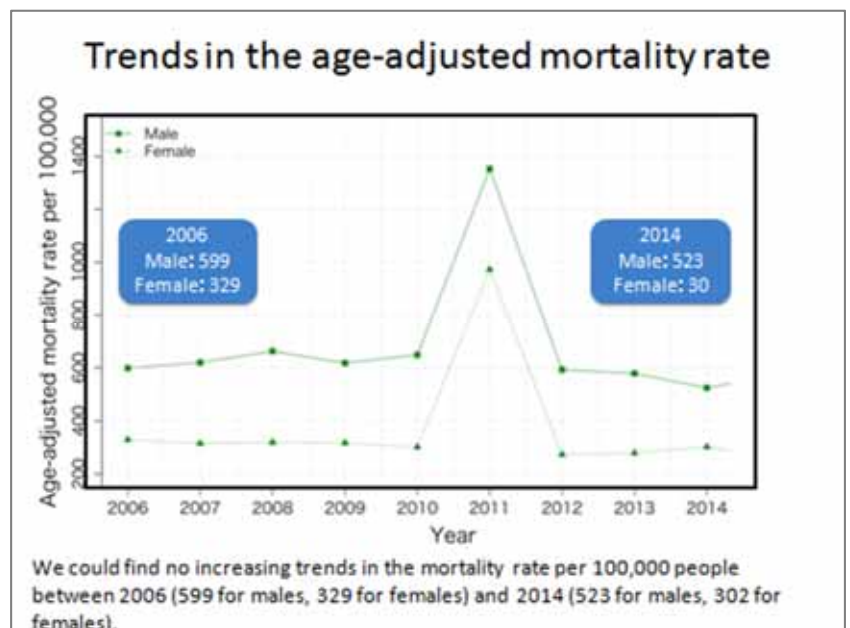
"The 3.11 report disaster health effects on residents of so-so district and possibilities for health promotion", this is the title of my presentation. First of all, the introduction. The health impacts of a disaster can be distributed to two types. The first is direct health impacts, which is caused by the injury from

the disaster. The second is the indirect health impacts, which is due to the drastic environmental change. For instance, in Kumamoto earthquake, some cases of "economy class syndrome" leading to death during evacuation were reported by the media. Besides, at the time of the Hanshin earthquake, some studies reported the increased number of patients with myocardial infarction after the disaster. These indirect health impacts can be caused by social impact of a disaster such as the loss of access to medical care, environmental change, and physical and psychological stress.

In the East Japan earthquake, there were large direct and indirect health impacts. Psychological stress from losing their families and the long-term evacuation life could have resulted in deterioration of medical condition. All of these are the compounding factors leading to the impact on health which we still do not know. That is why we have targeted Soma City and Minamisoma City to do the survey on mortality and cancer mortality.

This is the method and we have used the Vital Statistics managed by the Ministry of Health, Labor, and Welfare, which is also used for the deaths statistics. And also, we adjusted mortality rate for age.

This is the result, that is the trend of age adjusted mortality rate per 100,000 population before the disaster and after the disaster. As you can see, there was no major difference. The size of the peak is asserted. That would mean the death from the disaster. Although there was a big peak in 2011, age adjusted mortality rate have not changed significantly after the disaster compared to before.



This is as of 2011, what was the direct impact from the disaster. So, we did a detailed survey. In order to assess the indirect health impacts, we excluded the deaths from tsunami or the earthquake from further analysis. The result indicated only in the first month from the disaster, mortality risk was increased both among men and women: relative risk were 1.52 for male, and 1.35 for female.

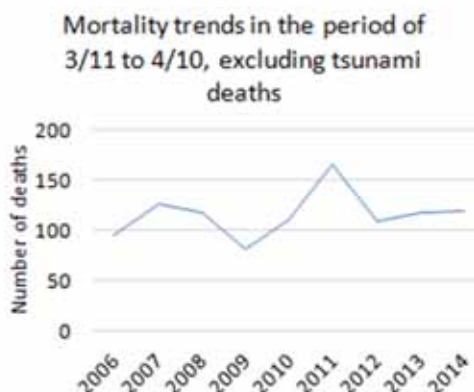
This is the cumulative mortality rate by age group by sex. Among both sexes, mortality rate was increased in the first month. Especially, among women, mortality rate among those older than 85 years old has increased from the first to the third month from the disaster. The relative mortality risk in post-disaster period in these three months were 1.45, 1.75, and 1.81.

his result indicates that indirect health impacts of the disaster can be more severe and persistent among elderly people than younger people.

In the Kumamoto earthquake case, only 1 month has passed but we will have to focus on the health promotion, particularly for the elderly. And so, we dig deeper the cause of death for these people. This is 1 month after the disaster and the pneumonia for male. And also, this is 1 month after pneumonia, usually 22 per month. However in 2011, 47 people died, about double the number died from pneumonia, so the cause of the 1 month period. This is the elderly people's deaths due to pneumonia. Probably, these elderly people can suffer aspiration pneumonia. That's the biggest cause of the disaster related deaths.

In order to prevent these secondary deaths, we have to prevent the elderly deaths due to pneumonia. This is why when helping the medical assistants in the affected areas, we will have to cater them in cleaning their oral cavity for instance for the purpose of prevention especially in the 1st month of the earthquake.

Changes by month



- Excluding direct deaths from the disaster (tsunami victims), we compared mortality rates by month

- Significant changes were found in the month of March

Male: 1.52 (1.19-1.93)

Female: 1.35 (1.05-1.74)

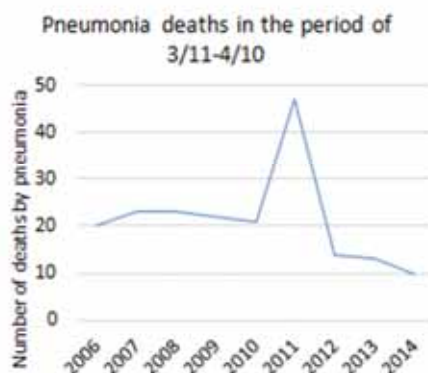
- No significant changes could be found after April.

Comparison of years

	3/11-4/10	4/11-5/10	5/11-6/10	6/11-7/10
Male				
0-39	NA	0.74 (0.09-6.02)	1.30 (0.14-11.60)	0.86 (0.10-7.18)
40-64	1.29 (0.67-2.50)	0.40 (0.14-1.09)	1.01 (0.51-1.99)	0.62 (0.24-1.56)
65-74	1.66 (0.96-2.86)	0.73 (0.36-1.46)	1.03 (0.50-2.11)	0.63 (0.27-1.48)
75-84	1.61 (1.07-2.42)*	1.24 (0.81-1.89)	1.22 (0.71-2.07)	1.09 (0.65-1.82)
85+	1.64 (1.07-2.52)*	0.97 (0.56-1.67)	1.53 (0.94-2.49)	1.42 (0.81-2.50)
Female				
0-39	NA	NA	1.75 (0.18-16.83)	NA
40-64	0.79 (0.24-2.69)	0.72 (0.16-3.17)	0.89 (0.26-3.04)	0.39 (0.05-2.97)
65-74	0.67 (0.20-2.23)	1.12 (0.38-3.31)	0.86 (0.30-2.46)	0.46 (0.11-1.97)
75-84	1.55 (0.99-2.43)	1.06 (0.59-1.88)	0.51 (0.25-1.07)	1.09 (0.61-1.95)
85+	1.45 (1.04-2.03)*	1.71 (1.21-2.41)**	1.81 (1.28-2.56)**	1.23 (0.82-1.84)

Excluding immediate tsunami deaths, we compared months of 2011 to pre-disaster baseline months, and found increasing trends of long-term disaster related deaths.

Cause of death



- In the first month after the disaster, we found that 30% of deaths in the elderly were caused by pneumonia

- It is possible that elderly pneumonia trends reflect long-term disaster related deaths

In order to prevent long-term disaster related deaths, pneumonia countermeasures for the elderly are important (oral care in evacuation centers, etc)

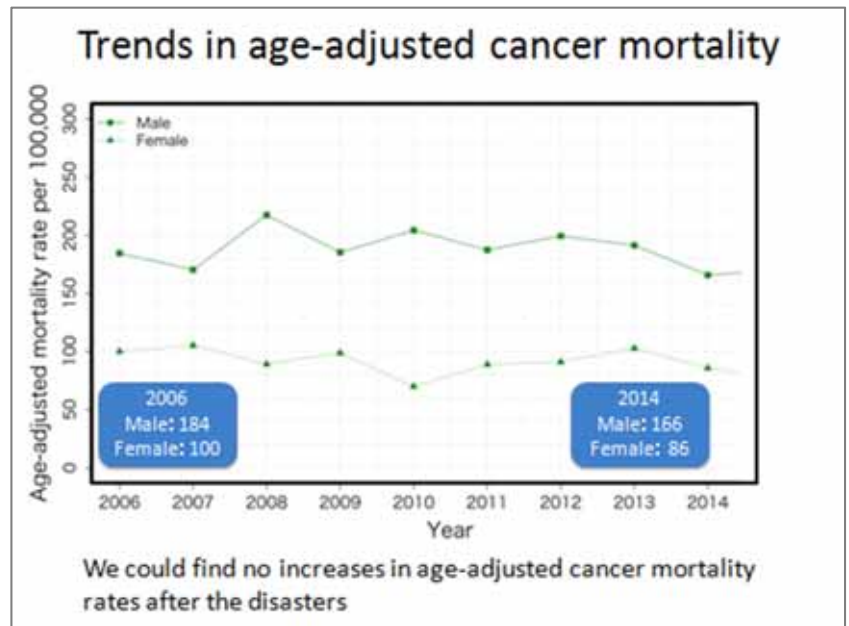
Then, how severe health effects of the nuclear accident itself was? Though radiation exposure among residents have been proved low, fear for health damage due to radiation exposure such as cancer still remains.

Therefore, we compared cancer mortality rate between pre-disaster period and post-disaster period. The result indicated that there is no increase in age adjusted cancer mortality after the disaster. In the past 5 years after the disaster you could find no long term increase in all-cause mortality or cancer mortality rates after disasters.

But the disaster related deaths in the past 5 years, most significant, the critical period was 1st month of the disaster. So, initial management or the countermeasure is required. Especially, focus should be on elderly people to really relieve them from that pneumonia aspiration, and pneumonia scenarios.

In the latter half of my presentation, I'd like to share you the medicals and the health measures we are taking. As Mr. Sakurai, the Mayor of Minamisoma mentioned that one of the characteristics of the disaster is that there are many young people evacuated from their hometown. Mass evacuation has occurred in mandatory evacuation within 20 km from the nuclear plant and also in voluntary evacuation zone from 20 to 30 km from the plant.

As a result, population in Minamisoma City has been aging rapidly. The aging rate has increased from 23% before the disaster to more than 30% after the disaster. The rapid population ageing means that the number of the people supporting elderly people is proportionally smaller. Here is the trend of the amount of public long-term care expenditure per elderly person in Minamisoma City. And the long term care expenditure spent by the municipality has increased after the disaster compared with prior to the disaster by 30%.



Summary

We could find no long-term increases in all-cause mortality or cancer mortality rates after the disaster.

However, the elderly appear to be at higher risk of disaster related deaths, which may continued for more than the first month after the disaster.

Health promoting measures for the elderly are important, particularly after disasters.



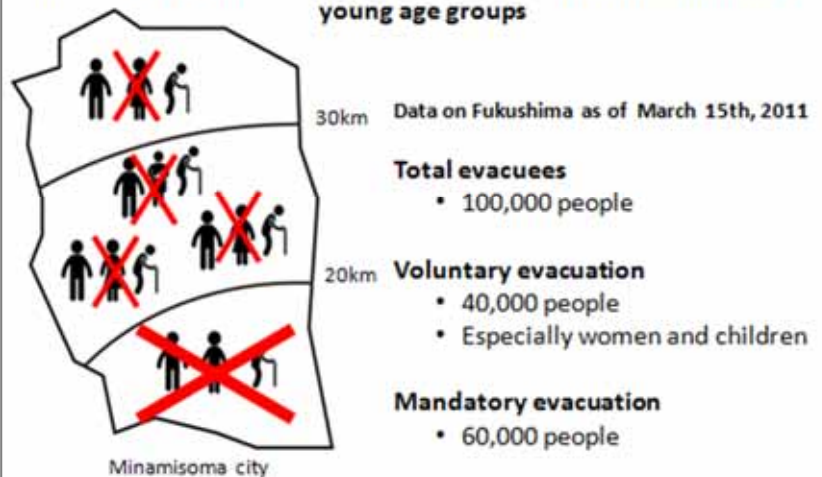
Besides, those who lost their carer sometimes lost houses because of tsunami, lost their families, and then these elderly people are left alone and solitary in the community. Those isolated elderly people are prone to get many diseases including stroke, fall, fracture, dementia, and others. Therefore, social support to save them from the health risks has been a public issue in this district.

Like in the previous case in the temporary housings of the victims of Hanshin earthquakes in Kobe, 50% of residents are elderly people. So, in Fukushima, the rate of the elderly in temporary housings were estimated as high as that used to be in Kobe. Thus, the demand for social support to keep the health of the elderly is huge. Now, local governments are struggling to manage this situation. One example is, the community housings for the elderly. It is a single story and semidetached house and elderly people who have lost their houses are actually living together. 57 people are living in this terraced house and half of them are 80 years or above.

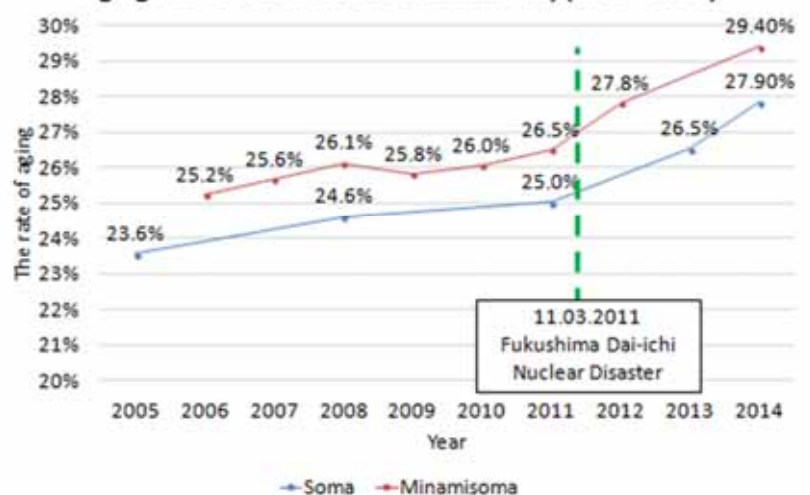
One of the characteristics of this program is that like a kind of shared house, they show some privacy space. Everyone has their own private room and everyone can actually sustain his or her own life. They go out as they like and they have their own activities to enjoy. In contrast, as for lunch, lunchboxes are distributed to all residents in the public dining room so that residents have an opportunity to meet with each other at least once every day. So, meet with them, talk with them to really refrain from getting alone and solitude. To create the elderly people's community, this kind of cooperative community can be useful.

Problems for the elderly in disaster settings

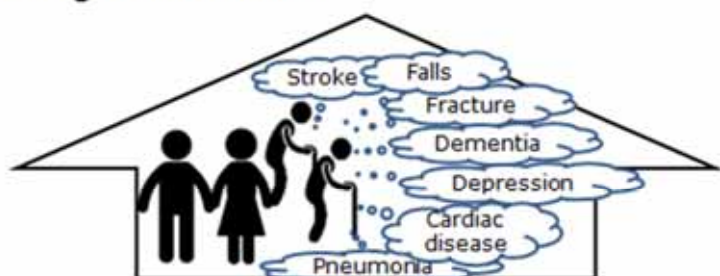
After the 3.11 triple disaster, mass-evacuation occurred primarily in young age groups



Aging rate of Minamisoma and Soma city (2005 – 2014)



The elderly can easily be affected by societal changes and isolation



- Social isolation can lead to many health problems in the elderly
- Moreover, diseases may be discovered late when isolated

I visit the community housings once every month and the public health nurse also visits. With help of volunteers, there is a number of activity programs or tea time events or other gathering events. This community housings seems to have a good effect to the health status of elderly people to prevent social isolation. If somebody is ill, some other people will take notice of that. So, the early detection of illness can be assured because the people can actually observe other people, this person is not coming up to the lunch or he does seem sick.

And also the better access to the healthcare. Sometimes elderly people refrain from going to hospital clinic. I am sure that you understand that the people think it's rather tedious to go out and go to the clinic and the hospital. But if your neighbor takes note of that and then the neighbor could offer you that I will take you to the hospital. And then, the healthcare can be provided. There are a number of cases where the sick patient was found and taken good care like hypertension. And this person was not quite aware of his own symptoms but the neighbors actually took him to the hospital.

There was the old lady with auditory hallucination. It was not actually noise that she noticed. It was actually hallucination. And then it was pointed out by her neighbors and she took the professional diagnosis. And it's quite often that neighbor to call the ambulatory service to save the life. It is safe and safe and securities and also better healthcare be attained with this kind of terraced house, the elderly people's home.

Health promotion measures in Soma

- In Soma, a public housing program for elderly disaster victims has been started
- 53 residents, with more than half over 80 years old.



Characteristics of the program

- Protect privacy
 - Residents live independently in their own rooms.
- Cooperative community
 - However, they take lunch in public rooms and washing machines are located in the public rooms. These rules can help residents to build the cooperative community.
- Visiting program
 - A public nurse and a physician visit the houses monthly.



Health impacts of public housing programs

- Prevention of social isolation
- Faster realization of health problems
- Access to healthcare

Examples of medical connections in public housing

A woman who had been ignoring her high blood pressure was recommended to talk to a doctor, and received medical attention thanks to their support

A woman with auditory hallucinations consulted a public health nurse, and transferred to a hospital for medical care by with her support

Now in conclusion, during 5 years from the disaster, total mortality rate has increased only in the 1st month. It's a very assuring result, but along with the greying population, we should have long term healthcare support for the elderly. With all those issues in mind, we have to come up with the most effective community support to elderly people. With this, I'd like to conclude my presentation. Thank you very much indeed.

Conclusion

- We could find no increases in total mortality or cancer mortality rates after the disaster.
- However, there has been rapid ageing in affected areas, and a need for policies to promote the health of the elderly.
- Creation of community support programs for the elderly can be an effective health promoting measure

Activities of the Follower Team: prevention of PTSD among children

Masaaki Abe Director, Seisa Nagoya Junior High School



Until March 2007, I was living in Koriyama City and worked as a center head of Seisa International High School, a correspondent high school. My ex-students are still living in this area.

Soon after the disaster Mr. Yasuo Miyazawa, the group head, and Mr. Tachiya, the Mayor of Soma discussed what support is needed, they reached the conclusion that we need some measures to help children, particularly the psyche of children. Then I was assigned as a team manager because I have many

acquaintances here.

This is what we experienced at the Hanshin-Awaji earthquake. Psychological problems became peak three years after the disaster. So, I thought that a single year follow-up is not enough. I thought long-term close relationship with children is required to prevent such problems. And that was my motivation and that was why the 'Follower Team' was created.

The 'Follower Team' is a clinical psychologist's team that was dispatched to this area. To my knowledge, this was the first attempt of long-term follow-up of children's psychological problem as a team.

Before us, many psychological aids were given, but they were provided for a short term without appropriate handover, so children were asked the same sort of questions repeatedly. When we started our activity, many people said that it would take much courage in order to consult with clinical psychologists. We thought of ways of overcoming these hurdles.

As for the short term goal, we aimed at fulfilling the immediate life needs, because we cannot go back to the past. If we look back on the past, we would just miss it. Instead, what was important was to fulfill our current life. That was our short term goal.

Then, we raised the midterm goal; and that is to increase the self-reliance of the children. To achieve this goal, expanding self-confidence and self-affirmation was the key. To expand the spectrum of the possibility of the children under the limited reality, we helped them to gain profound self-understanding and to practice positive behavior.

Our mission

Short-term goal Fulfilling immediate life needs

- Relieve worry and anxiety through providing mental care
- Provide learning support
- Provide exchange program

Prevent PTSD

Middle-term goal Expanding the spectrum of possibility

- Strengthen feelings of self-respect and self-affirmation
- Provide opportunities for learning and finding through academic development, art experience and sports experience, which will help children designate their own career.

Long-term goal 'Gold stars' for everyone's lives!

- Instead of 'My life was destroyed by 3.11', create a narrative closer to: 'I am living a full life to find my own way in an adverse situation.'

And the last one was a long term goal; that is to have the gold stars for everybody's lives. To achieve this goal, we have to collaborate with school teachers to create healthy atmosphere so that the children can feel that their lives were destroyed by 3.11, but they were able to successfully overcome these events and now they have a fulfilling life. These are the goals and the missions. And how to hand these real experiences down to future generation is our mission from now on.

When the team was formed, the most important mission was to prevent PTSD. The word PTSD was already popular among parents and children, which made them more anxious about the problem. Indeed, there were emotionally unstable children or children who are easily upset, which clearly suggests they got lots of mental stresses.

Under this situation, we had to devise measures to prevent or mitigate PTSD. Particularly, we tied up with a school community and also we did the interaction and cooperation with specialists. Because our focus was children, our main activity was in schools. And we wanted children to charge positive energy in them and to enjoy their school life so that they can have fun. So the Soma Follower Team provided both direct support and indirect support via parents and teachers for the children. All these efforts provided at the schools are one of the features of our activity.

Two junior high schools and two elementary schools, which were severely damaged by the tsunami and thus were in urgent need of support were chosen. The students experienced different types of hardships and needed a careful hand. Some children saw their friends and relatives washed away by the tsunami. Others lost their parents or their grand parents or siblings. In such a situation, our first priority was to build rapport with such children, facilitating them to get mental support at ease.

Particularly in the school where the teachers were also the victims, we needed to be accepted without becoming a burden on the teachers. Mingle with children and teachers during daily life were the key points. Through these experiences, we literally lived with them in the community, which made us provide consistent support. Because if people come and go, they ask the same question to the same persons, potentiating the anxiety of the students. That was not our stance. The same person would be there, would be persistent in helping them. So, we established a system where the single persons continued support giving the local people confidence.

Our area of activity

School	Fulfill school life: 'How to have fun, and how to worry' <ul style="list-style-type: none"> • School clinics: counseling for school children, parents, and teachers • Support for orphans of the disaster: continuous and multidimensional watch-over using individual records • Support for teachers: mental health surveillance by public health commissioners
Community	Healthy life: 'Protect and promote mental and physical well-being' <ul style="list-style-type: none"> • Visits to temporary housings: Health counseling by medical teams • Counseling system: counseling rooms, outreach at temporary housings and meeting spots, helpline • Health protection and promotion activity: publication and information transmission aiming at mental & physical health promotion
Interaction & Cooperation	Make the best of resources and opportunities: 'Meet, feel, think' <ul style="list-style-type: none"> • Professionals × Professionals: liaison meeting between support teams working in Soma area • Professionals × Students: exchange program between support teams and school children in Soma city

School support

Target	Two junior high schools and two elementary schools affected by tsunami
Course of action	Building rapport <ul style="list-style-type: none"> • Live in a close relationship • • NOT being a guest • Continuous and consistent mental support • Follow-up for teachers (Support by teachers) • From a private room to a class room to a campus

This consistent support was achievable only when we have a confidential relationship based on trust. One of the key measures that that gave peace of mind to the teachers was how we could respond to an emergency.

Without delay. And also, we wanted the children to have stronger ties with teachers rather than to us. So, we offered indirect support to children through their teachers.

You may think that counseling is conducted in a private room. But if that is the case, that would be a big hurdle. So, it was not a private room but in the corridor of a school or in a classroom where we provide support. Throughout the school life, we contacted children and teachers to create the counseling-friendly environment so that more teachers and children could come to us for help. We never intended to grade these children. We just accepted their feelings. We simply listened, and we did not coach them. Such 'never-rejected' atmosphere, I think, gave them a sense of security.

These were some of the stresses that children had to go through. This is the data after the typhoon number 23rd of 2004, which caused a huge flood damage. There were many types of stresses. As you can see, as the age advanced, the level of the stresses become stronger.

Although this kind of data was collected by several support teams, it seemed that these study results were not put into practice. What we had to do is to use this data to improve our support activity for children. So we utilized the findings in devising method of psychoeducational intervention for

children. We provided psychoeducation such as trust working, stress management. We also created more opportunities for children to confide with each other or with teachers.

Mental stress in children
(Post Traumatic Stress Reactions by the PsychoEducation Scale)

	1 st grade	2 nd grade	3 rd grade	Total	After typhoon23 in 2004
0	0	0	0	0	19.5
1~4	26	0	0	9	41.4
5~9	26	13	10	17	23.6
10~14	26	47	26	32	6.9
15~19	11	7	10	9	4.1
20~24	11	13	10	11	2.3
25~29	11	13	15	13	0.7
30~34	0	7	10	6	1.1
35~39	0	0	5	2	0.4
40~	0	0	15	6	0.1

(May 2011)

5

These are some of the important things in mental care. It is important, of course, to provide adequate information to children who need help. But more important thing is to provide children practical ways to eliminate solve the problems. We may not be able to eliminate a problem, but we can think together on how possibly we can solve these problems in the real world.

And also, we need to accept the reality so that we return to our daily life as soon as possible. Children have their own distress and challenges, but we think that children already have the answers in themselves. So we do not tell children what to do. We help children come to be aware of what they are thinking and the answers that they already have. And we get along with the children to take action for solving the problem. If children try to solve the problem using measures beyond their capability, that measure will become another burden for them. Therefore the most important thing for us is to detect what kind of and how many resources each child have. Look deeper in themselves so that they can find a way out is the shortest way to solve a problem.

I think vulnerabilities and risks had existed even before the disaster. Those who had had more factors before the disaster were more vulnerable to mental instability and were more likely to show emotional or physical expression after the disaster. This vulnerability existed because each child had a different living environment before the disaster.

What was lucky about Soma area is that the school resumed soon after the disaster. And in some cases where teachers visited shelters and provided lectures. And of course even after the schools were opened, many children commuted from shelters while others commuted from their own homes.

I am also used to go to Minamisoma. There, some children have houses not damaged by the disaster but they cannot go back (due to radiation contamination). Other children's houses were literally "washed away by the tsunami" so they didn't physically have their houses to go back. Others live in their own houses. The situation was different and some children have the sense of guilt because they are living in their own homes. However, although each child had a different background, all of them went to the same school and saw see each other, which created a sense of stability.

The school I was involved in was a school that was washed away by the tsunami. After the school reopened, children had to commute using the bus, which drove through the area where the tsunami swept away everything. Some of the children told me that they cannot look outside of the bus and try not to look outside by talking with each other or reading books. But even with these kinds of flashbacks, they wanted to go back to schools and the local government responded to their wish. They had cultural festivals, and the theme of the festival was 'what the town would look like 10 years from now'. They talked about how to create positive ways of thinking, and shared such image is help them to overcome the current difficulty and build back better. In another activity, children made the charms for the prayer using the natural stones that were donated. These tokens of prayer are to pray that these children can pass the entrance examinations for high schools. And these were some of the things that we did together with children. Through such activities that strengthen connection with others, they could gain a sense of self-affirmation and charged positive energy within their mind.

When we came first, we interviewed all the school members including the teachers. And one interview was not sufficient so throughout their daily lives, we chatted with them to establish the rapport. And twice or three times a year we did do the interviews.

Through the interview, a student said that I want to 'feel better', though s/he did not know what is better. I think the student experienced hardship. And the student said that s/he wanted to die. Then I asked what actually s/he wanted to do, and then s/he answered 'I want to be set free'. And then I asked, 'how can you be set free?'. And that was the trigger of the conversation. This student became my Facebook friend and I know what s/he is doing now, and the goal we discussed at that time is what s/he is pursuing now. S/he is now studying hard to get the job related to the goal.

Several students burst into tears when evacuation drills were conducted in May 2011. They are still having unstable minds. They had already had some problems before the disaster, and the stresses caused by the disaster triggered their physical manifestation. While talking it was revealed that she had mental stress from daily classes, extracurricular activities, friendships, and family problems. The stresses from the disaster were added to such stresses.

But one student, who easily lost temper before the disaster, regained himself because they had the opportunities of looking into them by having to live apart from their family. So, each environment is different and each student's coping capacity is different. So, we will have to look at individual students one at a time.

I think understanding each student's background and making the best of the information to support children is important. So we shared such information with the teachers and working together with children to solve the problem. In other words, how to make interrelationship with the teachers was the key.

After the disaster, there was a big change in environment and the interpersonal relationship. But some students converted these emergencies into opportunities. Through many support activities, they experienced what they would not have had if the disaster didn't occur. Through such experiences, some children broadened their dream. Some make a plan to study abroad, and others try to send messages to

all over the world. And that was a good aspect of what we did. We thought that it would be better if we can do such support without giving extra burden on the teachers.

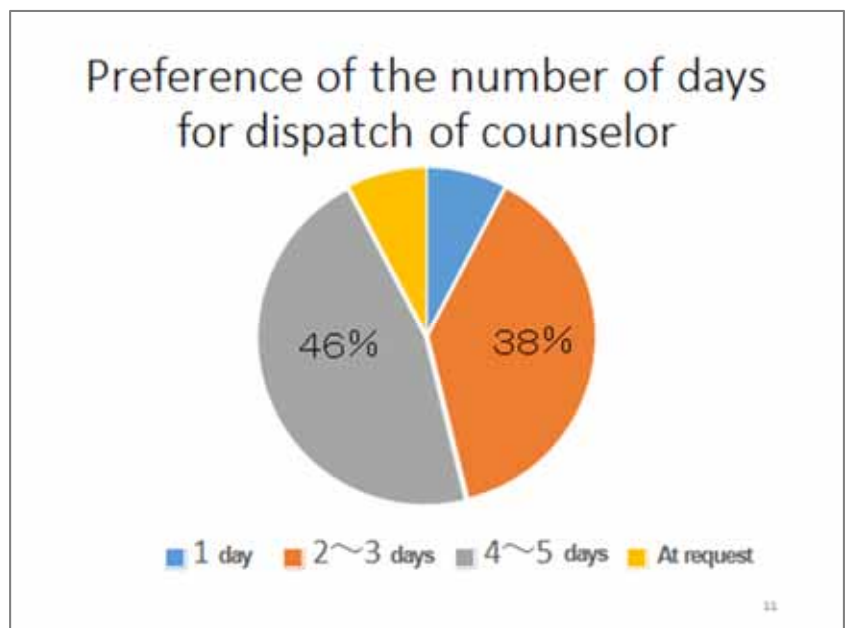
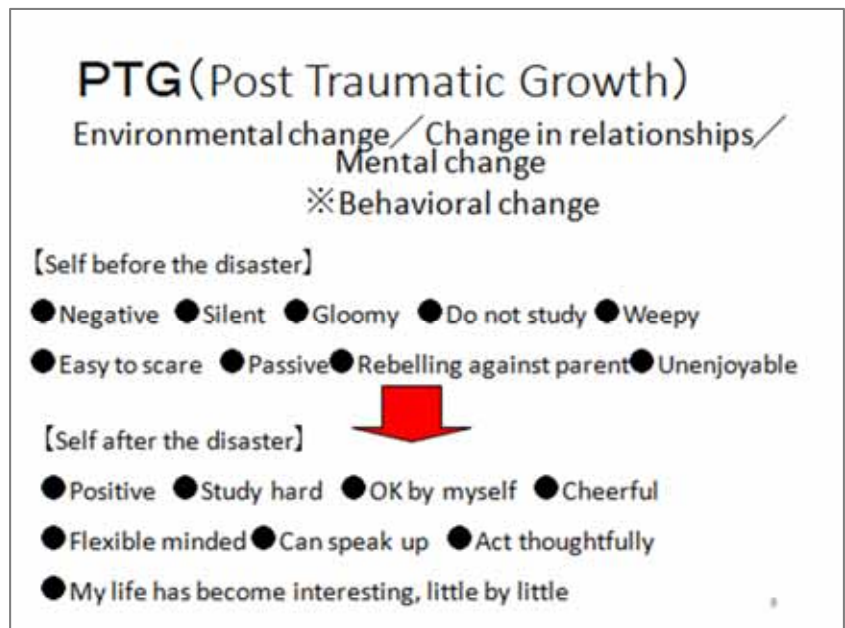
Extracurricular activities and support require teachers to arrange things. If teachers feel they are overwhelmed, the scheme will not advance. So, we also can drive how we can help students without giving extra burden to teachers. And this resulted in success. Some student expanded their experience and their dream for the future became greater. There are many students who successfully recharged mentally and ready to grow. The words in the slide are some of the words that were mentioned by students. I want them to praise themselves for making such progress.

And also, teachers said that they also had the space of mind to observe students' behavior in classrooms. And as such space of mind among the teachers will be reflected to the students, we think that what we did had a certain level of success.

This is the result of a questionnaire targeting head teachers after the 2 years' activity. On the 3rd year, we asked the school teachers 'how many days a week do you want the counselors to be at schools?'. About 84% answered they want us to stay at least 2-3 days a week. Of course, the clinical counselors will not be able to be there forever. But probably, this would be the desired number of days for us at schools.

And also, when we ask about the mental care necessity, 47% of the teachers say that they have the disaster-related stresses and they need help. And the majority of the teachers said that mental care to the adolescent children, in fact, 79% of the teachers said that the children need that kind of help. That may be the main reason why more than 80% of the teachers wanted school counselor to present at school.

The second issue was the parent support. Most of the children have accepted their new daily life and have recovered from the damage of the disaster, but many adults still compare their current lives with those before the disaster. That's why the parents are more likely to be stressed out from the disaster. And the teachers also said that they want us to help the parents as well.



We want the children to continue to smile. I want them to feel that 'there have been many ups and downs, but I'm happy where I am now.' We want to create such society as adults and that's the responsibility for us.

Five years have passed and during the time I learned myself and I believe that what we have learned is applied to the operation of the Seisa Nagoya Junior High School. This junior high school is focusing on school truant students and accepting students who refuse to go to school. And so, what we have learned in Soma is very much helping these truant students.

Everything is for the smiles of children!
Let's create a society where children can
say "There have been many ups and
downs, but I'm happy where I am now"



Thank you for listening

22

Finally, we want to continue to contrive so that we can keep the children smiling. Thank you.



Recovery from the Great East Japan Earthquake and lawyers, and the role of Japan Legal Support Center

Asako Sugioka Lawyer, Japan Legal Support Center, 1st Operation division



I belong to the Japan Legal Support Center. I would like to share with you the experience of Japan Legal Support Center, roles and responsibility in conjunction with the disaster. When the Great East Japan disaster occurred, I belonged to the Bar Association of Japan. The Association set up the East Japan Disaster Countermeasure Headquarters and I was one of the staff members at the headquarters to be engaged in the recovery activities of that disaster in Tohoku region.

I want to share with you about our efforts how the lawyers were engaged in the recovery of the disaster and how we made a relationship with the people in the community. During that period, I worked at the Japanese Bar Association, which is located in Tokyo. Many lawyers throughout Japan were actually joined in the support activity for the residents not only in Fukushima but also all over the Tohoku region. I was engaged in organizational work rather than legal consultation work, so let me start with the organizational aspect of the activities we conducted.

We lawyers were engaged in the dispute mitigation consultation. What I was used to do in normal days was to delist various cases. We actually provided the legal consultation and made the procedure for lawsuits and acted as the proxy or the legal attorney.

After the Great East Japan disaster occurred, many things arose. What the lawyers did first was to provide legal consultation services. We went to the evacuation centers to have the consultation services there. And many people evacuated to various parts of the region, so we provided telephone service to accept consultation from throughout Japan.

As far as we know, there are 40,000 cases within 1 year. So many consultations were asked for, and the local office of the Japan Legal Support Center in Fukushima has accepted 43,000 cases so far. Especially during the 'golden week' (Japanese holidays: 3-5th May) of 2011, 300 lawyers attended 95 evacuation centers in Sendai and got 1000 consultations.

After the legal consultation services, evacuees actually referred to the various cases and programs and we get the direct involvement to resolve those cases legally. Compared to the ordinary days, there were some differences after the disaster. We have a larger number of familial cases such as division of inherited properties, guardianship, and devotion than normal days. And also there were many cases inherent to the disaster: requesting compensation for damages related to nuclear plant incidents, which includes direct requests to the Tokyo Electric Power Company, requests using ADR processes and through jurisdiction procedures. And as for the disaster-related death, the local governments set up the review board for disaster-related deaths, and if the death is certified to be related to the disaster, the condolence money was provided to the bereaved family or special subsidy. Therefore, whether or not a person is certified as disaster-related death does matter for his/her family. We helped the procedure of the request and if the death is not certified, we made a proposal for lawsuit requesting certification.

What specific activity we did was to deal with ADR. ADR stands for the Alternative Dispute Resolution outside of court settlement. For ordinary people, going to the court and fight or the litigation case is quite stressful and also cumbersome. However, even for those who were actually suffering, they had to take an action as resort to such kind of litigation to resolve problems. However, such action and effort for the court may be rather difficult for the ordinary



people. To make the procedure easier and quicker, two ADR procedures were set up after the disaster. One was the guidelines for voluntary liquidation. This system is for the debtors who had difficulty in repaying their debts because of damage and losses by the disaster. Through some kind of consultations with debtor and lessors, the debt amount could be reduced, and/or the due could be postponed. As the registered expert, the lawyer supported those debtors.

Also, a center called the dispute settlement center was established for settlement of disputes in compensation for damage related to nuclear plant accident. They settled litigations not based on a direct request but by using ADR measures. As lawyers, we often served as agents to make some request and then to settle the case.

Another our activity was legislation proposal. Although there are various legislations laws to support disaster victims, they are not always a perfect fit. Sometimes it was too complicated or not sufficient, or sometimes they were not supportive for the victims to put their lives back in practice. As disasters are diverse in many forms and patterns, so that any single law cannot cover to resolve the problems and that on-going law system is not always perfect. Therefore we listened to the victims and the evacuees, and tried to reflect what we have learned to formulate new laws and regulations.

One major proposal we made is to establish the right of claim for damage by the nuclear power plant. Usually, the expiry period was only 3 years, but it seemed too short period for the victims of large incidents as such. So, we proposed to extend the term to 10 years from the time the damage was confirmed. And the proposal was accepted.

There were other activities we did. Lawyers were sometimes assigned as a termed or the short period public servants and made advice on paperwork or were directly engaged in city planning or community redevelopment. But personally, I think our fundamental work must be legal consultation.

Legal consultations in usual times are important to dispute resolution, to prevent conflicts by listening to the complaint and making legal advice for the solution. But at the time of disasters, somewhat different roles of lawyers is required. One is the provision of practical information. Only when you yourself become the victim, you start to realize what kind of measures and relief support there are necessary. Through legal consultations, we lawyers can provide those kinds of information, what kind of support system they are able to take.

And the counseling capability is another important role that lawyers can play. We listen attentively many worries and concerns of those victims have. We share the sorrows and grief with them as much as possible. That kind of attitude of lawyers I think is very important.

Also, other than the role of conflict prevention, we had a role of collecting legislated facts. By listening to the victims and survivors of disaster we recognized what is needed in the current legal system. Feedback based on the opinion of the victims can be deflected for the future improvement of the legal system. However, for you and perhaps for other people too, the legal consultation, lawyers and court are in a faraway existence. And the same is true when you are in the middle of a disaster.

The Japan Legal Support Center conducted a large-scale survey in 2013 targeting the victims of the disasters, and asked ‘what actually hindered you from making access to lawyers?’. We got a variety of answers. Sometimes they think it is just meaningless to make a legal consultation. It is a shame for lawyers because our roles and responsibilities are not well understood. The second point was that people think – well actually, 1/4th of respondents say that it will be very costly. Or they answered they don’t know any lawyers or the legal professional personally. And these are the bottlenecks for them to make access to the legal specialists.

Now, let me move on to introduce the Japan Legal Support Center. This center is a publicly established corporation that provides every Japanese with necessary legal support. The aim of the center is to eliminate barriers against referral to lawyers, such as cost and access. But unfortunately, in reality, not anybody is entitled to the service of Legal Support Center. We provide a free consultation or put up the cost for the legal procedures only for those with economic difficulty. At the time of the Great East Japan Earthquake disaster, many people are concerned about the cost and they don’t know the acquaintances who are a lawyer, as I mentioned before. On the other hand, as Legal Support Center’s system provides service only for those with economic difficulty, it requires clients to declare the income and assets and a number of family members. It is mandatory to provide this kind of information. I am sorry to ask those suffering from the loss of income and asset questions like how much money you have, how many assets do you have. We want to change such situation. Another issue is the problem in reimbursement. Aided expense for lawyers is not for free, but the object is to be reimbursed. Installment payment starts immediately after the consultation. But for the victims of the disaster, who have to rebuild their life, I felt that paying the legal expenditure immediately after is a bit challenging.



As for the process for ADR, its cost was not covered by our service, I meant at that time that to use the Legal Support Center is not practical.

In response to the needs of the victims, one year after the disaster, the Earthquake Special Provision Act was enacted. After that, all the residents who lived or worked in the affected area before the earthquake became able to get a free consultation. In addition, reimbursement has begun after the case was completely finished. The ADR procedures also became in the scope.

This Earthquake Special Provision Act is really effective for the Japan Legal Support Center to receive or to provide so many consultation services to victims. The Houterasu Fukushima is the branch office of Legal Support Center in this region. About 430,000 cases have been handled by the branch.

Let me introduce several characteristic consultation cases in this branch office: requesting compensation for damages, which had been only 118 cases in 2010, increased to 2,497 cases in 2012. And divorce cases significantly increased in number. There had been only 430 cases before the disaster, but in 2013 it became 1,300, about triple the number. Other than divorce, there are cases for children whose parent died, such as guardianship and succession of property. There had been 365 family cases in 2010, but the number increased to 1,793 in 2014, and 2,327 in 2013, about 6 times as much as that before the disaster. As for the control of debt management, there's not increase in the case.

The Great East Japan Earthquake and the role of Japan Legal Support Center

Content of legal consultation for disaster-related cases by Fukushima branch of Japan Legal Support Center

	2010	2011	2012	2013
appealing compensation for damages	118 cases	381 cases	2497 cases	1411 cases
Divorce	430 cases	516 cases	1204 cases	1304 cases
familial conflict other than divorce	365 cases	483 cases	1793 cases	2327 cases
Bankrupt + voluntary liquidation	1407 cases	908 cases	1174 cases	1218 cases

These trends show that not only compensation for damage by the nuclear accident but also divorces and other familial cases caused by drastic changes in their daily lives that really affected their life. Therefore, we have to follow up the area for a longer time.

Now, 5 years have passed and people's worries and concerns are very much diversified. Compensation appeal is one only thing. As health problem, environmental problem and how to secure houses to live in have been arisen, we would like to actually help those people with those problems from a legal perspective.

Challenges for the future

- ①Appealing compensation for damages related with nuclear disaster incidence
- ②Respond and meet to complicating demand
- ③Respond to cases appealing compensation for damages as well as conflict in general daily life like health, environment and etc.

Strengthen Lifeskills through Music :
Recovery, Regional Revitalization, international Exchange through Art and Culture

Yutaka Kikugawa Executive Director, Friends of El Sistema Japan



Today I will introduce our activities in Soma City, Fukushima Prefecture. I assume many of you do not know "El Sistema" in the first place.

El Sistema was established 41 years ago in Venezuela. It is a music education program, which provides children with an opportunity to learn music in an orchestra or chorus, regardless of their family background and disabilities with an aim of develop self-confidence and life skills.

In Venezuela, with the annual budget of approximately ¥10 billion, 500,000 students participate in 250 orchestras. At the moment, El Sistema is operated not only in Venezuela but also in around 70 countries.

With the aim to "develop life skills based on intrinsic motivation among children", the first El Sistema inspired program in Japan started in Soma City. The Friends of El Sistema Japan was founded on March 23, 2012, signed the cooperation agreement with the City of Soma and initiated activities on May 7, exactly 4 years ago from today. Since the time I was with UNICEF, I worked with the School Board members to support the children affected by the Great East Japan Earthquake and tsunami.

Soma is a small town but has great human resources as well as a long history of appreciating music, including classical music and folk songs. Therefore, we decided to make the most of the existing framework and resources. It was one year after the earthquake and tsunami hit the local communities, so the local government was then at the stage of planning recovery and rehabilitation activities. The stakeholders might have had the idea of bringing about drastic changes. Our cooperation agreement was based on the reconstruction plan.

As I mentioned earlier, what we regard as an important component in introducing the El Sistema inspired music education in Japan is to make it available to any child who wishes to participate at no charge. You can sing and play music alone, but we value the process of making music together as it promotes teamwork. By learning from each other (so-called "peer learning" or "peer teaching"), children can develop solidarity among themselves. As the teacher from Seisa Junior High

Strengthen Life Skills through Music

- Long tradition of appreciating folk songs and classical music and great human resources
 - Make the most of the existing framework
- At the emergency phase after the earthquake
 - High expectations for drastic changes
 - Position activities as part of the recovery plan and have the cooperation agreement in place



School touched upon, we envisage developing a framework for long-term psychosocial care and support.

The children participating in our activities include those who lost homes and settled in Soma as well as those who evacuated from the areas contaminated by the nuclear accident. By implementing a music program, which can be participated by any child, we plan to heal their wounds on a long-term basis. If children become resilient, then their families become also resilient, and so does the community they belong to.

Since 2013, Professor Kariyado, Aoyama Gakuin University, has been conducting an external evaluation. Recently, the latest report became available. Comparing the data of our weekend music class with the national level data collected by Benesse Educational Research and Development Institute in 2009, we found that our weekend music class scored higher on the question of “How do you feel about your community?” Additionally, on the question of “How do you feel about yourself”, the number of children who responded ‘very satisfied’ is not many, but “‘fairly satisfied’ scored high in comparison with the national average. Observing the children’s day-to-day behavior, I myself feel they have gained self-confidence over time.

We have the cooperation agreement with the local government from the onset. Furthermore, the Ministry of Education, Culture, Sports, Science and Technology has commissioned us a school counselor project, and the Agency for Cultural Affairs has decided to subsidize our program. Thanks to the framework that enables coordination with the local government, the implementation mechanism has grown to be more sustainable. Since the end of last year, we have joined “Furusato Nouzei”, an innovative tax collection system where taxpayers can earmark and decide how their money will be used.

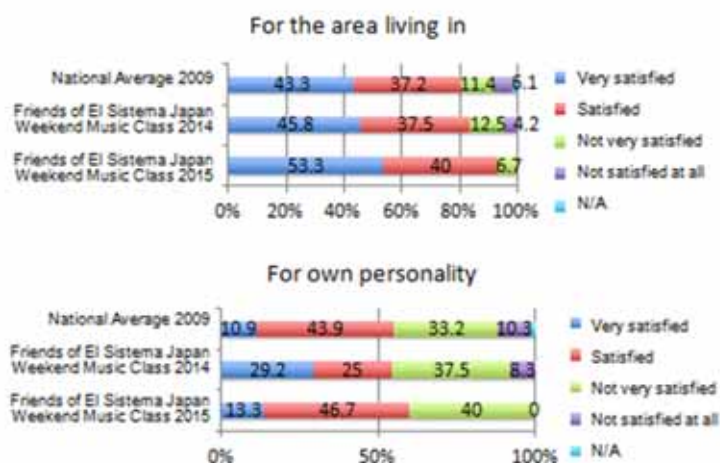
Our partners are committed to holistically fostering the ownership of children, their families and the School Board. Therefore, our program supports not only the Soma Children’s Orchestra and Chorus but also the local public schools. Some of the small-scale primary schools in Soma are not equipped with music teachers, so we dispatch trained music teachers to the schools, organize music appreciation classes and engage local traditional music masters to enrich learning experiences for children in any ways possible.

Our Priorities



- Any child can participate for free of charge
- Find joy through music
- Develop solidarity and teamwork by teaching and learning from each other
- Functions as Psychosocial care and support
- Community rebuilding by engaging children, their families and other community members

Results of the 3rd External Evaluation 2015



Those who can extend support do so and make a place for children – that is the joy of being together with music. Thanks to the support of the government, the private sector and generous individuals, our activities are made possible to deliver. What I feel and realize recently is that music itself does not have national borders. It is often said music can connect the world, and El Sistema's network is, in fact, extended around the globe. Last year the Youth Orchestra Los Angeles came from the US to play with the Soma Children's Orchestra and Chorus at Suntory Hall in March, and around 200 members of the Teresa Carreño Youth Orchestra of Venezuela also visited us and organized a joint concert in November. This year 37 children from the Soma Children's Orchestra, Soma High School and Soma Higashi High School travelled to Germany and played with the members of the Berlin Philharmonic in March. Then, 36 children of the Kaposoka Orchestra will visit us next and the following weeks from Angola where the gap between the rich and the poor still persists.

How I started the Friends of El Sistema Japan dates back to the time I was serving UNICEF as Emergency Relief Coordinator. A

member of the Berliner Philharmoniker, who was on a visit to Japan as UNICEF Goodwill Ambassador, observed the situation of children in the disaster affected areas and proposed the idea of introducing an El Sistema-inspired program. He mobilized his own network in Germany to get the initiative rolling. Then, the Berliner Philharmoniker organized a fund-raising concert in fall of 2012 to establish an orchestra for the children in Soma. We were very grateful for their generous support and dreamed of returning thanks to the people of Germany by organizing a concert tour to Germany someday. The dream came true in March this year. Out of 37 children who joined the concert tour to Germany, 16 children started learning the strings from the summer of 2013 onwards. The youngest cellist is a second grade girl student. At present, the members of the Soma Children's Orchestra range from 5 year-old to 17 year-old children. The Soma Children's Orchestra counts approximately 85 children while the Soma Children's Chorus is 70 children.

Lastly, I would like to share with you one more anecdote. Our weekend music class started in April 2013 with support from the Kumamoto Lions Club and the Youth Symphony Orchestra, which has a long-standing history of playing in Kumamoto. They made financial contributions to support our activities for the disaster-affected children. Recently, a major earthquake hit and devastated Kumamoto. I discussed the situation with the children and their families. The children said they

Synergistic effect through associations



- 「Urgent project to dispatch school counselor」 The Ministry of Education, Culture, Sports, Science and Technology
- 「Promotion project in local revitalization and international transmission」 Japanese Agency of Cultural Affairs
- 「Annual budget」 Soma city Enlargement of financial support by a hometown tax payment

3

Ownership of Children, Families and the Education Board / Partnerships among Stakeholders and Supporters



- Overarch schools, after school and weekends
- Those who is available to participate and extend assistance do so
- Create a space for children
- Share the joy of living with music
- Work together with individuals, the public administration and the private sector
- Connect with the world through music (e.g. Venezuela, the US, Germany and Angola)

4

want to return thanks to the people of Kumamoto, particularly to the Youth Symphony Orchestra, by joining fund-raising activities. Everybody says they want to play music with the Youth Symphony Orchestra in Kumamoto and nurture friendships.

In such a way, the children have developed the sense of gratitude and grown to find what they can do with music. I am very pleased with their growth, which is the outcome of our activities.



Recovery in agriculture in Soma area : Support by the Tokyo University of Agriculture(TUA)

Yukio Shibuya Professor of Tokyo University of Agriculture



The Tokyo University of Agriculture (TUA) located at Setagaya, Tokyo. We are celebrating 125th anniversary this year. I think we, TUA, were invited to this International Symposium on Disaster Management and Recovery for Children and Communities, because recovery of agriculture is essential in this community. Local industries have to actually recover and strive for young family to grow and sustain the family household and grow their children. So agriculture, I am

sure is very important to actually navigate the future of their community in Soma City.

First I'd like to share with you how we started support for the Great East Japan earthquake disaster, then outline each support project we have conducted. Lastly, I'd like to talk about some of the research achievements and how we have spread the achievement to the world.

Now, let me start with how the Great East Japan Earthquake Disaster and Support Project was formulated. The mission of our university is to educate personnel that support local industry in agriculture, forestry, and fishery. During the past 125 years, we were actually nurturing those navigator personnel for the primary industry. And our founder said, 'send people back to farm'.

At the time of the disaster, 1500 students of our university were from the affected areas, and 250 students had their houses swept away or severely damaged by the tsunami. Therefore, although we locate ourselves in Tokyo, we are closely related to this disaster in Tohoku area. And recovery of local industry, agriculture, forestry, and fishery in the affected area is an important mission for us, a nominated university of primary industries.

As we have the practical learning as a philosophy of the university, on-site problem-solving is our basic style. It was the exact time when the earthquake took place that we use our wisdom and knowledge accumulated at university to serve to the community. There are three prefectures in Tohoku area, or six prefectures all over Japan, that were severely affected. It was difficult for us to cover all these prefectures. We had to select a small number of places and concentrate our resources to make the effective research. Solution of a local problem will be applicable to solving global problems. So, after this disaster we focused on Soma City and adjacent municipalities in Fukushima as our research field.

We chose this area because this region is suffering from the triple difficulties of the earthquake, tsunami, and the radiation problems. And Soma city really needed realization of our philosophy, practical learning, because what they need was solution-based approach to achieve both recovery of entire local industries and recovery of people's life at the same time. Soma City has a good network ready to team up with local government, research organizations, and agricultural association agencies. And some of our faculty members are from this region. So, we decided to choose Soma district as a center of our research field.

We made the field survey from 1st to 4th of May, 2011. As is shown in this photograph, Dr. Osawa, the President of the University and 15 staff members with various specialty visited the region. And they racked their brain as to how their knowledge and expertise can serve to the Soma City.

On May, 2 months after the disaster, there were rubbles in paddy fields. In some area, automobiles were floating in the middle of the field. On the surface of the paddle field you see cracks in the shape of scales. When sodium goes into clay soil and precipitated, cracks like this is made. This shows that the tsunami brought the clay containing sodium into the paddy fields.

Damage to the agricultural equipment was also severe. Most of the agricultural operation in the rice field is carried out by machineries nowadays. Retrieving the set of the machineries costs about ¥10 million per agricultural household. One of the very serious damages to the local agriculture is this loss of personal possession.

On 2nd May 2011, we got a lecture on the local agriculture at a local research center near the coastal area. I and Professor Monma, the former project officer, also visited Mr. Tachiya in his office and took an intensive lecture about the status of damage caused by the disaster. And then, we visited Mr Matsumura in Tachikiri district, who was living in a house in which the ground floor was swept away by the tsunami. So, the families are actually living on the second floor. And we discussed as what assistance Tokyo University of Agriculture can provide to the local citizens. In the beginning of May, temporary housings were still under construction, and the affected people were living in the evacuation shelters.

Based on the first survey, we set up the Great East Japan Earthquake Disaster Support Project. This is the organization chart which encompasses various topics like the rebuilding communities, improving the nutritional state of people, forestry recovery, growing products, recovery of soil and farm,

1. Great East Japan Earthquake Disaster

(2) Field survey (From 1 to 3 on May in 2011)



1. Great East Japan Earthquake Disaster

(2) Field survey (From 1 to 3 on May in 2011)



1. Great East Japan Earthquake Disaster

(2) Field survey (From 1 to 3 on May in 2011)



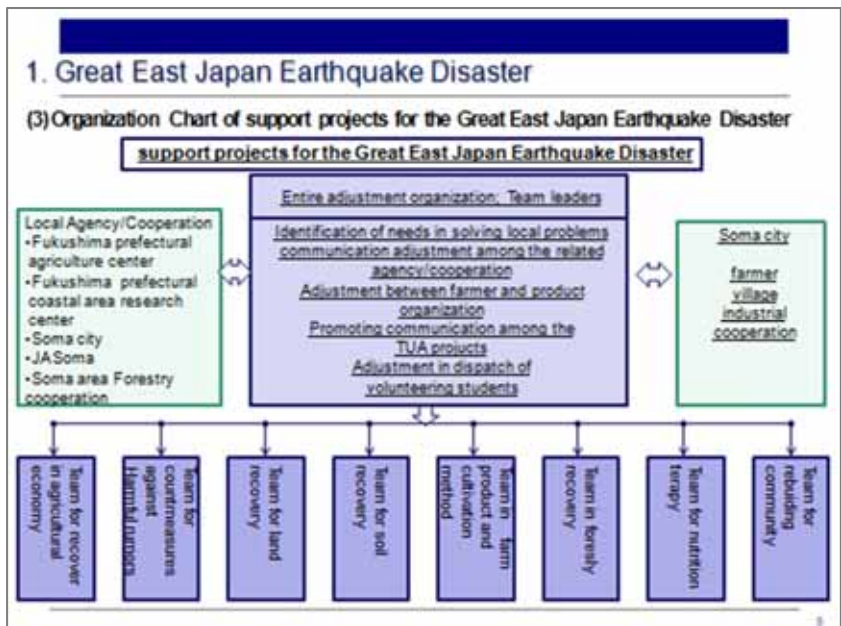
managing bad rumors, and recovery of agricultural industry. We literally collected the wisdom of the TUA.

At first we conducted an interview to see whether those farmers are intending to continue their farming in the future. The interview was conducted by postgraduate students targeting about 30 farmers until the summer of 2011.

Before the disaster, 20% of farmers wanted to expand their operation and 70% to actually continue the scope, some percentage of farmers wanted to shrink their scope. But after the disaster, about a half of these farmers wanted to shrink the scope, quit farming, or have no scope. This clearly shows that the disasters demotivated the farmers to continue agriculture.

We took a closer look at this result and found two patterns. One is that small scale farmers were more likely to want to shrink or quit farming. And farmers who lost the agricultural equipment also wanted to shrink their agricultural operation. As was mentioned before, it takes as much as ¥10 million to invest. People who are engaged in agriculture is aging and it was too hard for them to invest on the recovery of agricultural activity. From these results, it was revealed that some support is needed to manage abandoned farmlands of the small farmers. Or for those farmers who lost their agricultural equipment, there should be some means to get the equipment for them to continue agriculture.

The new agriculture corporation was established a year after the disaster that acquired land or right of the farm of those who wanted to quit agriculture. Based on the interview, it was revealed that the corporation would have to manage 100 hectares of farmland within



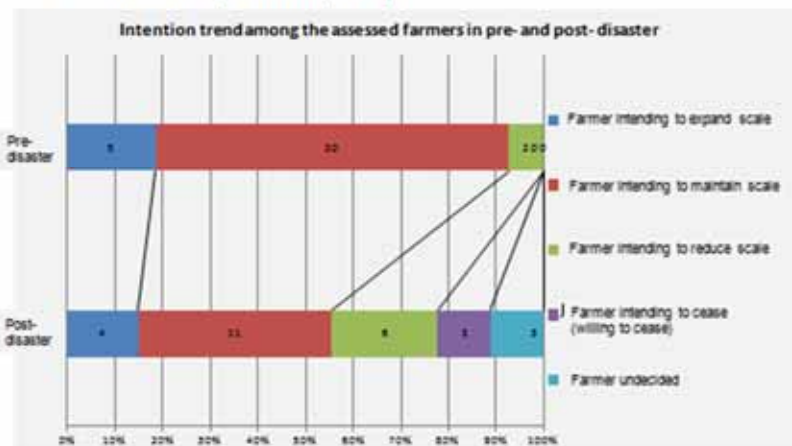
2. 1. The questionnaire survey of intention for farmers in agriculture

(1) The questionnaire survey in temporal house



2. 1. The questionnaire survey of intention for farmers in agriculture

(2) Results of questionnaire survey of intention for farmers in agriculture (2011)

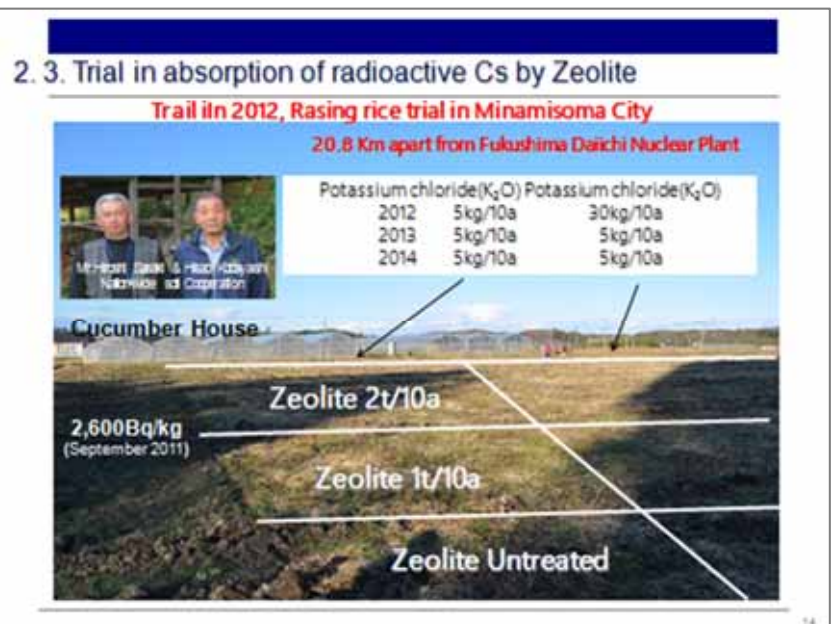


several years. And actually, this year they are managing 80 hectares of farmland. 80 hectares is quite large in Japan. Usually, those existing agricultural corporations take as long as 20 years to expand their farmland up to such size and accumulate knowledge and personnel during this period. But as it was estimated that the corporation would need to manage 100 hectares of farmland within 3 years, the corporation could prepare for the size from the start of its activity.

The second project is the Soma-style desalination measures. Salination and contamination were the major barriers for the farmers to harvest their crops. The Ministry of Forest instructed to scrape the surface of the soil.

However, Professor Goto, the specialist of soil analyzed the surface soil and found that the tsunami brought good minerals into the soil, so scraping was waste of money. So we decided to mix the debris together with the soil underneath instead of scraping. To make the soil alkaline we were advised to use converter slag from ironworks and this led to our success to retrieve rice crop. We named this method as the 'Soma-style desalination of farmland' and spread this method to the farmers in Soma.

Not only salination but also contamination with radioactive cesium was a very serious problem. And acquaintance of Professor Goto, Sasaki-san, and Kobayashi-san generously offer their land for our experiment on the effect of adding zeolite or chloride potassium to the soil; because people said that it's very effective. And we found out the larger the amount of zeolite mixed with soil, the less radioactive cesium absorbed to brown rice. Further addition of potassium turned out to be more effective.



2. 3. Trial in absorption of radioactive Cs by Zeolite

Radiation dose of brown rice harvested from the rice field treated with Zeolite in Minami-Soma city

Zeolite application amount	Oak application amount	Radioactivity of brown rice(Bq/kg)		
		2012	2013	2014
0t/10a	5kg/10a	16.6	31.4	3.3
	30kg/10a	6.4	37.0	2.1
1t/10a	5kg/10a	11.8	33.2	2.7
	30kg/10a	6.0	47.1	1.8
2t/10a	5kg/10a	6.3	37.3	1.7
	30kg/10a	5.3	38.5	1.5

★ Zeolite is effective to prevent Cs absorption into rice and soy bean (Particularly together with potassium (K))

In 2013, there was a slight increase in the cesium level. According to Professor Goto, radioactive substance might be dispersed at some time of decontamination at the nuclear power plant. But this titer was rapidly decreased in 2014. It was our achievement to prove zeolite, which is abundant in Japan, can prevent the brown rice and other crop to absorb radioactive cesium.

Tamano district in the western part of Soma City, mountain side got more fallouts of radioactive substances than the flat land, and farmers were nearly giving up agriculture. Especially after young parents with children left the area and only elderly people were left, which highly demotivated the farmers to continue farming or agriculture.

With help of our students, every farming lot were measurement of radiation dose before and after decontamination work. And this is the result. Prior to decontamination, red and yellow lots are the ones with higher dosage. The red to yellow and then down to the blue, decontamination is truly effective. And then Tamano people were very much enlightened and also motivated. And now the Tamano district now in the middle of the rice planting season and all those paddy fields are filled with young green rice plants. Our effort confirmed the effect of decontamination led to encouragement of farmers to continue agriculture and to the recovery.

There is another interesting project using arthropods. Accumulation of radioactive substances in the bodies of arthropods are used to monitor the dynamic state of radioactive substances in the farmlands. We captured butterflies, dragonflies, crickets, locust, and spiders in regular basis and monitored the

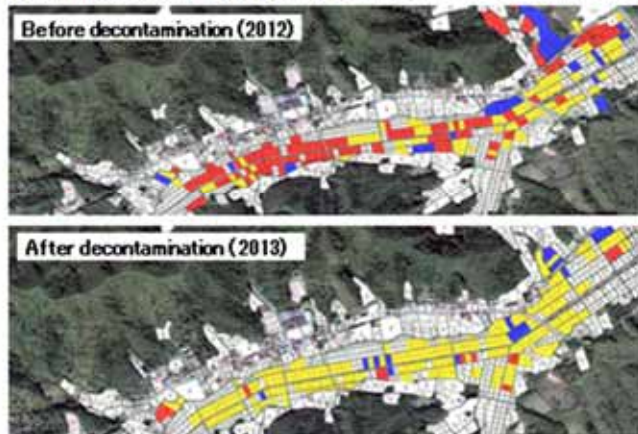
2. 4. Radiation measurement for each lot in Tamano area in Soma city

(1) Survey of spatial dose and radio-contamination in soil



2. 4. Radiation measurement for each lot in Tamano area in Soma city

(2) Decontamination effect in paddy (Map of soil radio-contamination at Nishi(west)-Tamano area)



Blue Zone; Less than 3000 soil radiation dose (Bq/ kg) in soil, Yellow Zone; 3000-4999 Bq/kg, Red Zone; more than 5000 Bq/kg

2. 5. Radiation monitoring of insects in the fields

(1) Insects used for radiation monitoring



levels of the radiation contamination. Using those insects that are existing everywhere, we actually detected the dynamic state of radioactive substances. This survey is conducted in Iitate village as well as Soma city.

The result is that the cesium concentration in locusts and crickets were rapidly decreased in 18, 30, 42 months after the disaster. But the situation is quite different among spiders. We speculate that as spiders are carnivorous insects, cesium is accumulated in the body of the spider. This study was praised by the Ministry of Education and we are going to scale up this project.

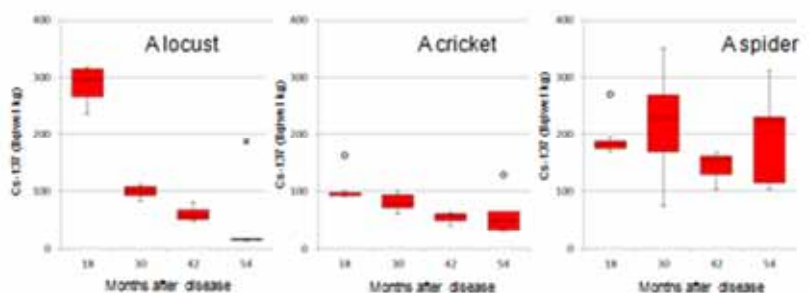
And by joint collaboration with the city and TUA, we have published a book titles 'Agricultural and Forestry Reconstruction After the Great East Japan Earthquake'. This was translated into English so that we can share the knowledge with people overseas.

Using Soma desalination method, we are able to harvest very good rice with much mineral. So in collaboration of Soma City, TUA, and the agricultural association, we made a brand called 'Disaster Recovery Rice in Soma'. And the package design was made by a school child of Soma.

These are examples of our support activity for agricultural recovery. From now on, we are supporting this area by wiping-off bad rumors, support for the livestock industry, and establishing sixth sector companies. Through these activities, we hope the agriculture in Soma adapts to the new situation and motivates younger generation to engage in agriculture so that cities and community will prosper for ever. That is our goal and the mission. Thank you very much indeed for your attention and giving me the opportunity to present to you our effort at Tokyo University of Agriculture.

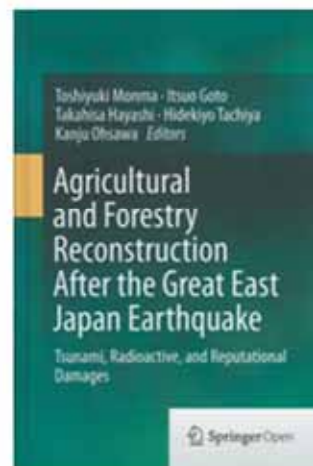
2. 5. Radiation monitoring of insects in the fields

(2) Annual measurement of radioactive Cs in arthropods



Annual measurement (From 2012 to 2015) of radioactive Cs-137 in arthropods Collected at Fukaya area in Iitate Village

3. Report and publishing of research achievements



Fishing trial; The present situation

Yujiro Watanobe Soma Fisheries Cooperative

Originally, Mr. Sato, the Director ought to be taking the podium. However due to his illness, he is not available. So, I would replace him to present to you.

This is Soma Fisheries Cooperative, consisted of seven fisheries cooperatives. Small boat coastal fishing area we cover is northern half of the water area in Fukushima, including the area facing the power plant.

Today, I would like to talk about Soma City fisheries industry recovery and our

engagement in pilot fishing in this area.

This is Soma City. We had 3 fisheries cooperatives: Soma Haragama; Isobe; and Matsukawa Bay. The number of boats before the disaster was 531. After the tsunami, 381 damaged and 150 remained. We utilized a fund and have recovered more than 200 boats. So altogether we now have 354 boats. This is some of them and 700 altogether, but currently we have 420 this month.

In Soma City, the entire coastline was destroyed by the tsunami. However, thanks to the leadership of Mr. Tachiya, the Mayor, we were able to reconstruct the fisheries-related facilities quickly, and we very much appreciate it.

In Soma Haragama region, we have now the fishing processing plant as well as the pickup and delivery area and sea water purification center. In Isobe region, we have seafood processing center and also fishing equipment destroyed in Sefo City as well as the water purification center. And also we have laying out the ground for the seaweed production.

Area	No. of ships before the disaster	No. of ships that collapsed	No. of ships that survived	Current number of ships (May 9, 2016)
Soma Haragama	233	103	130	154 (+24)
Isobe	63	62	1	14 (+13)
Matsukawa bay	235	216	19	186 (+167)
TOTAL	531	381	150	354 (+204)

In Soma Haragama area, a new fish handling center was constructed immediately after the damage. There is a large space for collect, pick-up and delivery, where we can pass to the intermediaries and they use the facility to box them for delivery. This center enables us to maintain the freshness of the product and by using fresh seawater. This is the fishing equipment storage with a space to repair broken fish-net.

In Isobe area, reconstruction of seaways, fish storage, and fish handling facilities were completed in March this year. These fish are harvested from the sea and using the equipment to lift them up to the facility. We had 62 boats there before the disaster, all of which were completely destroyed by the tsunami. Isobe was a center of the fishery of Hokkigai shellfish and Konago Shirasu. So we reconstructed the fish handling facility as a symbol of recovery in this area.

The fisheries cooperatives and the local intermediaries joined their forces in order to establish the joint fishery facilities. Originally, the harvesting was the end of the fishery work. However, we have established a new system to include processing and distribution. After the distributor sell the product, we divide the surplus.

On this February the 18th, the facility was completed and on March the 16th, fishery was started. Konago sea fish was the first harvest we handled.

From April 29th to May 1st, this facility was used for commercial delivery and enjoyed good reputation.

Minamisōma City has only one port, Manogawa. On March 21st, the facility in Manogawa equipped with a handling, storage, icing and oil-supply was started. Many products were still under pilot fishing. Immediately after the nuclear power plant disaster, contaminated water was discharged to the sea. And in all the Soma areas, we voluntarily restricted the fishing. We thought that if we did nothing, the fisheries industries would go extinct. So, on June 2012, we started pilot fishing of octopus and seashell.



At that point in time the Director, Mr. Sato, who would be here but is not available today due to illness, played a central role. Until last month, 73 sea products were the target of the pilot fishing, but this number is less than half of the products we had before the disaster.

But in 2011, the our fishery yield was ¥ 3.6 billion. If Konago fishing in March was not disturbed by the disaster, probably ¥ 7.0 billion would have been the total sales in 2011. The sales in 2014 was only ¥ 80 million, . Last year, this has recovered to ¥ 290, but this still is only 4% of the pre-disaster level.

Currently, 28 products are restricted for fishing due to the contamination of the seawater, including Konago, shirasu and octopus as well as Hirame (Japanese flounder) and Karei (flatfish), which were our major source of income. So, it would take time before we resume full scale operation of fishing.

For pilot fishing, radioactive cesium inspection is essential. In Fukushima Prefecture, the upper limit of radiation contamination for seafood is 100 Becquerel(Bq)/kg. However, we, the fisheries cooperative settled our delivery criteria as <50 Bq/kg. Even with this effort, there still is a bad rumor spreading. In the Isobe fish handling facilities we have additional nondestructive inspection tests as well the conventional ones. We announce that we are testing all of our products and then the consumers were pleased to purchase from us.



We raise 5 goals for the recovery of the fishery in Soma: wiping off bad rumor, moving from pilot fishing to full-scale fishing, recovery of fishing ground, reconstruction of distribution channel, and re-branding of the products in Fukushima (Joban-brand). We want the consumers to eat fish from Fukushima and that would be the only way to achieve these goals. We will take responsibility to supply safe fish. And we need your support and understanding for our effort. Thank you.

Fishery⑨

Challenges after reconstruction of facilities

- Wipe off bad rumor/stigmatisation
- Move from pilot fishing to full-scale fishing
(keep motivation)
- Recovery of fishing ground
(debris + radioactive substances)
- Reconstruction of distribution channel
(utilise transportation network)
- Re-branding of the products from the coastal area of Fukushima

13



Masayasu Kitagawa Emeritus professor of Waseda University



Good morning, ladies and gentlemen. I am here because I and Mayor Tachiya is a friend since more than 10 years ago. We have been holding a study meeting to discuss the ideal state of the regional municipalities.

When the disaster occurred, a lot of activities were needed to prevent any death from happening in future. With such overload of activities, there might be something you overlook. So, we needed an advisory council to exchange ideas candidly from

a broader perspective, and I was invited to be a member. Since then, I have been associating with him. The symposium yesterday and today is representative of the achievements. So I am deeply moved by all the effort you have made.

The framework of modern society in Japan is now moving from centralization to regionalization or decentralization, but just shifting power from central to local government is not enough – local communities must revitalize themselves. Without such motivation and spirit, we cannot create future of Japan. I think the 2011 disaster awakened us to recognize the need of this spirit once again. It goes without saying that recovery is important, but we need more: we have to go for the next 5 years and next 50 years to innovate Soma, Tohoku. Such information should be sent out not only to Japan but also to the world.

Kumamoto may learn from the lessons learned in Soma after the Great East Japan Earthquake and create a safer and more resilient Kumamoto and Kyushu. You can also be a world-class successful model of appropriately address and manage radiation issues based on evidence and data. For us, members of the advisory council, this is also a excellent case of regional revitalization and we can utilize these lessons effectively for the future.

Today many experts from home and abroad are sharing knowledge and experience on radiation and children's health, and this discussion will be spread all over the world. I hope all the attendances of this symposium make these 2 days a great opportunity to change future of Japan or world from a local region. That's something we may confirm in these 2 days.

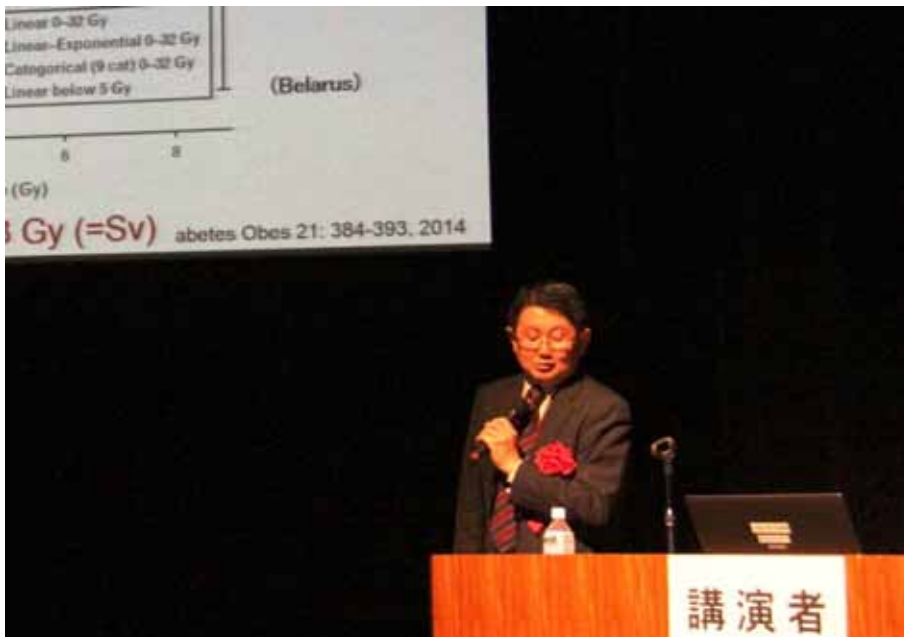
I would like to thank you all for your hard work and I would like to wish a great success of this symposium. Thank you.



A progress report of Thyroid Ultrasound Examination program in Fukushima Health Management Survey

Hiroki Shimura

Department of Laboratory Medicine, Fukushima Medical University



Good morning. My name is Shimura. I am in charge of the thyroid ultrasound examination or TUE which is the topic of my presentation today.

This is the humankind and we have been learning lessons in the past. This is external exposure which was experienced through the A-bombing of Hiroshima and Nagasaki and internal exposure through Chernobyl Nuclear Power Plant accidents. These are some of the representative examples.

This is Hiroshima and Nagasaki. The A-bomb, the victims' data, the details will be eliminated. However, this is the thyroid dose versus odds ratio and this is a linear relationship of the emergence of solid nodules, malignant tumors, benign nodules, and cysts.

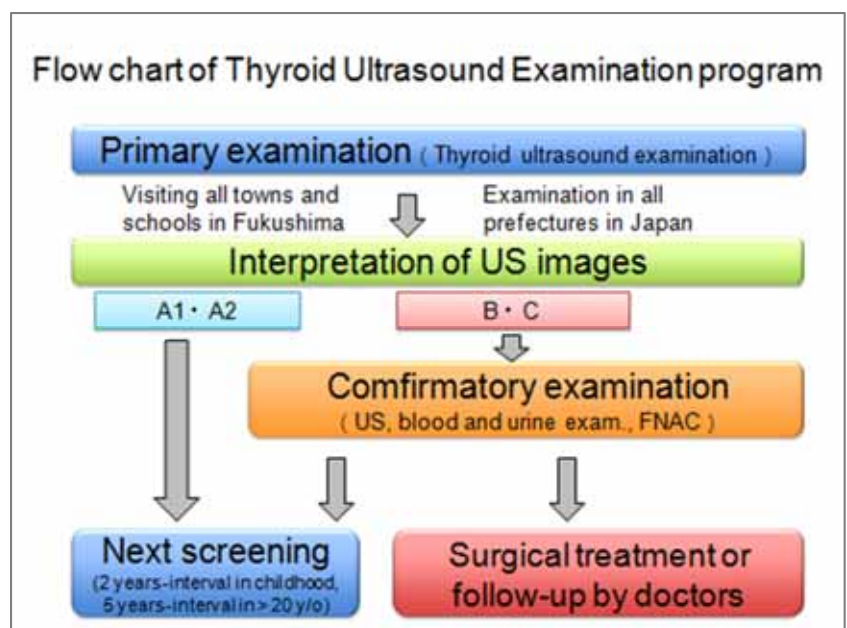
What about in the case of Fukushima? So this is an estimated dose of external radiation. It was probably at most 0.03 Sv. And this is almost 0 Sv for the emergence of these conditions.

This is Chernobyl for internal exposure. There is also a linear relationship in the incidence of thyroid cancer for children. 0.03 Gy or Sv is estimated to be the maximal dose in residents living in Fukushima.

Concerning all of them, the risk should not be high. However, the people living in Fukushima might have a worry that there may be an increase in thyroid cancer. So in order to respond to these concerns, Fukushima Health Management Survey and part of that was TUE or Thyroid Ultrasound Examination was stated.

This is A-bomb victims' data. Less than 20 years old or less than 18 years old, there is an increased risk for thyroid cancer and that was the same with Chernobyl nuclear accident. So that was why we conducted these thyroid ultrasound examinations for children between 0 to 18 years old.

This is the flowchart of TUE program. Primary examination we used thyroid ultrasound examination and we interpreted the ultrasound



images. This is the primary examination and how we did that. This is a notebook PC-styled ultrasound examination apparatus. Because many of the subjects are children, we arrange these animation characters so that the children can be relaxed.

This is the program of preliminary baseline screening that was done in the first week. Minamisoma is our neighbor which is closer to the nuclear power plant. So we began with the areas with the highest airborne radiation dose, and then proceeded to Fukushima, Koriyama, and Soma, Iwaki, and then Aizu.

That was the second round of testing that was the full-scale screening. And 2-1/2 years were compressed into 2 years. All of these screenings have been completed. Time flies and the second round of screening is complete and we will begin the third round of screening.

How are we doing the screening? These red marks indicate the clinics or hospitals where you can receive the TUE or ultrasound examination, Fukushima Medical Association supported us with all their efforts. So, these technicians and doctors pass the examination for the ultrasound testing to conduct the testing. For example, there are 11 places in Fukushima city, 8 places in Iwaki city, 1 places in Aizuwakamatsu city, and 2 places in Inawashiro. Soma city, none.

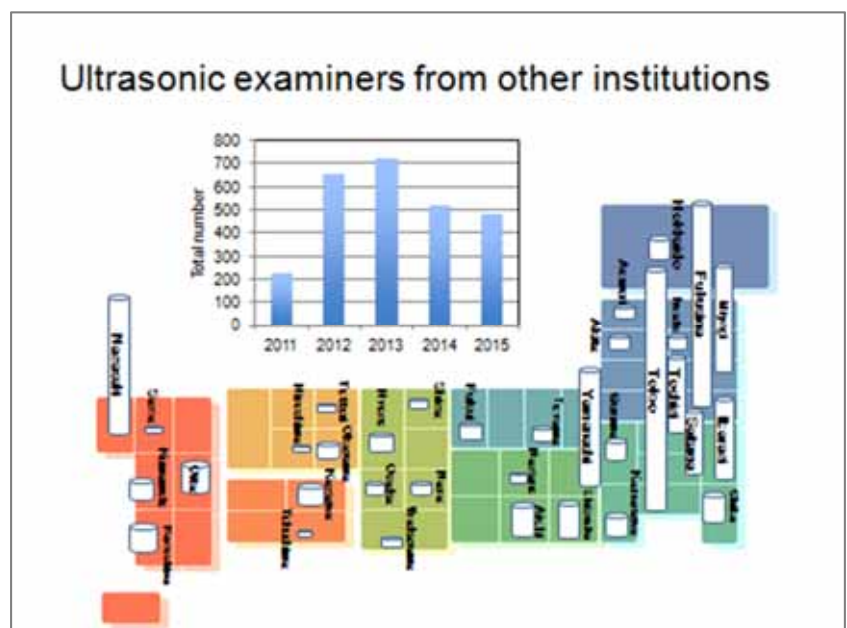
Soma city, the medical institution is coming soon to conduct the ultrasound testing. In fact there are 45 already, and 33 additional institutions will take part. Thirty three institutions are preparing for the testing so there will be more clinics coming in your neighborhood. I believe that the situation is getting to be closer to ideal situation.

This testing has been receiving all Japan support system. So this message was the gist of my presentation. These seven are the medical societies who support us with all their efforts. This is something that we are much grateful for.

This graph is outside Fukushima and Fukushima Medical University is canvassing throughout the country. The doctors and medical technologists are collaborating with us. In 2015, 700 people came from throughout the country for the testing. The neighboring prefectures, as well as Yamanashi and Nagasaki Prefecture show high bars.

I believe that most of the prefectures send the ultrasonic examiners inside Fukushima prefecture. There are more examiners in Fukushima rather than outside of Fukushima. But people graduate high-schools in Fukushima but then they leave Fukushima Prefecture to go to universities or to work. But these people can receive ultrasound examination because the testing is conducting throughout the country which is also unprecedented.

This is Tohoku area. And Miyagi, Tokyo, and that is Kanto, these are the majority of the participants receiving the testing. In all the prefectures, tests are available. This is something that is unique and that is to be blessed.



About the diagnostic criteria, this is something that you all know. B is nodule 5.1 or more, cysts 20.1 or more, and these will be subjected to confirmatory examination. This examination of nodules and cysts.

Cysts are pouch with fluid, benign only, and nodules are the solid tumor. And partially there may be fluid retention, but these can be either benign or malignant.

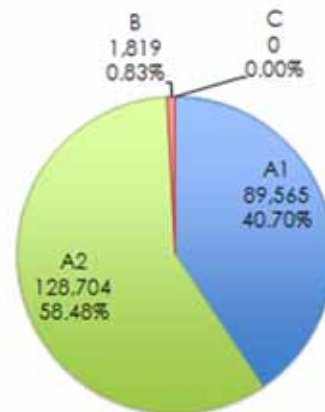
The preliminary baseline screening of the results, 360,000 people participated or 360,000 residents were subjected, out of which 81.7% participated. About half had known detection, and A1 more than half, and A2 less than half; so the majority either A1 or A2. And 0.8% of B, subjects were nodules and only 1 most of them had subject was C, and these B and C were subjected to confirmatory examination.

This was the result by age at the time of disaster. The green is A2, most of them were cysts. Elementary school children and junior high school students, about half experienced A2; and the smaller children showed, less incidents of A2 and B.

What about the breakdown by age and sex? The left one is A2, most of them were cysts. There was no difference between male and female. And the right side is B, most of them were nodules. And more incidents with female than male. This is something that is common with thyroid disease, more in female rather than male.

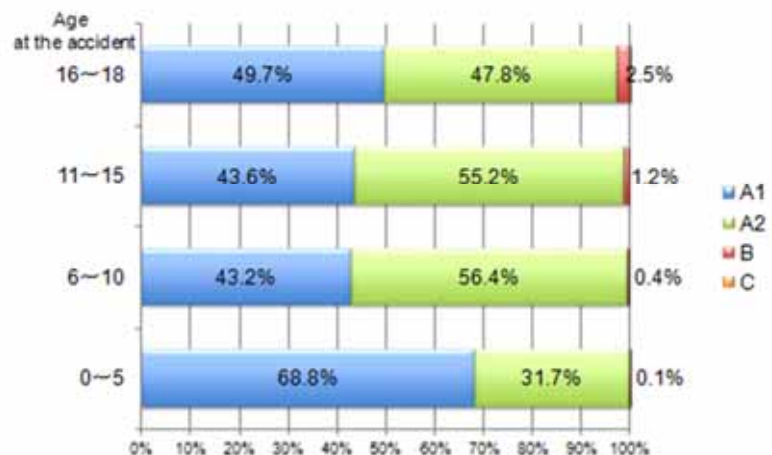
Second round of examination and similar results were observed. About half or less than half was judged as A and the majority is about A2 and only that few percentage of the solid tumor was found. Similar result is actual age at examination is plotted. So the elementary, junior and senior

Results of Full-Scale Screening

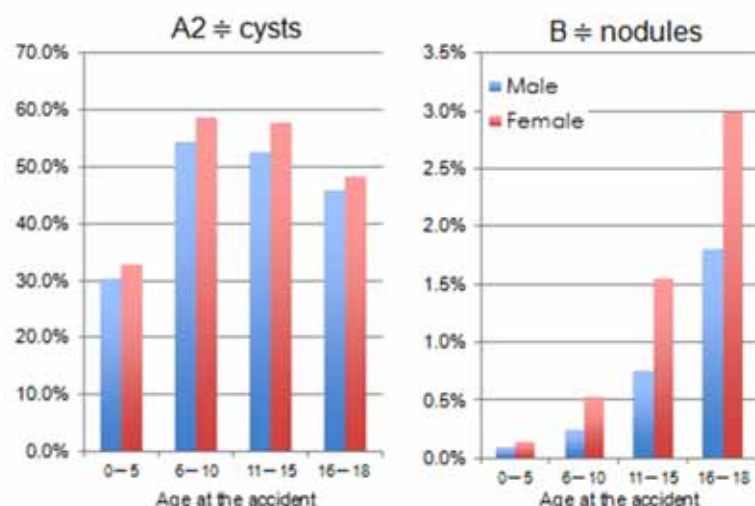


Until Dec, 2015
236,595 participants

Result of the preliminary screening by age



Result of the first screening by age and sex



high-schools, the majority should I say are the recipients have the cyst. Then some solid tumor case was found.

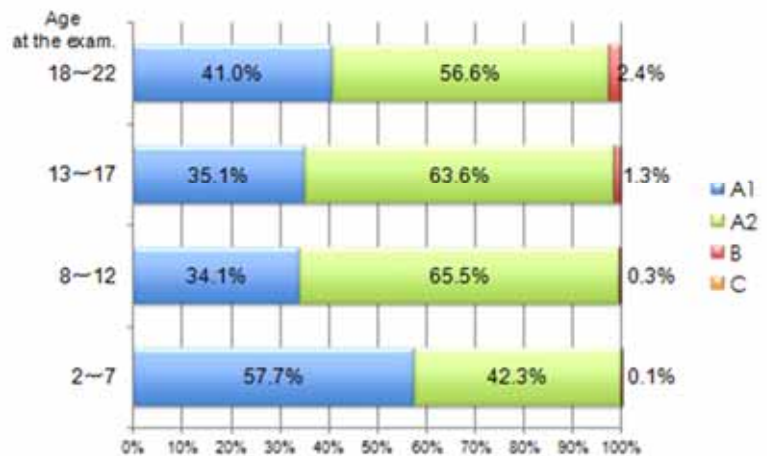
Once again it's about the confirmatory examination, secondary examination following after the primary examination. The procedures are similar to the ordinary consultation at clinic. We actually diagnosed and some interviews and made some kind of medical test. And also we conduct the thyroid ultrasonic examination, TUE, with more expensive and more accurate machines and the result actually determined whether or not do we go on to define needle aspirations cytology using very fine needle to producing the ultrasonic image.

The decision of whether you actually conduct Fine Needle Aspiration Cytology, FNAC or not is decided by this criteria. The tumor sizes of less than 5 millimeters are the majority of latent thyroid cancers. It has been reported that the 10% of ordinary people do have. Very small latent thyroid cancers. And those small tumors or the solid wouldn't do any harm but if left untreated, there could be some possibility so that we have to make meticulous procedures or testing.

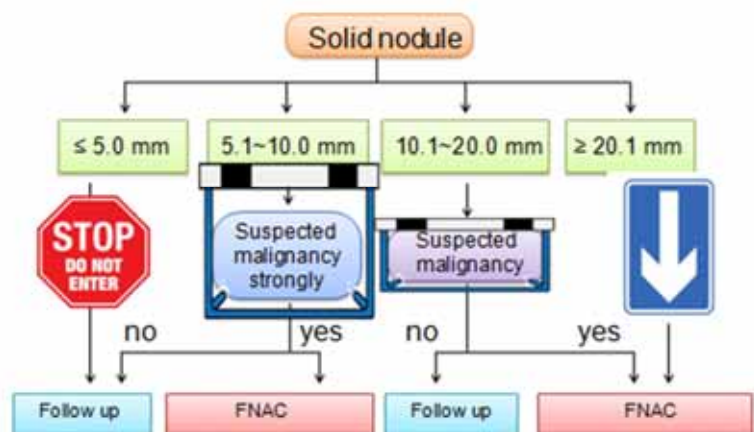
So that criteria is divided into four classes. Simply put like this, if it is below 5 millimeters, I mean we don't need to do extra or the confirmatory examination. The follow-up procedure will start 2 years after. But if it is larger than 20 millimeters and then you have to go through the FNAC, the fine needle aspiration cytology.

The size around 10 to 20, if there is a suspected malignancy, and then we may be deciding not to conduct FNAC. And 5 to 10 millimeters, if there is any strong suspicion of

Results of Full-Scale Screening

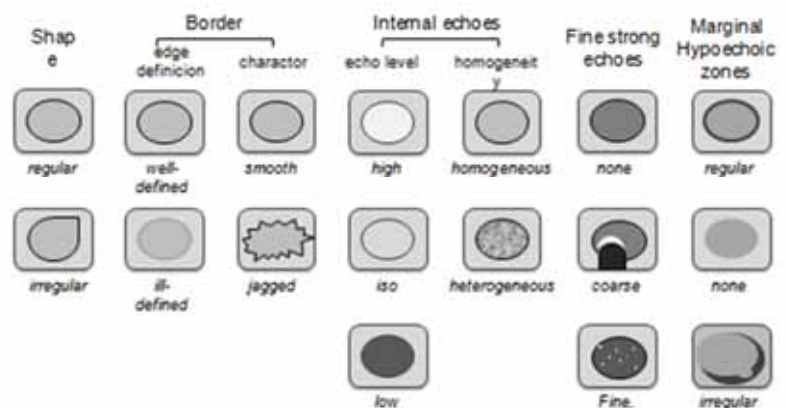


Guideline of thyroid nodule management



Guidebook for thyroid ultrasound diagnosis 2nd edition: 28-29, 2012

Ultrasound diagnostic criteria for thyroid nodule



malignancy and then we will make decision to conduct FNAC.

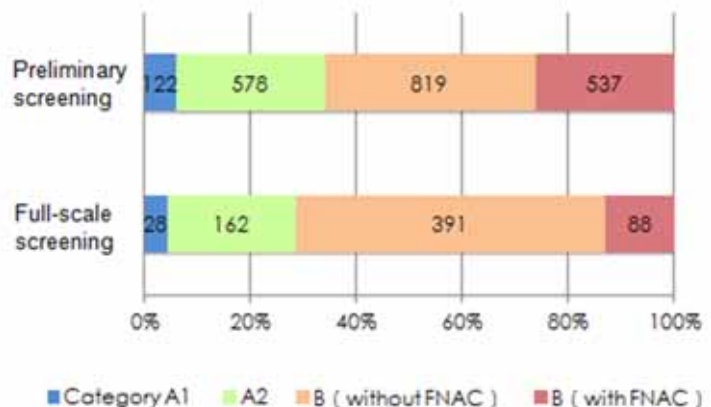
This has been the procedure described in the guideline which was established well before the disaster. Whether or not we go by those criteria, we have to meticulously look into the ultrasound diagnostic criteria. Malignant ultrasonic features are, for example, irregular boarder heterogeneous matters or the multiple high echo spots.

So as a result in the first round of test, the primary examination, 2294 people were judged as B and C findings and out of 2294, 2056 subject completed the test because some of them judged as B and C didn't come up. One-third of the confirmatory examination recipient subject were re-diagnosed as having A or A1 or A2. Such kind of nodules were shrinled cystic nodules or ectopic thymus. It was actually judged or diagnosed at the confirmatory examination.

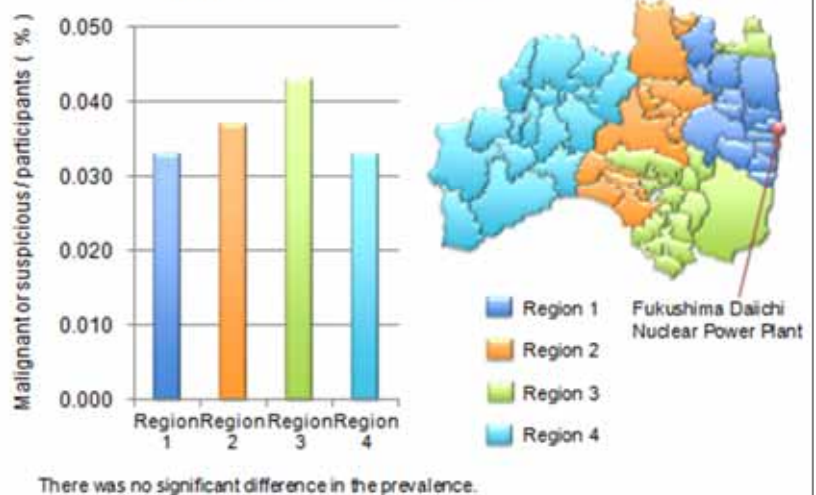
Two-thirds of the subjects were found somewhat larger tumor. So we made the decision to actually go through the surgical procedures and/or the follow-up. Then we conducted like this the necessary procedures and this is the second round confirmatory examination. And recipient of FNAC were reduced only that 10% or so, 1 in every 10 recipients; the rest of them were for follow-up.

That is the general image you may take about the outcomes of the thyroid ultrasonic examination programs. And this has already been announced and publicized. In the preliminary baseline screening, the 113 cases were found as having malignant or suspect malignant cases in their children with mean age of 17.2 years and age at exchange was 14.8 years.

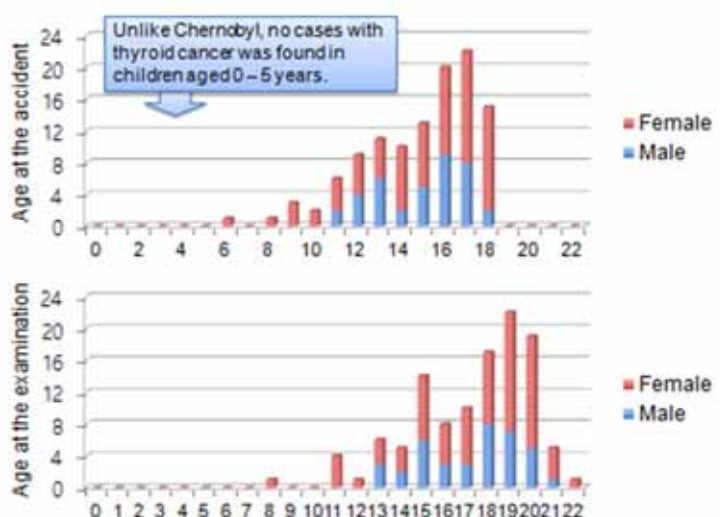
Result of the confirmatory screening



Prevalence of patients with cytologically malignant or suspicious of malignancy



Age and gender of 112 cases diagnosed with malignant or suspected of malignancy by FNAC in the PLBS



In 99 surgical cases, one case was benign nodules and three cases with poorly-differentiated thyroid carcinoma, and 95 was papillary thyroid carcinoma. Then second round, 45 people were malignant or suspicious for malignancy in FNAC and 16 cases surgical or the procedural operation was conducted and all 16 cases were diagnosed as papillary carcinomas.

The number was much larger than originally thought but further analysis using the thyroid ultrasonic examination we were able to detect thyroid cancers symptom at very early stage. We are able to respond to those four major questions that we often were asked. Is there any place dependent differences? What about age? In comparison with Chernobyl if that age distribution is similar or the radiation dose has something to do with the progress? Is the gene mutation in thyroid cancer same as that observed in patients in Chernobyl?

That's the place difference. We have four subdivisions in the prefecture. As indicated that we conducted the preliminary baseline screening to all the respondents or recipients of the examination. About 0.03% to 0.04% of the incidents were statistically found not significant differences.

As for the age, at the time of disaster in the upper half and at the time of examination, you will see that the gradual increase as time goes by but to smaller children and infant too as of today there is no infant found worst carcinoma. In the situation of Chernobyl, I would like to attract your attention to this graph. Time and age at the exposure from 0 to 1, the significant incidence was observed and that the age at the time of that the examination took place. By the way, the control group is the result of the data taken from the districts which were not affected by radiation and this shape of graph shows similarity to that of Fukushima.

As for the estimated external radiation dose, others departments of the Fukushima Medical University conducted base research. As for the external radiation dose by Millisieverts, if it is above 5, there are no incidents, 5 mSv. The first one was Sievert but the unit is different. Millisieverts is 0.005. For those, the people who got the external radiation dose at that amount didn't have any thyroid abnormality. So that the radiation dose amount is generally low.

What about genetic alteration? Gene mutation wakes a cell in patients with cancers, such oncogenic mutations are only found in cancer tissue, but not in other tissue or organs. Mutation in BRAF gene was the most frequently observed motion in childhood thyroid carcinoma in Fukushima.

And chromosomal rearrangement mutations were less observed. In the case of Chernobyl, relatively speaking, RET/PTC that two chromosomes joined together was often observed and less incidence of BRAF. And the situation in Fukushima was quite reversed with many BRAF and very small RET/PTC. That is the kind of mutation often found in adults, so more like adult-type cancer.

Now of course only 5 years has passed and it is just too premature for us to draw some conclusion. However, the radiation dose compared to Chernobyl is very low

in the case of Fukushima. There is no significant difference in the prevalence rate of thyroid cancer between places of residence. And we didn't see any cancer in small children, maybe in the future, but pattern is quite different in the case of Chernobyl and in the case of Fukushima. Genetic pattern of high prevalence is different from those patterns found in Chernobyl.

Estimated external radiation dose in cases with thyroid cancer

Table 5. Number of suspicious or malignant cases by estimated radiation dose

As of 30 June 2015

Effective dose (mSv)	Age at the time of disaster									
	0-5		6-10		11-15		16-18		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<1	0	0	0	5(1)	7(1)	8	7(1)	18(2)	14(2)	31(3)
1-1.9	0	0	0	0	3	9	2	3	5	12
2-4.9	0	0	0	0	1	0	0	0	1	0
5-9.9	0	0	0	0	0	0	0	0	0	0
10-19.9	0	0	0	0	0	0	0	0	0	0
>20	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	5(1)	11(1)	17	9(1)	21(2)	20(2)	41(3)

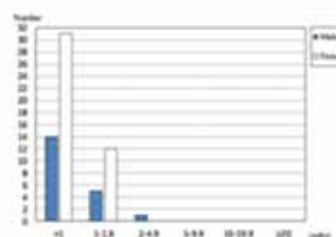


Fig. 5 Effective dose of the respondents

So my presentation can be concluded as follows. There is long-term large-scale thyroid ultrasonic examination program has just been started in Fukushima. In the first round we had 360,000 recipients and that's the second round, that is the full-scale screening, we have 236,000 recipients. The FNAC was conducted to those numbers of people in the preliminary baseline screening as well as full-scale screening.

In order to avoid the over-diagnosis of thyroid cancer, this program has been performed with the standardized criteria to decide indication of the FNAC. Only for those people we have very strong suspicion of having carcinogen will go through the FNAC procedure. What is important is that we have conducted this thorough screening program and that will be the standard for the future comparative studies. You know, few years into the future if we conduct similar surveys and we are able to correctly interpret the data using the result of this program as a yardstick to see whether the prevalence is increasing or not.

Without the cooperation of all the specialists in Japan and also cooperation from the residents of Fukushima, we would like to continue with this program.

Conclusions

- This long-term, large-scale Thyroid Ultrasound Examination (TUE) program began in Fukushima.
- At present, a preliminary and full scaled TUE survey has been performed on about 367,685 and 236,595 children, respectively.
- In terms of those who undertook FNAC, among 537 of the PLBS and 88 of the FSS, respectively, 113 and 45 cases were diagnosed with malignant or suspected of malignancy. 115 of those cases were confirmed as having thyroid cancer after thyroid surgery, and one was confirmed as having a benign nodule.
- In order to avoid the overdiagnosis of thyroid cancer, this program has been performed with the standardized criteria to decide the indication of the FNAC.
- These results will become the gold standard of future comparative TUEs in Fukushima, Japan, when determining whether the risk of childhood thyroid cancer will increase or not by radiation exposure.



Thyroid Screening – the Global Perspective

Gerry Thomas

Department of Surgery and Cancer, Imperial College London



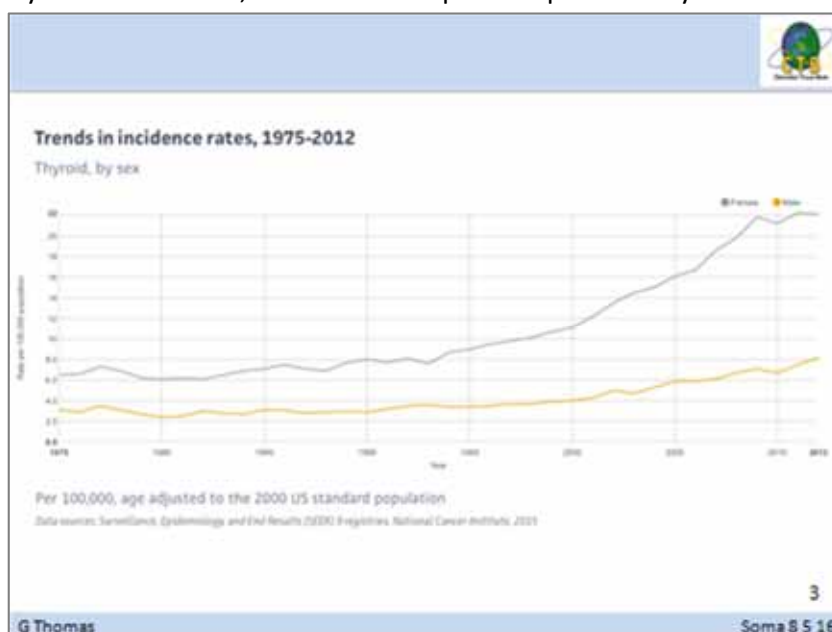
Thank you very much for inviting me. It's lovely to be back here in Japan again. I come quite often and it's always such a welcome that I receive here. I think my job today is to try and put this into some context of what we know about thyroid cancer in the young from other cities that we are currently doing. It's helpful to understand that thyroid cancer is a bit different from other cancers. So here are some basic facts about thyroid cancer.

Benign thyroid nodules are very common. At about age 60, 50% of people in this room will have a thyroid nodule, but you won't know about it because it's very small. It's estimated that about 6% of the world's population may have thyroid cancer but most people don't know about it because it's very small. That would mean that in the US, about 16.5 million people could have a thyroid cancer and because it's so small, they don't know about it.

Thyroid cancers are also associated with a 97% survival rate and it's even higher in childhood thyroid cancer. Most people when you say the word cancer think of death. They automatically think it is a death sentence. That is just not the case with thyroid cancer because we have the best targeted treatment to cure thyroid cancer. It's better than anything else we have for any other cancer. So it's extremely easy to deal with thyroid cancer using a mixture of surgery and using radioiodine but high doses of radioiodine.

Now there has been a large increase in places like the United States in the incidence of thyroid cancer over the years and this graph just shows you that increase, so from 1975 up to the present day. And

you can see that again, as the previous speaker said, it's much more common in females. Now this doesn't mean necessarily that there are more thyroid cancers. What it actually means is we can detect them much better. And we are starting to see similar things for renal cancer for example in Europe. We don't do so much ultrasound of the neck in Europe as they do in the US. So that's why they find thyroid cancers in the US. But in the UK, we often have patients who present with abdominal discomfort and when we use a CT scan, we will find they have lumps on their kidney. So how you look really



matters and that can change the incidence of cancers over time as your technology gets better and better.

So how you look really matters. The old way of looking for a thyroid cancer was to stand behind the patient and put your fingers on the neck and feel for a lump. And that was a very good way of detecting thyroid cancer but the incidence of nodules that were found that way was about 2% to 6%.

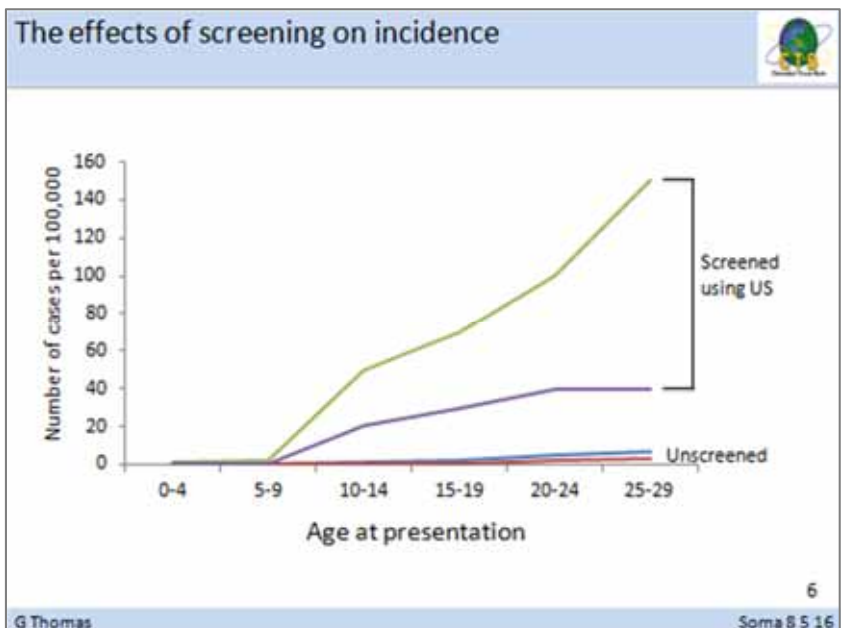
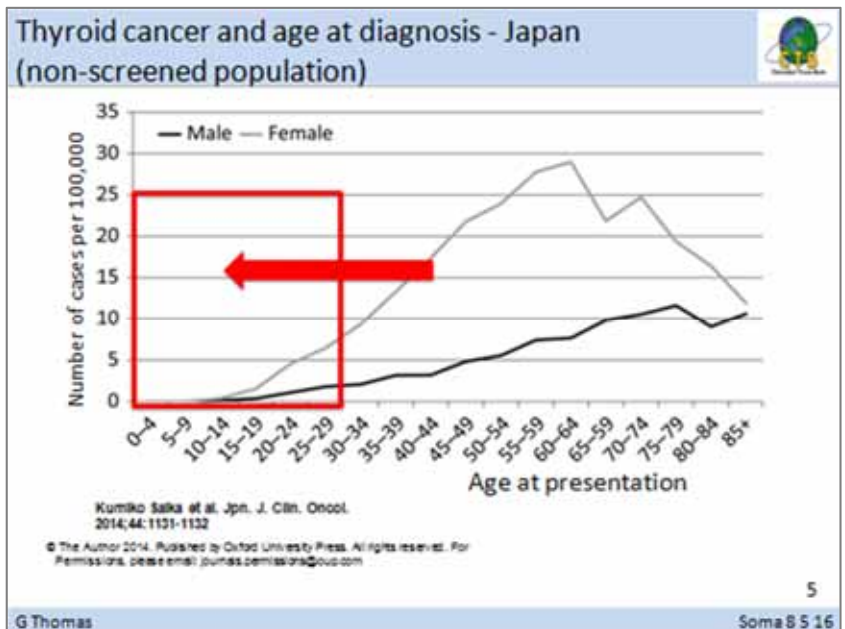
If you look with ultrasound, it's much more sensitive. So you are going to find smaller tumors earlier in life than you would otherwise do by feeling the neck and that can put the incidence up between 19% and 35% of the people that you examine will have some form of nodule in the neck. It depends on where you do that screening, which country, because different countries have different incidence of thyroid cancer and thyroid nodules. It also depends on the age group that you are screening as you will see later.

Interestingly, if you look using a postmortem, so after a patient has died and you take the thyroid out and you section it very carefully, you can find an awful lot more very tiny tumors and that frequency can be between 8% and 65%. So this shows you how the method you use to investigate what is going on in the thyroid can give you different percentages of incidents.

Now the other thing about thyroid is that it has actually got a slightly different curve to what we normally see with other cancers. So, here you can see the incidence for Japan, so this is thyroid cancers in a population that is not being screened. So people go to the doctor with a lump in their neck or because they have difficulties swallowing, they investigate the neck, and they find there is a thyroid lesion there. So these tumors tend to be much bigger than the ones found at screening.

But you can see in young people it's very rare but it rises very quickly as soon as you hit puberty. It rises very quickly in women and then decreases and there is a slow rise, more normally what we see with other cancers in men. We don't know why there is a difference between women and men but this is the same the world over.

Now, when you screen a population, what you do is you push that incidence curve to the left. So if you look at the age group at which you are currently screening in Japan, which is this age group here, and you move that curve to the left, you can quickly see that you will find many more cancers than if you were looking at an unscreened population.



So this will rise rapidly as the population gets older because we know thyroid cancer increases. But you can see what a difference that will make. And interestingly, that figure is a roundabout where we are seeing the numbers for the first screening of the Fukushima population here, about 30 per 100,000. So that is just the effect of screening.

So what did we learn from Chernobyl? Normally we do not screen childhood populations but we did some screening with a lot of support from the Japanese and the Sasakawa Foundation in the early years after the Chernobyl accident. And the baseline frequency of thyroid cancer in Ukraine and Belarus was around about 9 to 18 per 10,000, so 90 to 180 per 100,000.

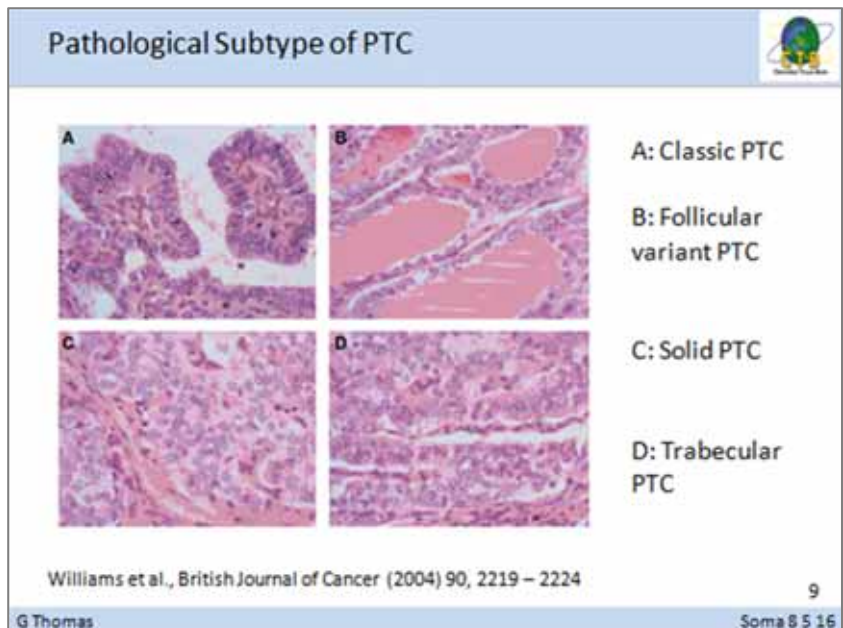
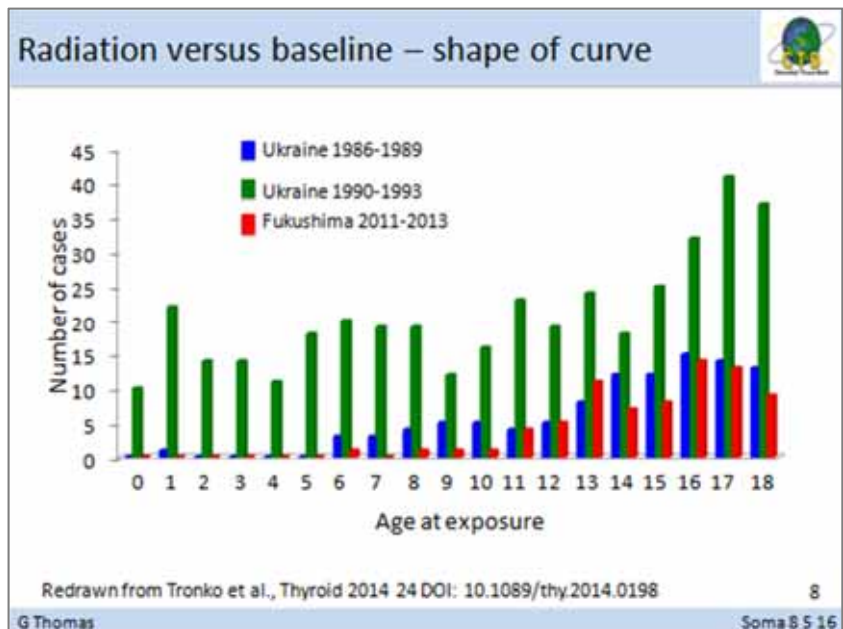
Now that they have a higher number of lesions found because they have less iodine in their diet and their thyroids are more lumpy because of that. We also know that the younger the child, the greater the risk. The younger the child, the exposure to radiation, the greater the risk; and I will show you a graph about that in a moment. The increase was largely restricted to one particular type of thyroid cancer called papillary thyroid cancer and I will show you what that looks like in a minute.

We also found much to our surprise that the subtype of PTC, so the type of cancer is a bit different in young people. And as they age and we screen them and we pick them up as they are older, the subtype changes with age. So there is a complex changes in the biology that happens over our lifetime.

So let's go back to looking at the number of cases that we see relative to age. So here you have some data that came from Ukraine where they simply have plotted in blue the number of cases that they found in 1986 to 1989, so before 4 years after the accident. And you can see the shape of that curve is very similar to what you have in Fukushima in the first round of screening.

Interestingly, that changed dramatically after 4 years after the accident and you are now in the second round of screening and we don't see that pattern at all in the second round of screening. So, your pattern still looks like this, which

suggests that as I showed you before on the other curves, you are just following the natural curve of spontaneous thyroid cancers that occurs in the population. It's not radiation related.



I said before about different pathological subtypes and these are pictures taken under microscope. So here you have typical papillary thyroid cancer. You have another variant that the cells form follicles. So this round thing here is a follicle. Then you have other variants that are solid or trabecular.

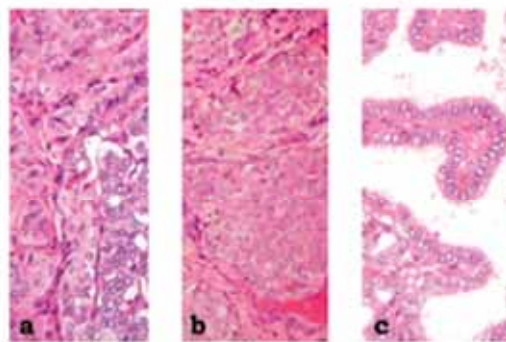
Now these change over time so that in children in Belarus, Ukraine, and in the UK – we did the same study in the UK – this solid pattern is more common. And as you get older, you change into this papillary subtype. But it's not quite as simple as that. We actually found that it didn't matter whether you were an exposed child in the Ukraine, so exposed to the radiation, or you were born after the accident and not exposed to the radioiodine and your cancer was therefore not caused by radiation, the patterns were the same.

However when we looked – this was before Fukushima happened – when we looked at children in Japan at same age as the children we were looking at in Ukraine, we found that the pattern was quite different. We think this is probably due to the fact that the Japanese diet is very, very rich in iodine, whereas in Ukraine and in the UK as well we have less iodine in our diet. We don't eat seaweed as much as you do, although we are starting to eat more Japanese food because it's very nice.

This is also true for adult cancers. So you have a different morphology in Japan which is interesting because it suggests that your diet is affecting the molecular biology of your tumor.

So as you heard before, there are two oncogenes that we look at mainly in papillary thyroid cancer and most cancers are driven through this pathway. So this is the molecular pathway that really matters. And in many cancers you will find that in thyroid cancer there

Morphology is affected by iodine intake



Exposed UA Unexposed UA Japan

Williams et al., Thyroid 2008 8 847-851 DOI: 10.1089=thy.2008.0039

Also true for adult PTCs

Ito et al., Endocr J. 2014;61(12):1221-8. doi: 10.1507/endocrj.EJ14-0239

G Thomas

Soma 8 5 16

Molecular biology of PTC – MAPK pathway

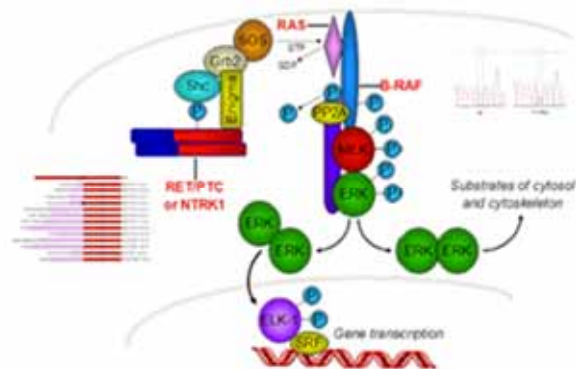


FIGURE 1 | Gene mutations involved in PTC carcinogenesis. PTC is driven by genetic alterations leading to the activation of the mitogen-activated protein kinase (MAPK) signaling pathway. Those include RET/PTC and NTRK1 rearrangements and RAS and BRAF point mutations.

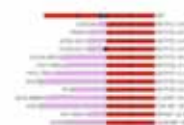
G Thomas

Soma 8 5 16

Molecular Biology and age

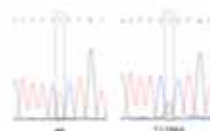
	age group	
PTC subtype	<16	16-30
solid	16/20 (80%)	2/6 (33%)
follicular	5/14 (36%)	5/20 (25%)
papillary	7/18 (38%)	13/25 (52%)
total	32/52 (54%)	20/51 (39%)

Ret/PTC



TCGA suggests adult frequency of 7%

BRAF



	age		
PTC subtype	<16	16-30	>30
solid	0/20	0/6	0/3
follicular	0/14	1/15 (6%)	6/12 (50%)
papillary	1/17 (6%)	4/21 (19%)	12/17 (71%)
total	1/51 (2%)	5/42 (12%)	18/32 (58%)

G Thomas

Soma 8 5 16

is either a rearrangement of the RET PTC gene or the BRAF gene. As you heard in the previous talk, this is a mutation so one of the bases changes in the DNA whereas this is a rearrangement of a gene and there are many different forms of this rearrangement.

What we didn't know before Chernobyl because we had so few pediatric thyroid cancers to look at, so few thyroid cancers in children, was that actually the molecular biology of adult cancers is very different from childhood cancers.

It doesn't matter whether it's caused by radiation or not. The child and the adult require different drivers to make their thyroid cancer grow. And in the adult, the frequency of RET rearrangement varies according to the study and according to the age of people in it but it's very low usually.

The frequency of BRAF mutation is much, much higher as you heard with the previous speaker.

In pediatric thyroid cancer, so children under 15 who get thyroid cancer, the frequency of RET rearrangement is about 50% to 70% in those who were radiated as part of the Chernobyl accident, but the frequency is exactly the same in the US and the UK. So this RET rearrangement is not actually caused by the radiation. It is caused by the age of the child. So it's the body selecting the mutation that helps the cells grow into a tumor.

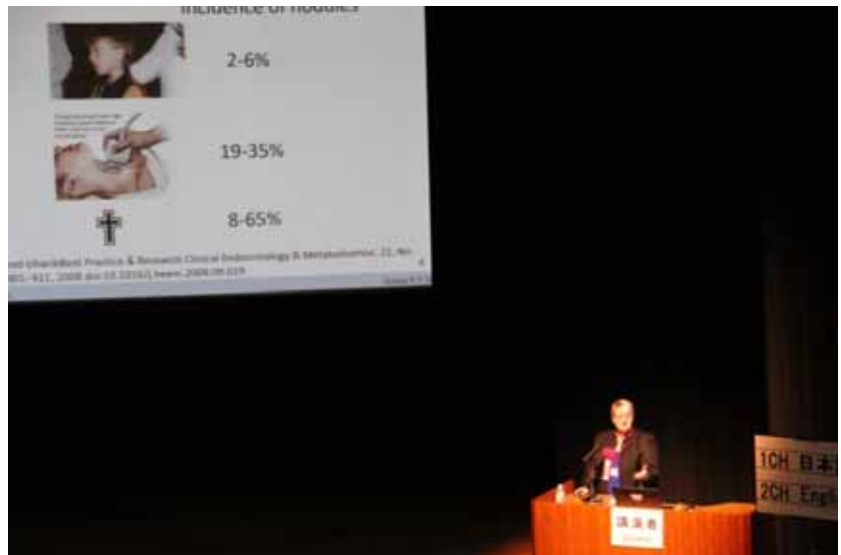
BRAF mutation is very rare. And it's very rare in post-Chernobyl thyroid cancer. In Japanese children who had nothing to do Fukushima accident, this was all research done before the Fukushima accident, and in a group of Portuguese children who had thyroid cancer.

So here you have the different subtypes that I showed you pictures of before and here you can see that the RET rearrangement is quite common in that solid phenotype of PTC. It's less common in the follicular and papillary but it's still quite a high percentage. The recent results from a whole genome sequencing study done in the US suggest that in adults the frequency is about 7%. So the frequency of RET changes depending on the age of the patient.

It's the opposite way round for BRAF. So with the BRAF mutation we very rarely find – in fact we have never found one in a solid phenotype tumor. We very rarely find it in follicular type PTCs. And the papillary type PTCs we see it increase over time. So the older you are and the more papillary type your cancer is, the likelihood is that you are going to have a BRAF mutation rather than anything else. So you can see how complicated interpreting some of the data that is already coming out from many of these studies actually is. It's not simple.

So let's talk about the clinical prognosis of the childhood thyroid cancer. Well, the evidence that we have from Chernobyl which is the largest amount of children who have got thyroid cancer that we can look at suggests that some of them might get a recurrence usually in the neck. About 30% of them will get a recurrence. However, their thyroid cancer remains really treatable with iodine 131. So it is not bad news. For many other cancer types when you have a recurrence, it's quite bad news but for thyroid cancer we still have a really good treatment for those patients.

The mortality rates are about 1% and that's how you know that the treatment in those who recur is going to work again because our mortality rates – the number of people who will die will be about 1%, which is very low for any cancer type.



Despite early papers that suggested that short-latency tumors that arose as a result of the Chernobyl accident were aggressive, the actual clinical outcomes now we have suggest that's just not the case. Yes, they did invade. They did go to the lungs but we were very good at treating them with iodine. So even though they may appear aggressive, actually clinically they are not as aggressive as we thought. And now we understand the molecular biology a lot more. We also understand that actually the molecular phenotype that they have means that they will take up iodine still which means we can use the best weapon we have to treat these patients.

Clinical prognosis of childhood thyroid cancer



- Recurrence rates around 30%
- Mortality rates around 1%
- Despite early papers suggesting that short latency cancers were more aggressive, later studies suggest that this is not so
- "Watchful waiting" may be better than proceeding immediately to surgery – no evidence that this is likely to lead to worse outcome

14

G Thomas

Soma 8 5 16

Many people are worried when they have a child who has thyroid cancer, should they have an operation immediately? Well, we have a plenty of data now that suggests what we call watchful waiting which is to keep watching the child, to keep examining the thyroid using ultrasound, to see if the tumor is growing, is actually better for the child and its clinical outcome rather than rushing into surgery immediately. I have teenaged children myself. I know how difficult teenaged children can be. And sometimes suggesting they have surgery might not be good for them at that particular age. But there is no reason why you can't wait.

We are starting to look at other tumor types like prostate and also think that sometimes we rush to surgery too quickly and in many cancer types now that maybe just watching to see if the tumor is actually going to grow it better than rushing straight to surgery.

The key points that I think that I would like to emphasize is that thyroid screening that's being carried out at the moment as part of the TUE is going to lead to an increased frequency of thyroid cancer compared to waiting for symptoms to develop. So you will see a larger number than you would expect based on the operative statistics that you have.

We know that the molecular biology and the morphology of thyroid cancer is driven more by the age at presentation and by iodine intake than by any exposure to radiation. So, natural biology is still driving that tumor. The radiation doesn't change that.

I would like to emphasize as well, as you saw from the previous speaker, the low doses of iodine 131 to the thyroid post Fukushima mean that an increase in thyroid cancer due to radiation, not to the screening, will not be discernible. So although those figures that you see in the press may look worrying,

Key points



- Thyroid screening using Ultrasound will lead to an increased frequency of thyroid cancer compared to waiting for symptoms to develop
- Molecular biology and morphology of thyroid cancer is driven more by age at presentation and by iodine intake
- The low doses of 131-I to the thyroid post Fukushima mean that an increase in thyroid cancer due to radiation will not be discernible

15

G Thomas

Soma 8 5 16

in actual fact they are as a result of carrying out the screening and it is not induced by radiation.

Finally, if it wasn't for other people in other countries, we wouldn't have all the data we have now and we wouldn't be able to look at this with the help of our Japanese colleagues who were responsible for doing most of the screening in the Ukraine and Belarus. So I would like to say a big thank you to the people in Belarus and Ukraine and Russia who have helped over many years, 30 years now, since the Chernobyl accident, and many of the scientists that are involved in there and doing molecular studies too.

Most importantly, if the patients in Ukraine, Belarus, and Russia had not agreed to donate their tissue, we would not understand the molecular biology and we wouldn't be able to help explain the thyroid patterns that you see in Japan without the help. So without those patients being very generous in donating their tissue, we wouldn't know what we know today. Thank you very much.

Acknowledgements





Patients in Ukraine,
Belarus and Russia that
have generously donated
their tissue for the CTB

16

G Thomas

Soma 8 5 16

Health impact of a disaster on physical performance of school children and elderly people

Sae Ochi

Director of Internal Medicine, Soma Central Hospital



Slightly different from previous speakers, I am talking about indirect impact caused by the nuclear accident, especially on physical performance of the residents. As many speakers yesterday have shown you, the Fukushima Daiichi Nuclear Power Plant accident was not a simple event of explosion and contamination but a complex series of events which include mass evacuation, bad rumor and closure of the plant.

All of these factors, through intermediate factors, may

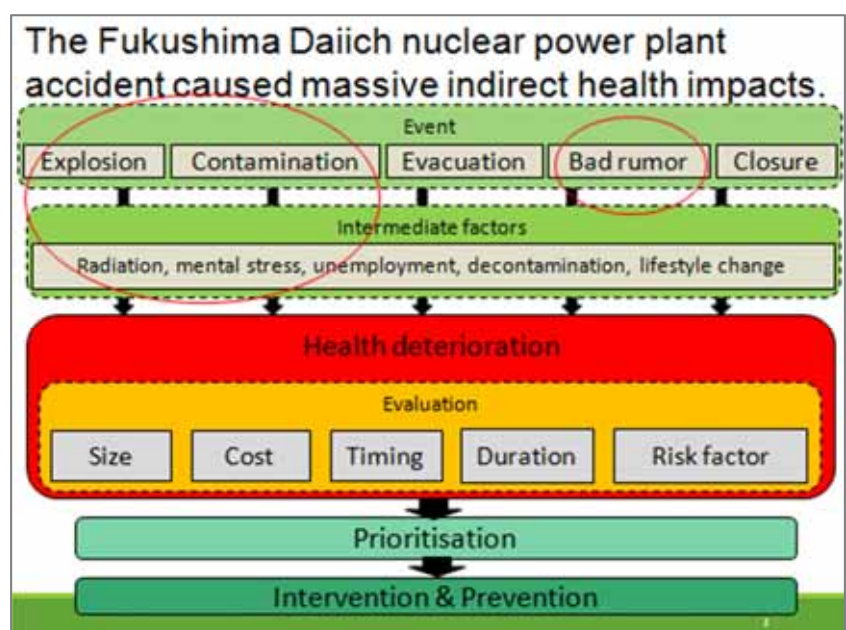
deteriorate resident's health. So what we have to do is to evaluate each health problem with regard to its size, cost, timing, duration, and risk factors. Only after that we can prioritize what intervention needs to be made. However, so far more often than not discussions focus only on relatively narrow topic and many health problems are still overlooked.

So I am showing you one of the examples of these problems: muscle weakness among the residents. Soon after the disaster, there were increasing concerns about deterioration of physical performance because many people stayed indoors from fear of radiation. Not only that, but also many other factors may affect physical activity, which includes long-term displacement, deterioration of living conditions, loss of jobs, social isolation, and increasing mental health problems.

Especially, there were two vulnerable populations to such health impact. One was children who were more likely to stay indoors, and another was the elderly who were more likely to be affected by lifestyle change.

In response to these concerns, we conducted two types of research. One was comparison of physical performance of elementary school children before and after the disaster. And another was comparison of physical performance among the elderly between temporary housing residents and non-temporary housing residents.

First, let me show you the results among children. Many elementary schools in Japan annually provides physical fitness test. So we collected this data from eight elementary schools in



Fukushima prefecture and compared the data in 2010, before the disaster, and 2012, after the disaster.

Four physical tests were included. First one was grip strength and second one was softball throwing. These two tests represent performance in upper body. A side step test – many Japanese people may know 'Hanpuku-yokotobi' - is the test in which the subject jumps 1 meter to the side, then jump back to the center and jump to the other side and continue it for 20 seconds. The number of lines crossed by the subject was counted.

And the 20 meter shuttle run test represents endurance tests. The subject continuously runs between two lines faster than the interval of the beeps and as long as possible. Here are the results of the tests. This is among boys. Interestingly, the performance in the upper body, grip test and softball throwing, there was no difference, or the data score was slightly better after the disaster in 2012. On the contrary, the performance in the lower body - side step test and shuttle run-, the scores in 2012, after the disaster, were slightly lower among many grades.

And these are the results of the girls, the same tendency was observed.

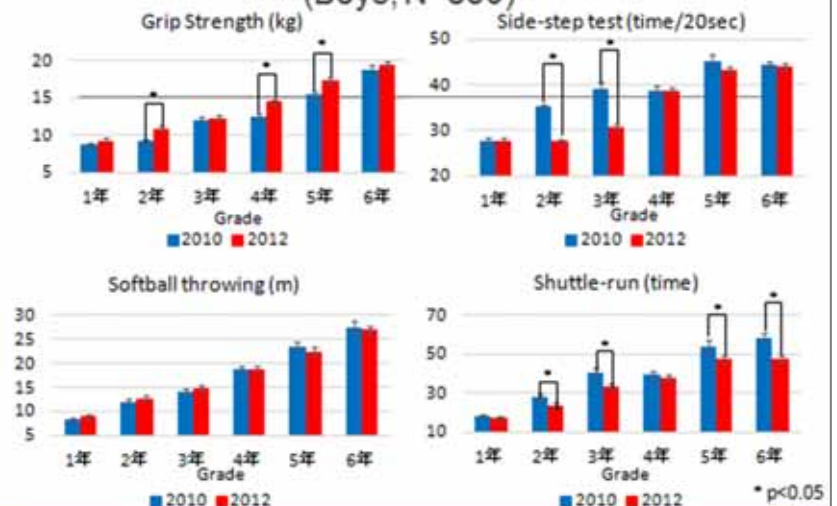
So in summary, physical performance of upper body seems the same or better in 2012 compared with 2010. On the contrary, agility and endurance test appear to be worse in 2012 after the disaster.

Physical fitness test at elementary schools in Fukushima prefecture

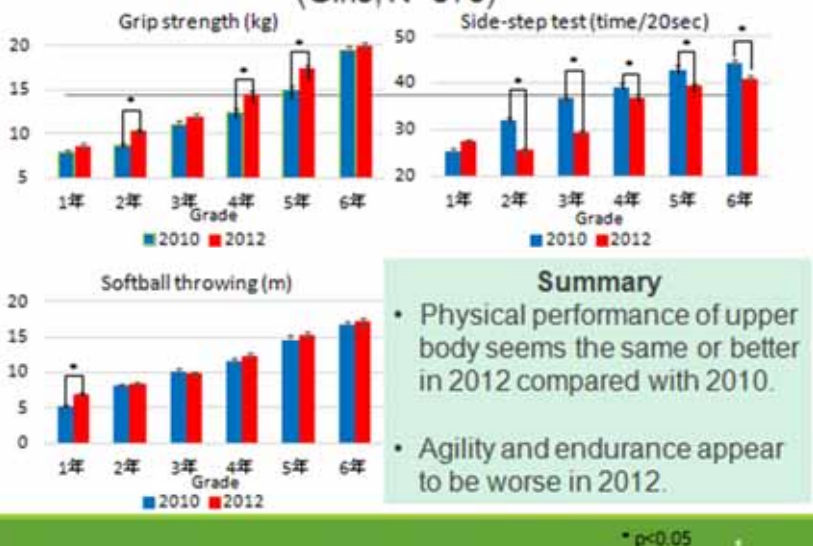
- Data were collected from 8 elementary schools in Fukushima prefecture
- The data in 2010 (before) and 2012 (after) were compared.
- Physical fitness tests include:
 - Grip strength (kg)
 - Softball throwing (m): power of the upper body
 - Side-step test (time / 20sec): agility
 - 20m shuttle run (time): endurance



Comparison of physical performance in 2010 and 2012 (Boys, N=850)



Comparison of physical performance in 2010 and 2012 (Girls, N=873)



Summary

- Physical performance of upper body seems the same or better in 2012 compared with 2010.
- Agility and endurance appear to be worse in 2012.

So how about the elderly? One year after the disaster, Soma city local government, in collaboration with University of Tokyo, conducted physical performance tests targeting elderly people in Soma city. The residents of Soma city at 65 years old or above were included and they were categorized into two groups. TH group means residents in temporary housings and the control group were the residents in Tamano area who also got this performance test.

Two physical performance tests were conducted: grip strength and open eyed one-leg standing test. In open eyed one-leg standing test, the subject stands as long as possible with one leg. And those who could not stand more than 15 seconds were defined as declined standing stability.

This is the result. For both male and female, grip strength is stronger among temporary housing residents. On the contrary, about two-thirds of the temporary housing residents showed decreased standing stability. Two-thirds of them could not stand longer than 15 seconds. But, if the risk of decreasing standing stability was calculated, the risk of declined standing stability is more than five times among temporary housing residents.

Considering that many of the temporary housing residents were former fishermen and farmers and that muscle of leg is lost more easily than grip, this result strongly suggests that those foot muscles were stronger before disaster, lost their standing stability within 1 year by living at temporary housings. You may see the striking similarity between children and the elderly. Both lost their leg strength compared to arm strength.

Globally, physical inactivity has been identified as the fourth leading risk factor for global mortality with 6%

Physical performance test targeting elderly people in Soma city, 2012

- Target population:
- Residents of Soma city ≥ 65 y.o.
 - TH group: the residents in temporary housings
 - Control group: the residents in Tamano area
- Physical performance tests
 - Grip strength (kg)
 - Open-eyed one-leg standing test (OLS, sec)
 - <15 second is assumed as 'declined'



Comparison of physical performance (N=1890, TH: 207, Control 1683)

	Gender	Housing	Mean	CE	95% C.I.	P*
Grip strength (kg)	Male	TH (N=82)	35.2	1.62	0.92 2.32	<0.01
		Control (N=669)	32.2			
	Female	TH (N=125)	23.7	1.29	0.88 1.70	<0.01
		Control (N=974)	21.3			
			%	OR	95% C.I.	P*
Decreased OLS (<15sec)	Male	TH (N=82)	64%	5.2	2.97 9.21	<0.01
		Control (N=669)	31%			
	Female	TH (N=125)	66%	5.4	3.43 8.49	<0.01
		Control (N=974)	30%			

TH group showed stronger grip, but decreased standing stability

TH: residents at temporary housing
* Controlled for age



Imai T, et al. Physical performance deterioration of temporary housing residents after the Great East Japan Earthquake. Preventive Medicine Reports 2 (2014) 915-919. 11

Importance of physical performance

Physical inactivity has been identified as the fourth leading risk factor for global mortality with 6 % of deaths globally¹

For children:

Physical activity may affect:

- physical and mental development
- academic achievement²

For elderly people:

Physical performance is closely related to life expectancy and healthy life expectancy³

1. WHO. Global Strategy on Diet, Physical Activity and Health.
2. Booth JN, et al. Sports Med. 2014 Feb;48(3):265-70.
3. Warburton DE, et al. CMAJ 2006;174 (6): 801-9.

of the death globally. Not only that, but also for children, physical activity may affect physical and mental development. And even more, it may affect academic achievement. Among the elderly, physical performance is closely related to life expectancy and healthy life expectancy. So you may see that the indirect impact of the nuclear accident on physical performance caused much impact among the residents in Fukushima prefecture.

In summary, the triple disaster in Fukushima appears to have caused negative impact on physical performance, especially for that of lower body. However, by focusing too much on radiation and cancer, such preventable health deterioration might be overlooked and practical disaster risk reduction plan may not be established.

We have to remember that the goal of disaster recovery is not reconstruction of buildings but recovery of people's health. So, broader view of health impact caused by the nuclear accident is required for us to achieve full recovery of the society. Thank you.

Summary & Conclusion

- ❖ The triple disaster in Fukushima appears to have caused negative impacts on physical performance, especially of lower body.
- ❖ By focusing too much on radiation & cancer:
 - ❖ Such **preventable** health deterioration might be overlooked
 - ❖ **Practical** disaster risk reduction plan has not been established
- ❖ The goal of disaster recovery is recovery of **people's health**.
- ❖ Broader view of health impacts caused by disaster is required to achieve recovery of the society.



Current situation of internal and external radiation exposure in Soma region

Masaharu Tsubokura

Attending physician, Soma Central Hospital,
Part time physician at Minamisoma Municipal General Hospital



Dr. Suzuki, thank you for your very kind introduction. My name is Tsubokura from Soma Central Hospital and I am a part time physician at Minamisoma Municipal General Hospital.

I would like to make a research report, especially about internal and external radiation exposure. How is it examined and what are the results? I would like to summarize this in my presentation. First of all, allow me to speak in Japanese.

We have an internal and external radiation exposure. External exposure is having radiation exposed from outside of our body. Internal exposure is to absorb radioactive material into the body through inhalation or ingestion. The total radiation level from both internal and external radiation is an issue. Some say internal radiation is more dangerous but the total dose level is going to be the issue at the end.

After Chernobyl, food control was poor so high levels of internal contamination were noted. Thus, people tend to think about internal radiation but we have to consider the total exposure level.

You may know this already but let me look back upon the history of our 5-year struggle. Initially this bus came. This is Minamisoma Municipal General Hospital 4 months after the disaster. Radiologists and sonographers tried to use the equipment and created exam sheet and informed consent sheets to start the screening for internal exposure.

We have this kind of chair type whole-body counter first. We had to go through trial and error process. Although it didn't work initially, Dr. Hayano came to reanalyze the data. Thanks to his help, we have been able to regenerate the data again.

There were school whole body counter screenings including primary and junior high school students twice a year in Minamisoma area. Ninety-nine percent or more is the coverage for 4 years by now. And also there is almost no detection at all.



We have been able to maintain this throughout this period.

We have these graphs in the initial stage of the nuclear incident. From July 2011 we started screening because we thought we should start early. Radioactive material, particular cesium, may still remain in the body. From which area we should start the test that was the initial question. Many municipalities wanted the test first. During the screening people sometimes became angry.

In the 5 years initially radioactive cesium was detected but then very low level has been maintained. Over the past 5 years, internal exposure level was controlled at a very low level in children according to the results. It's not something we were able to achieve, but farmer's and fishermen's hard work resulted in this. This is overwhelming difference compared to Chernobyl, although we had a similar level of soil contamination in some areas compared to Chernobyl.

Some people wondered whether the situation is very similar to Chernobyl. Clearly, we can say that it's very different. So please do not say that it's the same with Chernobyl. We have been able to maintain a very low level and internal radioactive material accumulation has been controlled completely or suppressed.

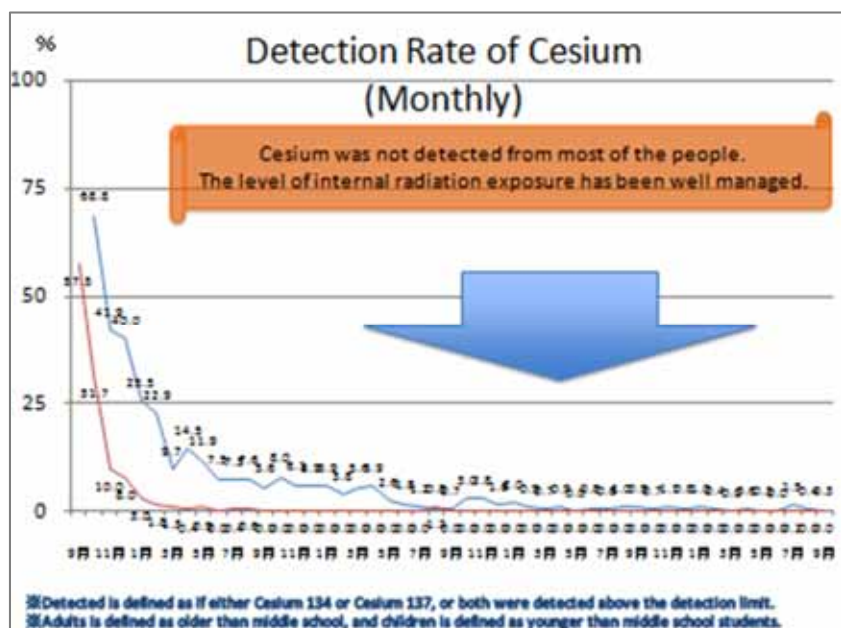
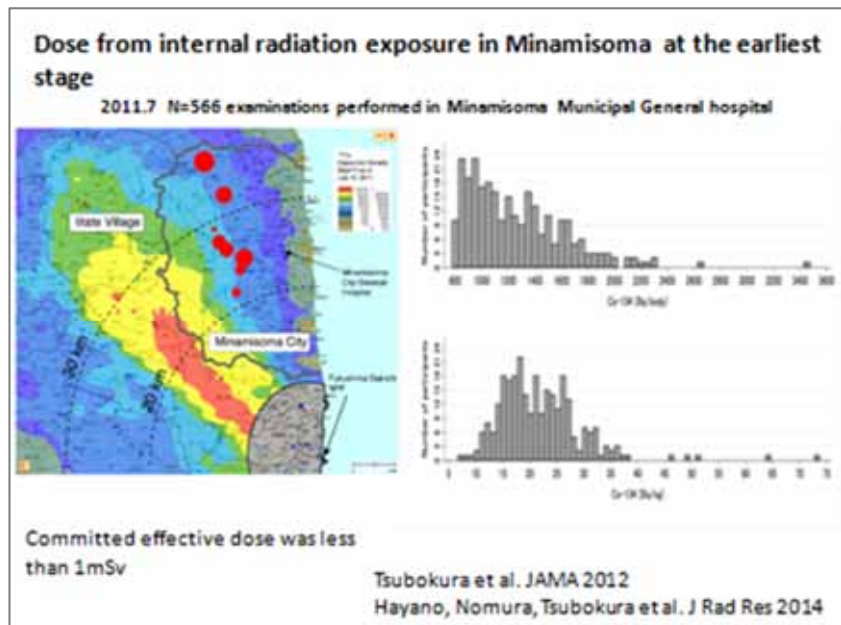
In some cases some people may like, particularly middle-aged men might like mushroom or mountain vegetables, maybe one in 10,000, very rare. For them, even if they continue to eat contaminated mushroom every day, it doesn't amount to 1 millisievert in 1 year. So if you are going to talk about radiation level, after 5 years we haven't detected anything significant.

Whole Body Counter (Fastscan) used today

Detection limit: 250 Bq/body



- Continuous monitoring of the internal radiation exposure level since the disaster.
- The program is now mandatory for all the students in Minamisoma and Soma cities.



Initially, we did detect some level of radiation, but in the autumn 2011 compared to the average 50 years ago, the levels of internal contamination among those in Fukushima were comparable to the Japanese population in 1960's since there was a lot of nuclear testing 50 years ago. Japanese and people around the world were exposed to internal radiation then. Cesium was detected from the urine.

So in terms of the internal radiation in Soma and Minamisoma, it was half or one-fourth of the barium testing right after the disaster. In terms of the radiation in the autumn in 2011, it was lower than the average 50 years ago and no detection at all since for the past 5 years. So that's the current status of the value for the internal radiation exposure in this region.

Dr. Hayano is going to talk about this later, but we developed equipment for testing in babies. Many mothers wanted their small children to be screened but we could not because of lack of the equipment. This was new equipment and staff members studied a lot to enable themselves to use this.

We have many student volunteers here on this occasion this like this. Students came from across Japan and bring the data to identify who are the high-risk groups. We had lots of files, mountain of files. There was a data entry. This is Nomura-san who did the management. I was demanding to him to finish everything by tomorrow morning and he did his best and we were able to generate data. You may say that the risk is high in mushroom and mountain vegetables. You may think that's taken for granted but that's thanks to the data.

As for the external radiation exposure, initially external radiation exposure was the highest of all.

Whole Body Counter (Babyscan) used today
Detection limit: 50 Bq/body



Residents with high levels of internal radiation exposure



We confirmed that high levels of internal contamination were mainly for ingestion of highly contaminated local produce through dietary counseling

External Radiation Exposure Control (Glass badges)



Measures the periodic average level of external exposure

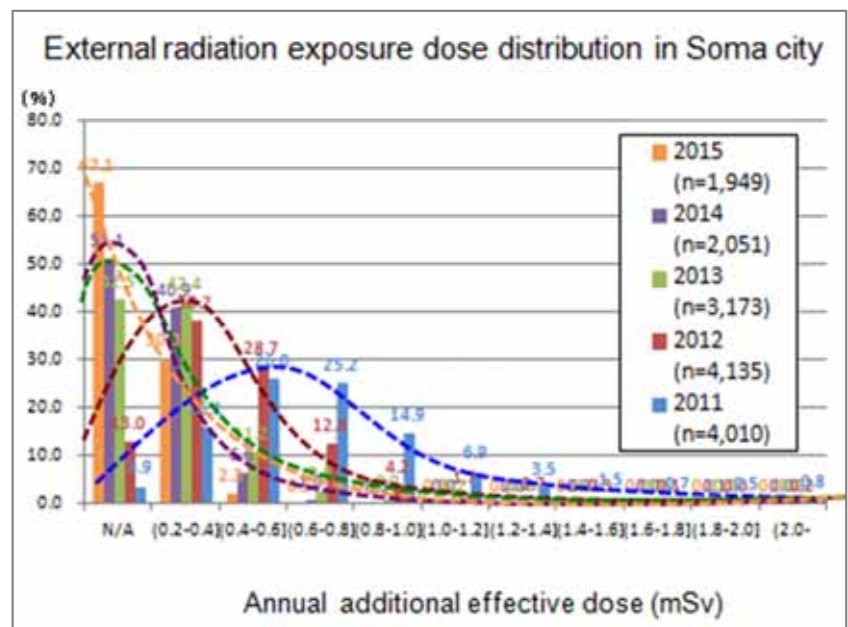
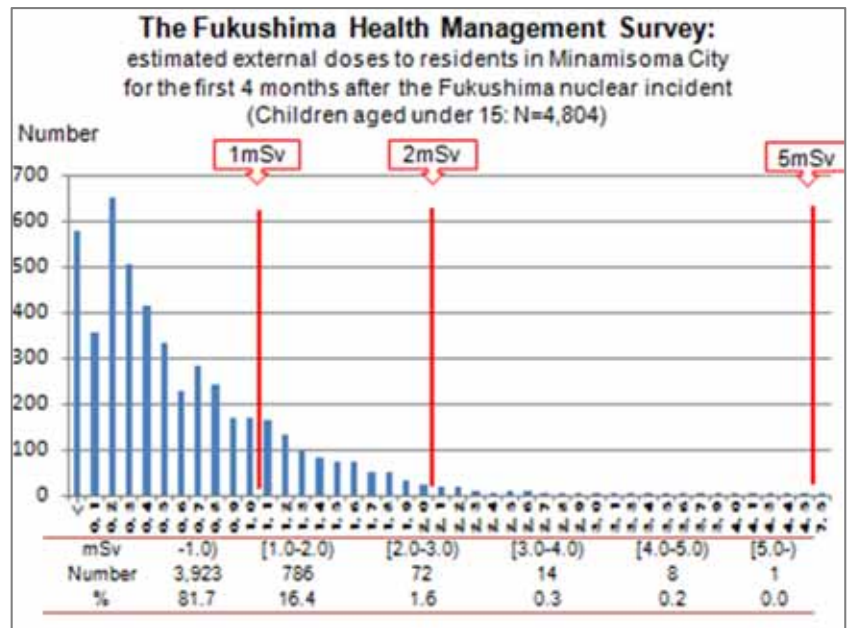
Measures the hourly average level of external radiation exposure

These are the results from Minamisoma city from the prefectural health management survey just among children in Minamisoma. In the initial 4 months, what was the level of exposure? This is the line for plus 1 millisievert. This is 2 millisievert and this is 5 millisievert, up to plus 2 millimeter sievert. Up to 99% of the children's exposure levels are within this range. This is about the initial 4 months; 0.1 was the level of internal exposure, so this is 10 times. In the end there was more external exposure.

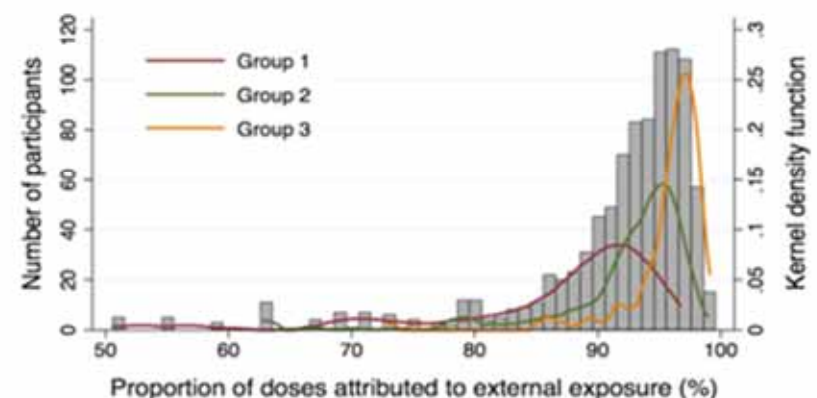
According to the image, this 3 millisievert is one head CT. Chest CT is 7 millisievert. If you had appendicitis, it's 15 millisieverts. It doesn't mean that it's nice to have this exposure but it doesn't mean that children are developing diseases one after another. You can tell based on this data. We have to move on to that stage for the future.

This is Soma city public health center data. Public nurses in Soma city worked very hard. Initial year data was really in confusion. There were mountains of data, you had to summarize the data. This is done by each municipality and the data has been generated in that way.

You may think the data is high or low but it's not just that. In the background a lot of work has been done to gather data to be able to show this to you. In Soma in 2014, as of 2014, there were almost 0 for exceeding 1 millisievert. In 2015, nobody exceeded 1 millisievert. In Minamisoma, the curve is rather to the right. The result can be different in Iitate village but 98% to 99% of the children and their external exposure level is below 1 millisievert. If you live in France, 1.5 times; if you live in Nordic countries, 3 to 4 times higher according to the data. So, no issue at all about exposure.



Dose from external radiation exposure accounts for 93.4% of the total effective dose.



Tsubokura et al. 2015

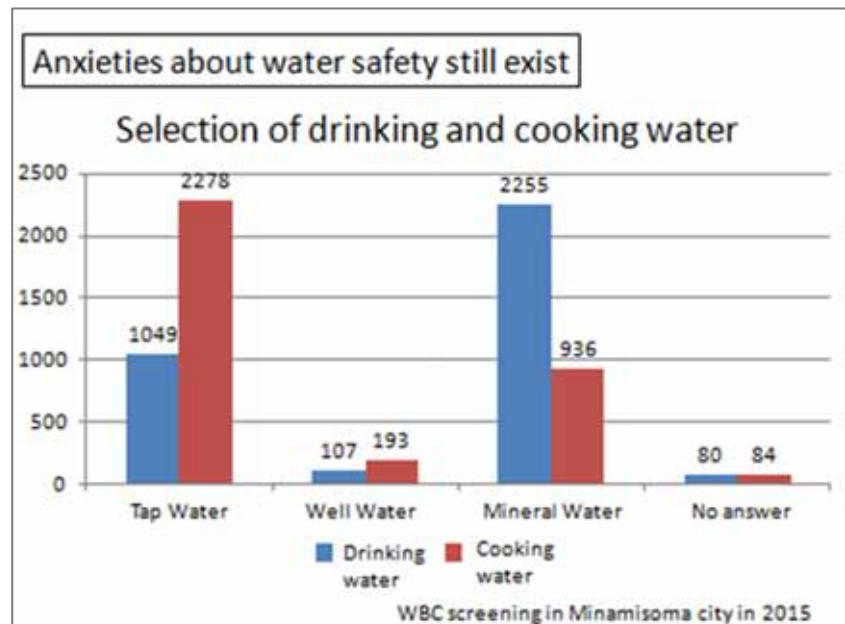
It is true that we had a nuclear accident and many people suffered. That is also part of the reality. Most of the exposure was external exposure in the end. It was the external exposure right after the nuclear accident in the initial stage, 90% or more actually 93.4%. The initial value and the later value for internal and external exposure is summarized here. In the end the value was not so high.

Then what should we do for the future? Future, let me talk about two points. First, we have been able to maintain this low level but still for food there is some tendency for people to dislike certain food. Whole-body counter question survey was done. Those who come to the whole body counter were surveyed. So they are more concerned. Seventy percent still try to avoid food from Fukushima. There is a declining trend but still this is not declining a lot.

Those who come to the whole-body counter test are worried. Seventy percent do not want food from Fukushima. Those who don't come for whole body counter test do not really care. So 30% to 40% of the general survey respondents do not want food from Fukushima. They try to avoid it.

In this region, there is also a lot of enquiry about water. Many mothers tend to choose mineral waters. As for the water, no difference compared to the water in Tokyo. It's really safe. It's tested and scientifically we can say that it's safe.

When I see this data, there is bipolarization. Some say no and others say this is fine and acceptable. But we have to make efforts to move a step forward because 5 years have passed. We have to make efforts to move forward together. Once again, for example, what's the level of exposure, why you don't like it, what about the data?



Radiation Seminars

We performed radiation seminars for all residents in So-so region more than 200 times.

Anxieties about radiation varies depending on backgrounds among residents.

People no longer touch those issues. That's not mentioned in the conversation. But there should be more opportunities to have a discussion on these topics. We should talk about lessons learned in 5 years' and 10 years' time.

Children coming of age, reaching 20 years old drink mineral water and do not eat vegetables from Fukushima because their mom didn't like it. I don't think that's the right thing. But still, it doesn't mean that we should tell them to eat food from Fukushima. And now, each one of us have to revisit these issues and discuss

together. We have organized seminars. Even 5 years after this, there can be a question about low-dose exposure and the disease in Chernobyl. There can be a lot of questions.

Most of the question topics do not really change overtime. In school lessons, that's very important for children, but we do not have enough opportunity to talk about radiation. Adults do not really talk about it. There is no more opportunity for children to discuss. It's not raised as a topic.

I am invited to one of high schools. More than half of the students say they heard it for the first time. When I went to school in Minamisoma, they said there was no such lesson for 3 years. Or at some junior high school, they do this just once a year.

We can control the radiation level at a low level but in 5 or 10 years' time when children go out into society, what's going to happen. Some children may try to withdraw themselves by taking a step behind or backward.

When we talk about radiation, some people say that's none of my business. How to move the situation forward? In my view if adults say they don't want to talk about radiation, we have to take some countermeasures to prevent the bully related to radiation problem from happening. In school lessons at least basics should be taught. I am not suggesting we have a safety lesson but we can talk about radiation in chemistry and physics classes. We can continue such efforts. I think we are now at such a stage. Five years after the disaster, the size of radiation education is getting smaller. Continuity is also in question because of the losing interest. We have to consider what we can continue.



Conclusion

- Levels of radiation exposure among residents in Soma and Minamisoma are very low.
- There is still a tendency exist to avoid food products produced in Fukushima prefecture.
- To establish proper education system for all students is mandatory.

We have to maintain the sustainable screening system. We have to create more opportunities to provide information and discuss together

and we have to have education on radiation. This is my summary. I showed the results for internal and external exposure. There is some tendency to avoid food from Fukushima. What adults should do, what children should do under these circumstances? I shared my ideas in my presentation.

I thank you for this precious opportunity today. I am doing these tests for past 5 years, thanks to your support. We have a variety of data like this here and there. That's the accumulation of all efforts by local people. In order for you to move forward in your life, this is going to be a great asset. Fishermen's union face a lot of issues every day and people in Soma should know what fishermen are doing every day as well. I think and hope that this can be such an opportunity to learn. Thank you very much.



International Radiation Protection System: Protecting Children in the Community

Peter Johnston Director, Division of Radiation, Transport and Waste Safety,
Department of Nuclear Safety and Security, IAEA



Thank you. Konnichiwa! I am very happy to be here. It's a great privilege to be here in Soma city and I was very pleased yesterday to see some of the very impressive remediation work that has been undertaken following the disaster here in 2011.

I want to talk a little bit about radiation protection of children because that seemed to be at the core of what the symposium was about. So in this presentation I will talk about the role of the International Atomic

Energy Agency, the development of safety standards, radiation protection framework and how it applies to children, reference levels and dose limits because these dictate a lot of what we actually do, radiation risks to children, how radiation risks are estimated, and finally the conclusion.

I start with the role of the International Atomic Energy Agency. The International Atomic Energy Agency is celebrating its 60th anniversary this year. The IAEA is part of the UN family of organizations and it was established with a number of roles. One of its roles is to promote the peaceful use of nuclear energy but another of its roles is the establishment of standards, in particular standards for safety for the protection of health and the minimization of danger to life and property. The Department of Nuclear Safety and Security is the department charged with the development of these standards.

The Division that I lead sits within the Department of Nuclear Safety and Security. It establishes safety standards for use by member states. And really in many senses the most important role we have is to assist in the implementation of standards through interaction with regulators, that includes the development of regulatory infrastructure and capacity building across the member states.

The general framework of how standards are developed begins with the evaluations of science conducted by the United Nations Scientific Committee on the Effects of Atomic Radiation, known as UNSCEAR. In turn, that evaluation of science is considered by the International Committee on Radiation Protection, ICRP, which many of you will have heard of, and that turns the science into recommendations for protection. And in turn, the IAEA's job is to take those recommendations and

Role of the IAEA: Statute III (6)

- To establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, **standards of safety for protection of health and minimization of danger to life and property** (including such standards for labour conditions), and to provide for the application of these standards to its own operation as well as to the operations making use of materials, services, equipment, facilities, and information made available by the Agency or at its request or under its control or supervision; and to provide for the application of these standards, at the request of the parties, to operations under any bilateral or multilateral arrangements, or, at the request of a State, to any of that State's activities in the field of atomic energy;



essentially put them in a form which is suitable for use by regulators.

So, the framework for radiation protection that we have really talks about three types of exposure situations, and it is somewhat useful to look at these three types of exposure situations. The first type is what we call planned exposure situations and this is what applies if you are proposing to build a power plant or conduct any form of activity which involves the use of ionizing radiation.

When there is a planned exposure situation, we have three principles that we follow. The first principle is justification, which I will explain a little bit more later; the second one is optimization; finally, the third one is limitation or the establishment of dose limits.

The second type of exposure situation is what we call an existing exposure situation and that's what happens when the radiation exposure situation wasn't planned or had not previously been regulated and I will come back to that in a while. And finally, we have an emergency exposure situation which is when something is out of control.

All three of the exposure situations use the principles of justification and optimization. In the case of planned exposure situations, we have dose limits and in the case of existing and emergency exposure situations, we have things called reference levels.

The situation now in Fukushima prefecture is an existing exposure situation. We had an emergency. There was something out of control. It is now under control. So the emergency is over. But we had a situation which we didn't plan to have and we have to deal with the radiation exposure from the situation we find ourselves in.

How are Safety Standards developed?

- The science is evaluated by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)
- The International Committee on Radiation Protection (ICRP) turns the science into Recommendations for protection
- The IAEA turns the Recommendations into language suitable for Regulations



Exposure Situations

- Planned – what should we consider in developing a new use of radiation
- Existing – when a radiation exposure situation exists but was not planned and a decision to control has been taken
- Emergency – when something is out of control
- All of these use the principles of justification and optimisation. Dose Limits and Reference Levels also apply.



Principles of Radiation Protection: Justification

- "Do more good than harm"
- Look at all hazards and choose a path that minimizes the total hazard to the Community.
- Children cannot be separated from the Community and the System of Radiation Protection does not treat them separately



So what does justification and optimization really mean? Well, justification is actually a very simple concept. It simply says that a practice is justified if it does more good than harm. And in order to justify a practice, we should look at all the hazards that are involved and choose a path that minimizes the total hazard to the community.

Now this actually involves considering not just radiation hazards but all the other hazards that might be present. And it has been very constructive to me to look at the deep understanding of disasters that Japan has and how it understands the social impacts that disasters can have. These form an important part of the overall consideration of justifying what you do in the future. In fact, I think there are many situations in Japan where radiation exposure is now a very minor hazard in comparison to the other social problems that have arisen from the disasters.

In this context, I mentioned children because there is no separate framework for radiation protection for children. Radiation protection of children acknowledges that children have different sensitivities to radiation to adults. And certainly when one does assessments, one comes up with a different dose for children to what one might get for an adult. But in general children are considered in the same framework as all other people.

Optimization is ultimately again a very simple concept as well. Optimization simply asks the question can we do better with the resources that we have available. I can see already that in the social context some of Japan's knowledge of disasters has recognized the fact that elderly people are particularly vulnerable in the aftermath of a disaster. So there have been practical steps taken to improve the social situation of elderly people. This is a form of optimization. It is not applied to radiation of course; but nevertheless, it is exactly what we would call, in radiation protection language, optimization.

So how do we apply optimization? First of all, we make the decision that is something justified, is it going to do more good and harm, and is it the best option for the community. Then we often can do much better by empowering the community to improve the situation itself.

An area which causes lots of problems and misunderstandings are the concepts of limits and reference levels. Dose limits, as I have said before, apply only in planned exposure situations for workers and members of the public. So if I work in a hospital and I am doing radiography, then I am a worker and I have to fall within a worker dose limit. If I am building a plant of any type, then I have to make a consideration of whether I will expose members of the public to more than the public dose limit. And if I am going to expose them to more than public dose limit, I have to find a better way of doing the job I have to do.

Reference levels apply much more generally and these need to be developed by government at a level that is justified. In the case of reference levels for existing exposure situations, the ICRP recommends a reference level in the range of 1 to 20mSv. It should be determined on the basis of minimizing all risks from all hazards.

In Japan, the government has essentially chosen a reference level of 1mSv at the bottom of this range because of the extreme concern about radiation issues. It's worth reflecting on whether that is actually the optimum reference level for the situation at hand.

Limits and Reference Levels

- Dose limits apply only in Planned Exposure Situations for workers and the public
- Reference Levels apply more generally and these need to be determined by the government at a level that is justified.
- ICRP recommends a Reference Level for the public in the range 1-20 mSv. It should be determined on the basis of minimizing all risks from all hazards.



We have talked a bit around 1mSv as being an important number in the symposium. I will try to put that into some context. The natural background worldwide averages 2.4mSv but it varies enormously from less than 1mSv in some places to much more than 10mSv in others. So this 1mSv which probably has more prominence than it deserves is really actually a very small dose which is used really prospectively for planning new facilities. And we should not get tied up too much about that. The more important concepts are those of justification and optimization.

As was indicated this morning, if one goes for a CT examination, one would get a lot more than 1mSv. In fact, depending on how big you are, it is typically something of the order of 10mSv. For a child, it might be a in a range of 2-5mSv. For me, it's probably considerable more. A chest X-ray is something like 0.1mSv; mammography 0.7mSv, and if you have to have radiation therapy, then the dose are really very, very large because they are designed to kill large numbers of cells and leave very few cancer cells alone.

Our understanding of radiation risks to children comes from a wide range of sources. In fact there was a very excellent volume produced by UNSCEAR recently on exactly this topic. And children are not like little adults. They actually have rather different presentations of cancers. Some cancers are much more prevalent in children than they are with adults for a particular radiation dose. The other area where we actually know quite a lot about childhood cancer is from the aftermath of Chernobyl.

Now, Chernobyl was an accident which released a very large fraction of the core material from a very large reactor. It happened in an agricultural area where the economy was effectively a peasant economy where a lot of people were eating produce from their own farms and there was very little restriction of food to many of the population in the immediate area.

One of the lessons that was learned from Chernobyl was that ingestion of milk, green vegetables, and other foods is a critical pathway in the radiation exposure of children. While one might criticize a number of things that happened in Japan following the accident of Fukushima Daiichi Nuclear Power Plant, certainly restriction of food was effective and that has saved Japanese children from being highly exposed to radiation.

As a consequence of the accident, UNSCEAR indicated that it is very unlikely that there will be very discernible increase in cancers to the Japanese population. They do say, however, that it was possible that one might see an increase in childhood thyroid cancers. The UNSCEAR report indicated doses which we now recognize as being quite high compared to the situation as we understand it now. So I think it is reasonable to take those two pieces of information together and suggest that it is very, very unlikely that we will discern any increase in cancer from the Fukushima Daiichi Nuclear Power Plant accident.

<ul style="list-style-type: none"> Natural background average 2.4 mSv (most people in the range 1-10 mSv) Medical procedures 		
Procedure	Effective Dose	Equivalent period of Background
Chest X-ray	0.1	10 days
Mammography	0.7	3 months
CT Abdomen	10	3 years
Radiotherapy	20,000-70,000	6000-21000 years



The UNSCEAR report of 2013 also indicates that data about cancers or radiogenic cancers in children are really very limited. Children are more sensitive than adults with respect to radiation exposure but it varies greatly with age. And the data is still really quite uncertain, and that there needs to be additional research and the research should be focused around areas of high natural background after high-dose medical procedures and following radiation therapy.

We also have data that we apply from the US and National Academy of Sciences who have examined the radiation-sensitive children and they also indicate significantly higher radiation-sensitivity of children than adults, significantly higher radiation sensitivity of women than men. But when it comes to the development of safety standards, because we are dealing with a large population, we do not differentiate between men, women, and people of different ages because we are trying to come up with a standard that is useful across the whole community.

So to summarize our understanding of radiation related to children, children are considered to be more sensitive to radiation than adults. Cancers in children are rare. Many studies are underway to look at radiation-induced cancers following medical procedures, especially computed tomography. And I think that it is worth just digressing for a minute to think about some of these studies because these studies involve looking at many hundreds of thousands of children who have had CT scans with doses of typically 5mSv.

These studies are some of the few studies that have the power to actually show effects of radiation at low doses of the sort that occurred in the Fukushima prefecture. Those studies are going to be long and hard. The ones that we have published so far have been disputed heavily in the scientific community and have shown really very, very small increases in cancer risk with the sorts of doses that come from CT which is of the order of 5mSv.

So I conclude by again saying that children are at greater risk due to radiation exposure than adults. Radiation risks cannot be entirely

Our understanding of radiation risks to children - summary

- Children are considered to be more sensitive to radiation than adults.
- Cancers in children are rare
- Many studies are underway to look for radiation induced cancers following medical procedures, especially Computed Tomography
- This research is difficult and hard to interpret



Conclusion

- Children are at greater risk due to radiation exposure than adults
- Radiation risks cannot be entirely avoided
- The system of radiation protection is designed to provide adequate protection to the entire community
- The greatest risk following a nuclear accident is thyroid cancer in children from radioiodine



Conclusion II

- The risk of developing thyroid cancer is dependent on the dose. Thyroid doses in Fukushima were low or very low.
- There will be health benefits for ongoing health monitoring and survey campaigns as well as health assistance campaigns to prevent radiological and non-radiological health effects.



avoided. We are all radiated all of the time. Radiation is part of nature. The system of radiation protection is designed to provide adequate protection to the entire community. And the greatest risk following a nuclear accident is thyroid cancer in children from radioiodine; but fortunately, this can be mitigated by effective controls on access of children to milk, green vegetables and other foods.

Finally, the risk of developing thyroid cancer is dependent on the dose. The thyroid doses in Fukushima were low or very low. There will be health benefits for ongoing health monitoring and survey campaigns as well as health assistance campaign to prevent radiological and non-radiological health effects. But as has been mentioned already, we have to be conscious of the fact that not everything that we find as an abnormality in those health surveillance programs is actually going to be a cancer that needs prompt treatment.

Finally, the IAEA is heavily involved in working in Fukushima Prefecture. We have a range of projects underway at the current time looking at remediation and decontamination, largely with Fukushima Prefecture. Management of radioactive waste from remediation activities remains a matter of real interest to us and you have a lot of soil to worry about, you have a lot of water and storage that has to be dealt with. These are going to be ongoing problems.

We are working with the prefecture and the Ministry of Environment in fact in the use of radiation monitoring data to develop maps that can be made available to the public on our websites. So with that, I conclude. Thank you.

**IAEA assistance to the Fukushima Prefecture:
Projects in Implementation – 5 years plan**

- Remediation and Decontamination in Fukushima Prefecture
- Management of Radioactive Waste from Remediation Activities
- Assistance in the use of radiation monitoring data to develop maps to be made available to the public

 IAEA

Thank you for your attention



 IAEA

Post-nuclear evacuation and health risks in Fukushima

Shuhe Nomura

PhD Candidate Department of Epidemiology and Biostatistics,
School of Public Health, Imperial College London



Yes, thank you very much for introduction, Oikawa-sensei. Good morning, everyone. I am Shuhe Nomura, a Ph.D. candidate at Imperial College, London. I do really, really appreciate all of you here and those who organized this symposium for having me today. As this title suggests, I am going to talk about evacuation and health risks after the Fukushima nuclear incident.

But before getting into that, let me briefly introduce myself. When the incident happened 5 years ago, I was

just a Master students at the University of Tokyo, Japan, and soon after the incident, my professor, who will also speak this afternoon, gave me a chance to visit Fukushima as a volunteer for health checkup. There I met a lot of people from this area including many of today's speakers. In these 5 years, I have been working for the disaster recovery with the local government and with the local hospitals and local health centers and many, many local staff. So in this session, I am going to introduce some of the research based at Minamisoma city and Soma city.

So this is the outline of my talk. The first topic is evacuation and mortality in elderly population and followed by chronic health risk. And finally, I will present other health challenges.

So the first topic, mortality associated with evacuation. You know, safe evacuation of elderly population is very, very important aspect of disaster planning and preparations. For example, in the case of the Hurricane Katrina in 2005 in America, some research suggested that evacuation can be associated with approximately twice the mortality risk in elderly people. So, in elderly population whether or not to evacuate after major disaster and when evacuation is really necessary, how to reduce the potential increase of mortality associated with evacuation are very, very well important issue at the local level and national and global level.

Fukushima incident also required evacuation of elderly population and provided a lot of important insight and lessons on this issue. So, to sum up the evacuation instruction by the central government after the incident, soon after the incident, the central government issued mandatory evacuation order for those living in the 20-kilometer radius of the nuclear power plant. A few days later the government also issued a voluntary evacuation instruction to the 20 to 30 kilometer zone. So after that, a lot of people evacuated from this area.

As of now there are some reports concerning the increased risk of mortality after the evacuation. This is from the National Diet of Japan Fukushima Investigation Commission where I worked as a research assistant before. It says that in the 20-kilometer zone, there were seven hospitals and from there after the incident 850 patients evacuated and sixty people died within 1 month after the evacuation.

Second one is from the Fukushima Medical University which said that in the 20-kilometer zone there were 32 nursing homes and from there about 2000 people evacuated and the mortality increased about 2.4 times in comparison with the previous year, 2010.

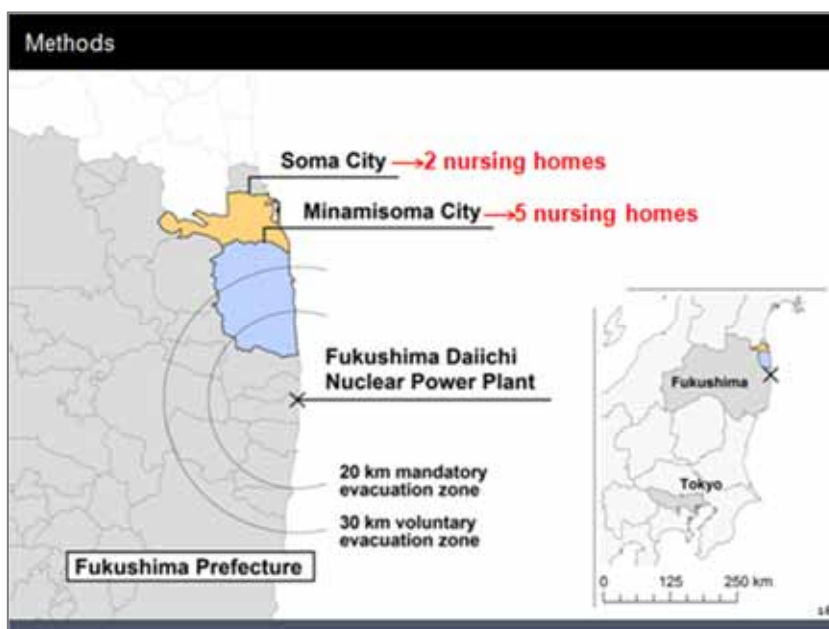
This is my paper using the data of Minamisoma city and we reported that after the evacuation, the mortality increased about 2.68 in the nursing home resident. The final one is from the newspaper article. As of the end of the 2013, 1-1/2 years after the nuclear incident, the number of death due to evacuation exceeded the total number of tsunami victims in Fukushima prefecture. So, the mortality due to evacuation was higher than the direct death of tsunami in Fukushima.

I am going to introduce my research work in more details. So, my study site, Minamisoma city and Soma city, and in total seven nursing homes participated in our study. Importantly, all the facilities in Minamisoma city evacuated after the incident; on the other hand, facilities in Soma city did not. So, this situation enabled us to conduct comparative analysis between evacuees versus non-evacuees in order to assess the mortality risk associated with evacuations.

It should be noted that after the nuclear incident in Fukushima, evacuation was not avoidable for the nursing home resident in Minamisoma city because of extreme anxiety about radiation exposure, lack of reliable information on radiation level and also they lacked human resource, medical supply, food stuff, and lots of resources.

I would like to repeat that the objective of this study was to evaluate the mortality associated with evacuation and the risk factors that affected the mortality increase. What we have to learn from this incident is how to reduce the potential increase of mortality associated with evacuation. Lessons learned from this incident can be applied to any type of disasters which will require evacuation of elderly population in the future.

This is the first result showing the relative risk of mortality after the incident in Minamisoma city by facilities that evacuated, so all of the facilities in this table evacuated after the incident. The main point is that the overall relative risk after the evacuation was 2.68. Another point is that there are huge variations of the increased mortality after the evacuation between facilities ranging from 0.98 to 3.93. And two facilities, facility 3 and 5, statistically did not increase the mortality even after the evacuation.



Results 1

Facility-specific relative incidence in Minamisoma City: 2006–2010 vs. 2011

Facility	Incident	Population	Death	Relative incidence (95% Confidence interval)
1	Before	144	55	
	After	72	23	3.78 (2.22–6.26)
2	Before	94	31	
	After	50	12	3.01 (1.41–6.04)
3	Before	99	43	
	After	50	9	1.63 (0.70–3.38)
4	Before	119	50	
	After	69	25	3.93 (2.36–6.57)
5	Before	259	51	
	After	87	6	0.98 (0.34–2.29)
Combined	Before	596	230	
	After	328	75	2.68 (2.04–3.49)

(Nomura S, et al. PLOS ONE. 2013)

This result may indicate that the mortality associated with evacuation highly depends on facility-specific evacuation procedures. This is the analysis that evaluated the effect of evacuation distance and evacuation number on the mortality. After the incident, many people evacuated several times like the first evacuation from the original facility to the evacuation site and second evacuation from there to another evacuation site. And by doing so, they were moving away from the nuclear power plant and looking for the facility best suited for them.

The point of this result is that initial evacuation from the original facility had about two times mortality risk of subsequent evacuations. Another point is that evacuation distance had no statistically significant impact on mortality. This result indicates that regardless of evacuation distance, many people died after the initial evacuation. Those who survived the initial evacuation could also survive the subsequent evacuations.

Then this is the analysis that incorporated the data of Soma city which did not conduct evacuation. So this is a comparative analysis between evacuees versus non-evacuees. The point is that in comparison with non-evacuation, initial evacuation from the original facility had about 3.4 times mortality risk, which is huge impact on mortality.

So this is the brief summary of evacuation study. First of all, I found a substantial increase of mortality after the evacuation and there are huge variations of the increased risk between facilities, which may indicate that the mortality associated with evacuation highly depends on each facility's specific evacuation procedures.

Results 2

Associations between evacuation distance/type and the post-incident mortality in Minamisoma City

Variable	Hazard ratio (95% Confidence interval)	P-value
Evacuation distance (km)		
less than 150	Ref	
150 to 300	1.01 (0.35–2.91)	0.99
more than 300	0.92 (0.41–2.07)	0.85
Evacuation type		
Initial	1.94 (1.07–3.49)	<0.05
Subsequent	Ref	

*Adjusted for facility, sex, age, and care level
in cox regression model*

(Nomura S, et al. PLOS ONE. 2013)

22

Results 3

Comparison of the post-incident mortality between evacuees and non-evacuees

Variable	Hazard ratio (95% Confidence interval)	P-value
Evacuation type		
None	Ref	
Initial	3.37 (1.66–6.81)	<0.01
Subsequent	1.93 (0.90–4.14)	0.09

*Adjusted for sex, age, and care level
in cox regression model*

(Nomura S, et al. Preventive Medicine. 2015)

23

Summary

- Following the Fukushima incident, initial evacuation (vs. non-evacuation) had a substantial impact on mortality.
- Second and subsequent evacuations, which were more likely to have been pre-planned and carefully executed, did not show a significant impact on mortality risk.
- Current disaster plans for elderly care facilities do not necessarily meet the challenges of mass-displacement disasters
- Relevant authorities should support care facilities so that, during/after a disaster residents can shelter in place for at least sufficient time to adequately prepare initial evacuation.

(Nomura S, et al. Preventive Medicine. 2015)

24

Also, we found that initial evacuation from the original facility had a huge impact on mortality while subsequent evacuation has less impact, which may indicate the importance of well-preparedness of initial evacuation.

For example in Minamisoma city, as I mentioned, the facilities in Minamisoma evacuated because of anxiety about exposure to radiation, lack of resources, human, food, and other resources. And also, they could not prepare for proper transportation means like the vehicles for disabled persons. They had to use general vehicle for their resident which might impose huge burden in the elderly. Then as a result some facilities increased mortality after the evacuations.

On the other hand, the facilities in Soma did not conduct evacuations because they fortunately received external support from like NGO or distant facilities and then they did not have to conduct the evacuations. Then they did not increase the mortality after the incident.

The lesson is that evacuation may not be the best life-saving strategy for elderly people. But, you know, when evacuation is necessary, which can be happening any type of disasters, in order to avoid evacuation burden, especially the burden of the initial evacuation, arrangement of any evacuation procedures such as well-preparedness of evacuation site or proper transportation means are quite important, which critically determines the survival of elderly population.

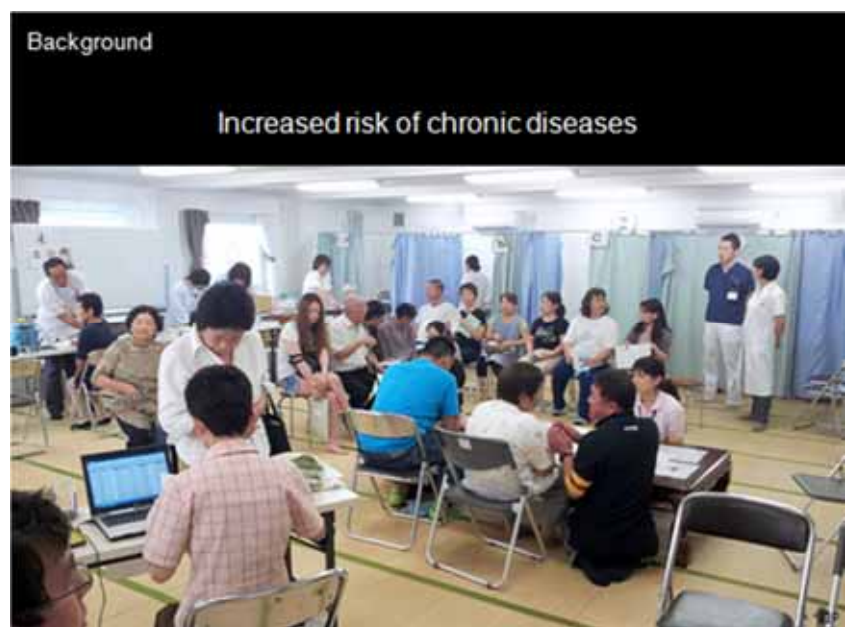
Finally, I think that relevant authorities need to help and support the affected facilities in emergency time. In Japanese guidelines for emergency response, medical facilities are supposed to conduct evacuation themselves. But in emergency time the facilities will not be capable to prepare for and to implement evacuation themselves. They definitely need support.

If you are interested in our study or need more information about this topic, you can check this article which is already published. I have some brief summary written in Japanese. So if you need Japanese version, please let me know so and another article related to the study.

Let's move to the next topic, chronic health risk. So the health impact of evacuation is not limited to mortality of course. Evacuation has powerful influence on individual vulnerability to psychological stress or changes in socioeconomic status and thus on people's health, and Fukushima incident is no exception. Some research suggested elevated value for metabolic markers like BMI or blood pressure, particularly in evacuees and in the acute phase of the incident.

However, the long-term health consequences of evacuations are not clear because of difficulty of data collection or other reasons. So, the risks in the chronic health in long-term perspective at this present moment were unclear. However, the Soma city and Minamisoma city initiated evaluation of this chronic health risk in long-term perspective. Data was collected from the annual health checkup from 2008 to 2014 and we targeted diabetes and hyperlipidemia and hypertension.

First of all, in the analysis we classified the participants into evacuees and non-evacuees based on their home address at the time of the incident. So in this figure, the area colored in blue, yellow, and green were mandatory evacuation area after the incident. If the participants were living in these areas, they were regarded as evacuees.



Then I compared the disease risk between before and after the incident in order to see how much disease risk increased after the incident. And then that relative risk before and after the incident was compared between evacuees versus non-evacuees. This is the result of the relative risk of the diseases before and after the incident by evacuation status. The left is for evacuees and the right is for the non-evacuees. I apologize for the very busy table.

So in summary, increased risk of diseases was identified in diabetes and hyperlipidemia after 2013, 2 years after the incident. On the other hand, the hypertension did not increase the risk after the incident. This maybe indicates that hypertension was relatively easy to control even in the disaster setting just using a medicine.

When comparing these relative risks between evacuees versus non-evacuees, the significant difference was identified in only hyperlipidemia. So, this result indicates that the increased risk of hyperlipidemia after the incident was greater among evacuees than among non-evacuees.

A major disaster often social disruption through mass evacuation or changes in socioeconomic status which may result in reduced physical exercise, decreased access to medical care, and thus they have a powerful influence on human health.

In conclusion, my study also demonstrated that disaster impact may persist in long term with regard to particularly diabetes and hyperlipidemia. And also, evacuation has powerful influence on the risk in long-term perspective. So, all the disaster-related stakeholders including medical community should pay more

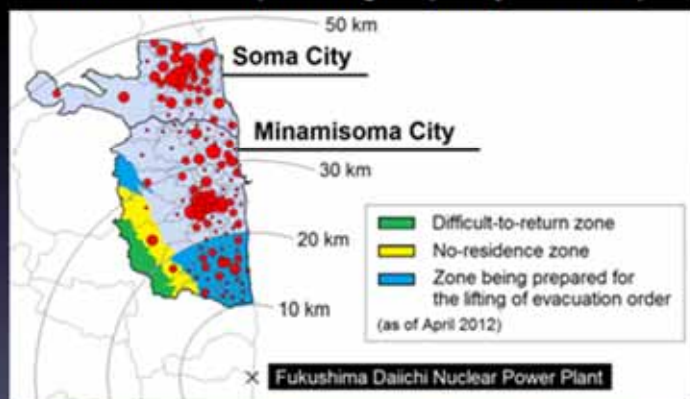
Methods 1

- Data source: annual public health check-ups (available only for those aged 40–74 years)
 - physical examination
 - blood sample test
 - self-report medical history and lifestyle survey
 - Study period: 2008–2010 (pre-incident) and 2012–2014 (post-incident)
 - Target diseases*:
 - diabetes
 - hyperlipidemia
 - hypertension
- * based on the clinical guidelines for disease diagnosis or self-reported medication use

34

Methods 2

- Subgroup classification
 - Evacuees
 - Non-evacuees (including temporary evacuees)



The red circles show the geographical distribution of the health check-up participants in 2010, where the circles are proportional to the number of subjects living in each district

35

Results 1

Pre- and post-incident relative risk of the diseases (versus baseline: 2008–2010)

	Evacuees (95% CI)	Non-evacuees (95% CI)
Diabetes		
2011	1.12 (0.70–1.79)	0.94 (0.81–1.10)
2012	1.21 (0.88–1.67)	1.11 (0.97–1.27)
2013	1.55 (1.15–2.09)**	1.33 (1.17–1.52)***
2014	1.60 (1.18–2.16)**	1.27 (1.11–1.45)***
Hyperlipidemia		
2011	1.10 (0.94–1.27)	1.00 (0.95–1.05)
2012	1.16 (1.05–1.29)**	1.03 (0.98–1.08)
2013	1.30 (1.18–1.43)***	1.12 (1.07–1.17)***
2014	1.20 (1.08–1.32)**	1.14 (1.09–1.20)**
Hypertension		
2011	1.05 (0.91–1.21)	1.05 (1.01–1.10)
2012	1.04 (0.94–1.14)	1.03 (0.99–1.07)
2013	1.10 (1.00–1.21)*	1.01 (0.97–1.05)
2014	0.94 (0.85–1.05)	0.95 (0.91–0.99)*

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$ for given year versus baseline (2008–2010), adjusted for age (Nomura S, et al. BMJ Open. 2016)

36

attention to the chronic health control in long-term perspective and even at this present moment. If you want more information, you can check this article which is already published. I also have a Japanese version. If you need that kind of version, you can ask me.

Finally, I will quickly introduce a new study of Soma city which is about obesity in school children after the Fukushima incident. This is not an evacuation study but there are some increasing concerns about this topic. So then I am going to speak a bit on this topic today.

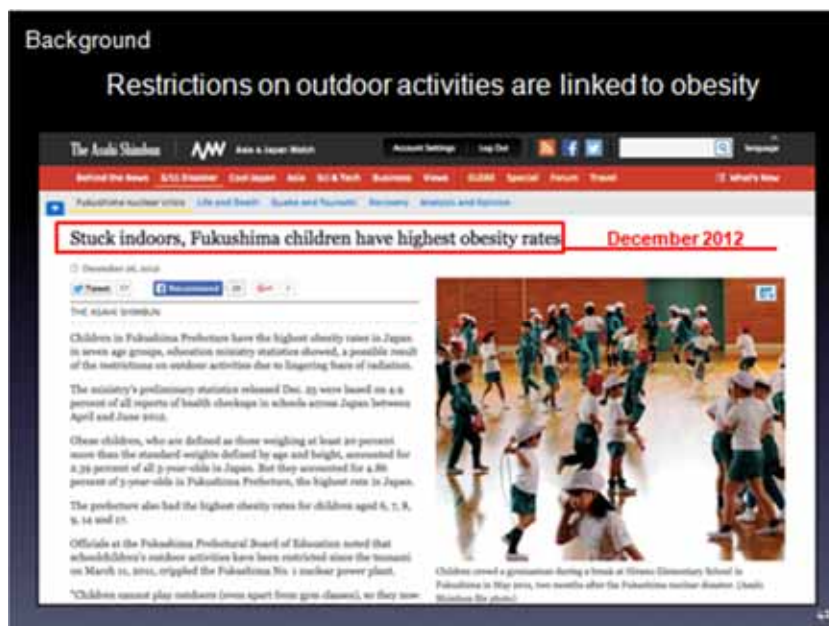
As many speakers already mentioned earlier, one of the major public concerns after the Fukushima nuclear incident is the radiation exposure in the children. And many people like many parents and many schools teachers, they were worried about particularly their outdoor activities. And as a response to the incident, many schools in Fukushima prefecture including Soma city and Minamisoma city imposed restriction on the outdoor activities by cutting or shortening physical exercise classes. However, as a result of these restrictions, another concern has raised in Fukushima which is that obesity level in school children might increase in Fukushima.

Then in order to answer this concern, Soma City is going to evaluate the obesity level in the school children in the city by comparing the obesity level before and after the incident.

As you may know, in Japan – every school in Japan measured the physical status of the school children almost every year and Soma city also conducted the measurement in 2010, 2012, and 2015 and we are going to use this data.

We set three health outcomes as an indicator for obesity level: the BMI, the percentage of overweight, and obesity rate. The definitions are a little bit too technical, so I want to skip this. But the BMI is popular and maybe easy to understand.

The analysis will be undertaken soon. I think this is the old version. This is not what I sent. Briefly, you can say that this is BMI. This is percentage of overweight and this is obesity rate. As you might see, the significant difference was not observed. There is only small shift in BMI, percentage overweight, and obesity rate. Statistically, these are not significant. So based on this data, we might be able to say that in Soma city the restrictions on the outdoor activities did not much affect the obesity level in school children. But at the next step, we are going to evaluate this data in more detail and will release the result to the public as soon as possible.



Methods 1

- **Data source:** Physical measurement data of primary (aged 6–11: 6 grades) and secondary (aged 12–14: 3 grades) school children in Soma City
- **Study period:** 2010 (pre-incident), and 2012 and 2015 (post-incident)
- **Outcome measures:**
 - 1) BMI (Body Mass Index)
 - 2) POW (Percentage of overweight)
 - 3) Rate of obesity, defined as a POW of 20% or more

$$POW (\%) = 100 \times (\text{measured weight} / \text{standard weight}) - 100$$

* Standard weight is the age- and sex-specific weight for height on the basis of the data of the Annual Report of School Health Statistics 2000 from Ministry of Education, Culture, Sports, Science and Technology, Japan

So this is the final slide. So regarding evacuation and health risks, I would like to repeat that after the Fukushima nuclear incident, evacuation was not avoidable for the nursing home resident and the local people because of anxiety about exposure to radiation. They also lacked reliable information on exposure level. They lacked human resource, food, and medical supply.

What we have to learn from this Fukushima incident is how we can reduce the evacuation-related health risks. The lesson learned from this incident would be used for any types of disaster, will inform the future disaster planning all over the world beyond Fukushima, beyond Japan. Also, these lessons will be used for the health measurement for the local people at this present moment.

Thank you very much all the people who made a huge contribution to our study and those who organized this super-symposium. I really appreciate you. Thank you very much.

Conclusions

- For nursing home facilities and local residents, evacuation was NOT avoidable after the Fukushima incident.
- My intention is not to question the evacuation decision, but to show that there is considerable latitude for reducing evacuation risk to protect human health.
- The Fukushima incident offers an historic opportunity to inform future response and resilience in nuclear disasters.

51



Empowering the young - radiation protection in Fukushima -

Ryugo Hayano Professor, Department of Physics, University of Tokyo



Thank you very much, Mr. Chairman. Because this symposium is about children, I chose to speak with this title, How to Empower the Young Generation of Fukushima in Terms of Radiation Protection?

I started to think about this 2 years ago when I took three students from Fukushima High School to Geneva. There is a laboratory called CERN. That's the world's largest particle accelerator laboratory which hosted a radiation protection workshop for high school

students. There were about 200 students including the three from Fukushima High School. These three students gave very wonderful presentation about the status of Fukushima. One of these students in fact is Mr. Oikawa, the son of our chairman.

Well, after the presentation they were surrounded by all the audience, the French and German students. They all asked these Fukushima High School students 'Are you really from Fukushima?' 'We thought after the accident it is not possible anymore to live in Fukushima.' That was quite a shock to me and also to the students. So we thought we have to do something about it.

Well, in fact the CERN is where I work. I am a physicist. But the reason I am here today is because of my Twitter account. I started to tweet about the Fukushima accident after March 11th and the number of my Twitter followers increased from 3000 to more than 150,000 within a few days. That had many side-effects including the fact that I got connected to medical doctors in Fukushima including Dr. Tsubokura.

So, our collaboration started and the collaboration is about the assessment of the internal exposure risks of Fukushima people, which after some time resulted in the paper.

This machine is called the whole-body counter. There wasn't any such device (in Fukushima) immediately after the accident. Now there are more than 50 such devices around Fukushima. Typically, you stand in this box for 2 minutes. This is heavily shielded. From the end of 2011, we started to measure Fukushima people using such



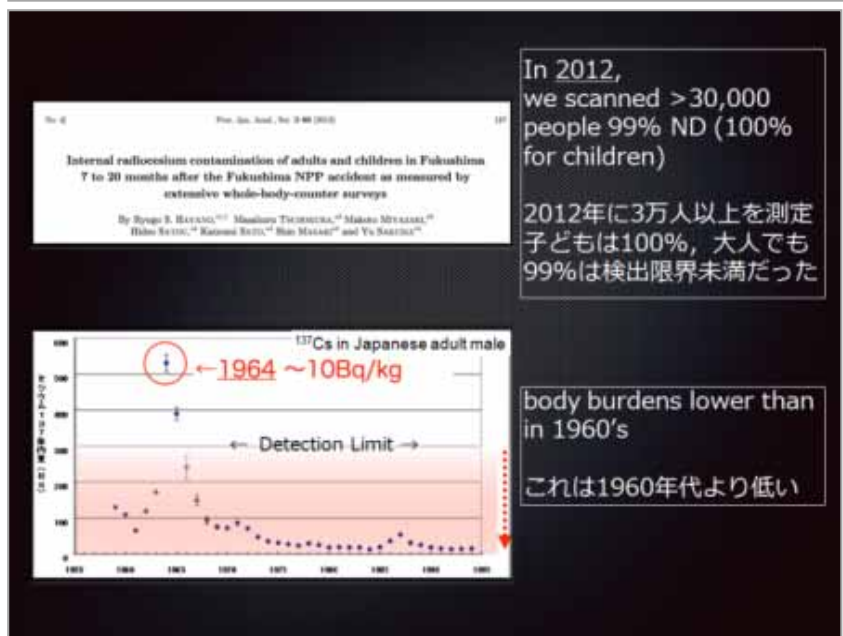
devices. And during 2012 we together measured more than 30,000 people.

Surprisingly, 100% of children were below the detection limit; and even for adults, 99% were below the detection limit as of 2012. For me this was my first medical paper that I authored.

Well, the detection limit of the whole-body counter that we used is about 300 becquerel (Bq) per body. This is the detection limit, and almost everybody were below this limit. In 1964, as Dr. Tsubokura already explained, average Japanese adult male had about nearly 600 Bq in the body as a result of global fallout, that's about A-bomb and H-bomb test.

So already in 2012, the majority of Fukushima people were below this level. However, many people, especially parents, were still unconvinced and especially the most frequently asked question was 'How about our children?'. Remember, the whole body counter that I showed, you have to stand for 2 minutes and the geometry was optimized for measuring the radiation workers at the nuclear facilities of course. So it was impossible to measure small children who cannot stand.

So we stated a project to make a baby scan. It's the special device for measuring small children. But this is not just a measurement tool - Well, it is a very good measurement tool. The detection limit is now below say 30 Bq per body instead of 300. This is about 10 times more sensitive - But this is a communication tool. The parents come to the hospitals to have their children measured and it is a wonderful timing for doctors like Dr. Tsubokura to talk to or listen to those parents. So this is why we made this.



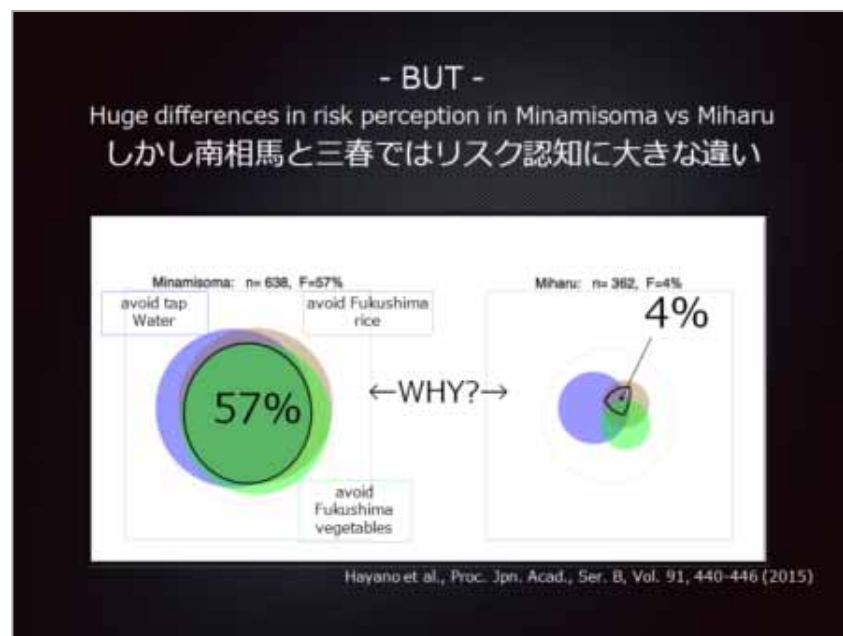
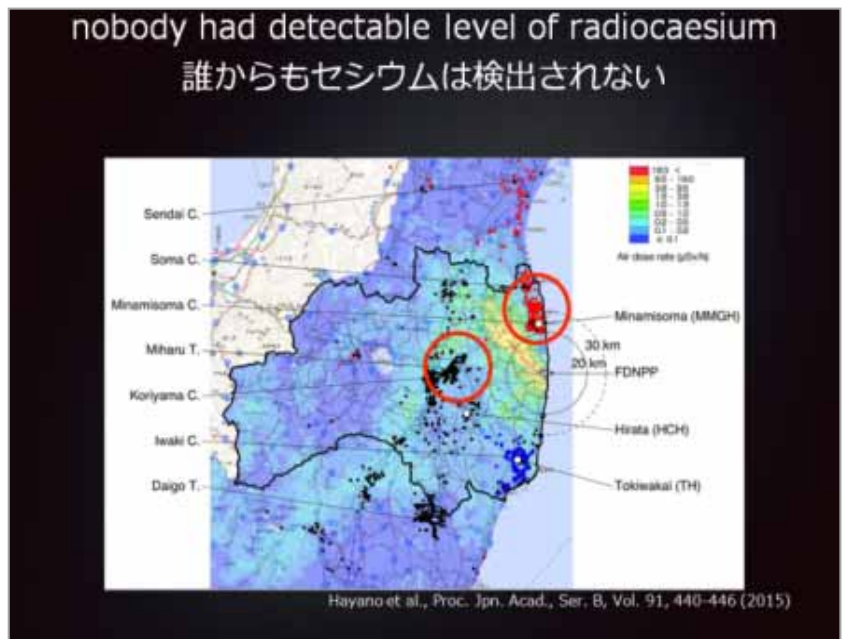
It has a hyper-adjustable belt and the mother comes with the children and the mother can watch the baby and the baby can watch the mother. The scan is done in about 4 minutes or so. So, the first unit was installed near Koriyama city at the end of 2013 and the second unit in the spring of 2014 in Iwaki, then the third unit in Minamisoma in the summer of 2014.

So far we have measured about more than 5,000 babies and we haven't found anybody who had detectable level of cesium. This shows the distribution of where those babies came from, so some of them actually came from around Sendai. Well, this is good news but this is not the end of the story.

I now compare the situation of Minamisoma and a town of Miharu which is about 40 to 50 km to the west of Fukushima Daiichi Nuclear Power Plant. As Dr. Tsubokura has already explained, we asked the parents to fill out the questionnaire before taking the test. We asked about the evacuation situation, situation of their food, water and so on. And this is what we found.

The area of the circle is drawn in proportion to the number of people. So in Minamisoma, the majority of people said that they avoid tap water. This was already discussed by Mayor Sakurai yesterday. A large fraction also say they never eat local rice. And again, a large fraction of people said they avoid Fukushima vegetables. And in fact, about 60% of them avoid all three. That's the situation in Minamisoma.

But the situation is quite different in the town of Miharu. Only 4% avoid water and rice and vegetables. Well, if you understand why, please tell me. I don't quite understand. I have some theories but I cannot prove this. But it is important to understand why there is such a large difference in risk perception among the parents at Minamisoma or the Soso area and other places in Fukushima.



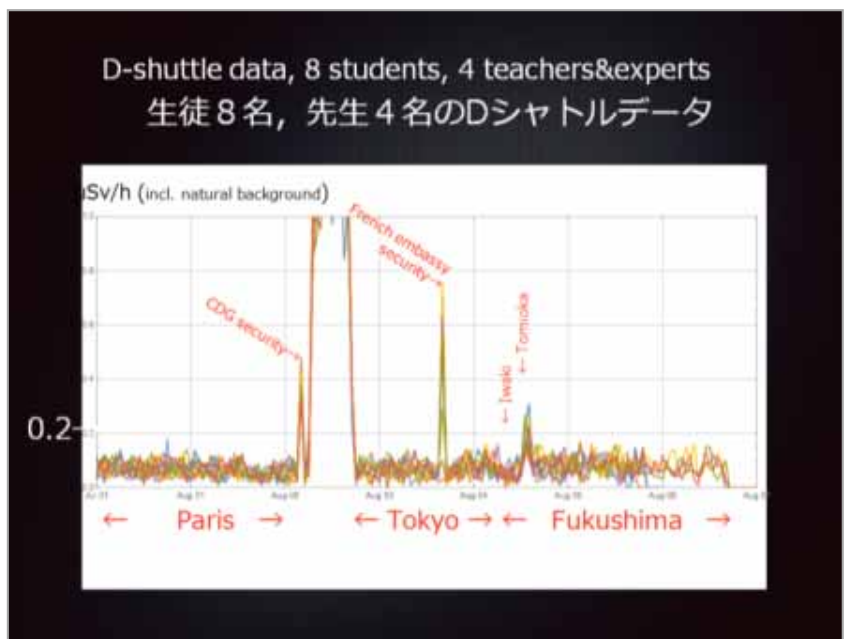
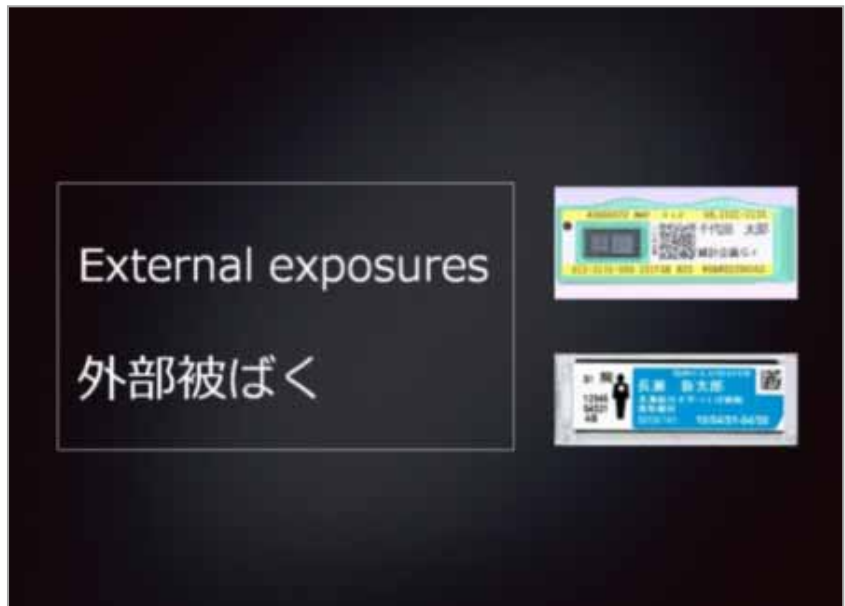
Let me now switch to external exposures. Already in the fall of 2011, many municipalities started to distribute this person dosimeters, usually called the glass badges, initially to children and to pregnant women. This is the compilation of the first year measurement from Fukushima city, Minamisoma city, and Soma city. Already in the first year nobody exceeded 10 mSv per year.

One mSv per year is the long-term goal set by the Japanese government, and in 2011 about 50% of the children were already below 1 mSv per year, and that number increased for instance in Fukushima city to more than 96% in 2014. So, external exposure is lower than what most people think and have steadily decreased over time. But in fact, it is higher than the internal exposure level, because internal exposure is almost negligible.

Well, the glass badge is a common method used by almost all the municipalities. But you just get one number printed on a piece of paper after 3 months of measurement, which is not so informative. You cannot really correlate this one number to your behavior. So, I started to use the device called D-shuttle which is the electronic dosimeter with which you can measure and record the person dose every hour with a time stamp.

Let me show you an example how this device can be used. We sent these units to France last summer and French students came to Fukushima with this D-shuttle in the summer of 2015. This is the result. There are eight students and four teachers, 12 people in total came to Fukushima and this is an overlay of the 12 D-shuttle readouts. Then there is this tiny peak while they were still in Paris. They went to the airport and the dosimeter was X-rayed. That's this tiny peak.

As you may all know, during flight, due to the cosmic ray radiation, the radiation level is very high. It



overshoots. Then they came to Tokyo and then there was a peak while they were still in Tokyo. Why? We all got invited by the French embassy downtown Tokyo and we have to go through the security gate. The dosimeter was again X-rayed. And the next day we all got on the bus and drove to Iwaki. Then you notice there is a peak. Why? French students wanted to see the effect of tsunami. So we proposed to take them to Tomioka station which was devastated by the tsunami. And this is 10 km south of Fukushima Daiichi and you are still not allowed to live there. This picture was taken in front of the Tomioka station. And as you may realize that each student has a nametag and the dosimeter.



And during this time the students stayed at Fukushima. They went to Kunimi on the last day. Kunimi is the northern part of the Fukushima which is famous for peaches. So we visited the peach farmers and they told us about the hardships they have had, the difficulty of selling the peaches and so on. And we picked and enjoyed eating the beautiful peaches and then at the end we picked the peaches and went back to Fukushima High School and measured the peach and confirmed that the peach doesn't contain radioactive cesium.

Well, anyway, as you would all agree, this is measured using the same dosimeter worn by the same people over about 1 week. There is not much difference between Paris, Tokyo, and Fukushima. So as you can see, this Deshuttle is very powerful device and Fukushima High School students were motivated to use this device to better understand their environment by themselves.

So, we launched a project to measure the personal dose of high-school students and compare the doses at different parts of Fukushima, other parts of Japan, and other parts of the world. Then

Summer 2014 Japanese co-authors came to Fukushima
2014年夏 全国各地の高校生を交えて福島で合宿



France フランスの参加校



Poland ポーランドの参加校



Belarus ベラルーシの参加校



we recently managed to publish a research paper together. The project actually started in the summer of 2014. We invited our collaborators, the high-school students from other parts of Japan, and then we had the first kickoff meeting at Fukushima High School.

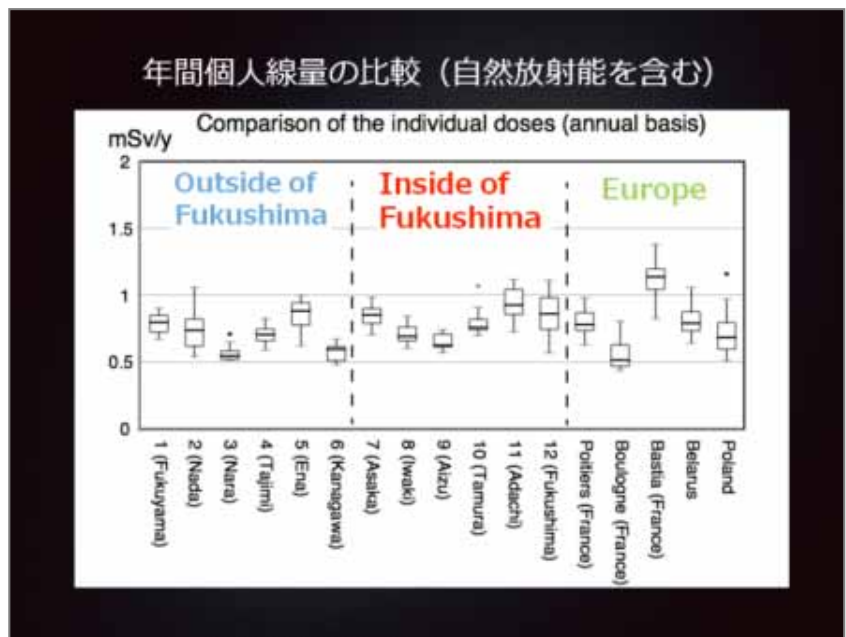
On that day, the last day of our workshop held at Fukushima High School, this picture was taken inside of the classroom of Fukushima High School. These students were attending this workshop. This is the cover of one of the best-selling books about the Fukushima accident which I authored together with Mr. Itoi and more than 100,000 copies have been sold so far.

Anyway, we then sent the dosimeters to France, to Poland, and to Belarus and they came back to Fukushima High School end of 2014 and then the data were again analyzed by Fukushima High School students. This is what we managed to publish end of November last year. Most of these 233 coauthors are high school students from Japan, from France, Poland, and Belarus. In the 5 months since we published this paper, this paper has been downloaded more than 60,000 times. Amazing!

We compared the high-school students attending six schools in

Fukushima, six schools outside of Fukushima, three regions in France, many regions in Poland, Brahin, and Gomel. Brahin actually is very close to Chernobyl Nuclear Power Plant.

And This is the result. We estimated annual exposure based on our 2-week measurement and this is the comparison of individual doses including the natural background radiation. Then actually the highest median was found in France. Bastia, on Corsica Island was higher than in Fukushima.



Since our mission was to communicate this to the world, I took one of the coauthors, Ms. Onodera to the Foreign Correspondence Club of Japan on February 2016 and we gave the press conference and that may have contributed to some extent to this large number of downloads of our paper.

Here are conclusions. Well, internal exposure is negligibly low in Fukushima. I can repeat this and Tsubokura-sensei already repeated this. External exposure, at least in the region where we live, external exposure is not higher than in other parts of the world.

It is very important to empower young people in Fukushima by having them actively involved in understanding and communicating the radiological situation of Fukushima. It is important for them to avoid unnecessary prejudice, discrimination, and so on. This is something that we have to continue doing. Thank you very much.

Conclusions: 結論

1. int. exposures negligibly low in Fukushima
福島の内部被ばくは無視できるほど低い
2. Fukushima ext. exposures not higher than in other parts of the world
福島の外被ばくは世界各地と比較して高くない
3. Empower young people in Fukushima by having them actively involved in understanding /communicating the radiological situation
福島の若い人が自分で線量などを測定し結果を伝える取り組みをすることの重要性



Lessons for Disaster Management and Recovery

Shinjiro Nozaki Senior consultant, WHO Centre for Health Development



Thank you very much for the kind introduction, Professor Shibuya. I was wondering whether I should speak in English or in Japanese. But the original idea was Dr. Alex Ross who was to deliver the keynote lecture in English and I was to augment as supplementary information in Japanese. However, yesterday, due to the family problem, he was not available yesterday and there was no keynote lecture. However, he insisted that this material to be delivered to the

audience. So first, I would like to use his materials and then I would like to use my slides to augment what he had to say.

This is the WHO Center for Health Development where I belong to. That is WHO Kobe Center. That is the nickname. It has a deep relationship with disasters. There was Hanshin Great Earthquake and it was established as a symbol of the reconstruction from the earthquake together with Kobe and WHO center was established. So, immediately after the foundation, it had devised various schemes against disasters. So, these are some of the things that I would like to mention today.

First of all, this is WHO and what we consider the most important is global health security because this has everybody's business because it leads to health and security for all the people in the world. This is global health security. At the center is health security. When it comes to health, it has a political relevance as well as economic relevance. And also, it is connected to food security and environmental security. So it is very closely linked to all these aspects of security.



Why we need security? Because, that is required for our people living in happiness and in a healthy state; I believe that that is the common value sense of human beings.

This is a map. This is an airplane that is crisscrossing the world on a real-time basis. This is the number of airplanes flying all over the world. In the process of globalization, people are coming and going and moving around. That is the globalization in which we have to consider health security.

So the risk related the health?

The most immediately one is the Kumamoto earthquake. These are the earthquakes and natural disasters. What do we do? This is a safe hospital framework.

I do not know your image about WHO but we go to the forefront together with DMAT or firefighters or self-defense forces and police. We rescue and help people. But rather than going to the forefront, WHO works at the background; that is, to make the regulation studies to do the monitoring and supervision and that's what we do at the background.

For instance, in Kumamoto earthquake what did we do? There were reports about the Kumamoto earthquake and MHLW Kumamoto prefecture, Kumamoto city makes the announcements. However, all of this information were in Japanese and also we have the WHO and CNN information in English. We saw these English reports and these data all two times or three times difference. Also, it was true with Great East Japan Earthquake.

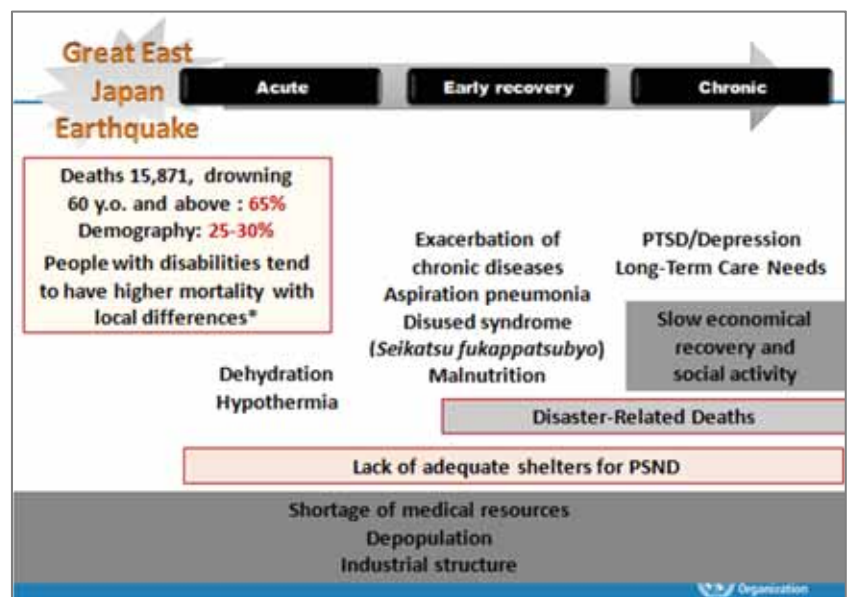
Also in the Kumamoto earthquake, because this WHO is at Kobe Center and it is not Japan center but it is coincidentally located in Kobe. So this center was and is responsible for research. But because it is in Japan, there were lots of people who can translate Japanese into English. So this all data can be updated. That was why we translated the Japanese data into English and sent these data to WHO headquarters. If the headquarters deemed this data necessary to be transmitted, then they were free to do that. So, we devised the data and we monitored the data. That saved hospital framework and it is to the regulation with which hospitals become safe even in emergencies.

It was GEJE or Great East Japan Earthquake. In WHO it was deemed as a very complicated disaster because it was a triple one comprised of earthquake, tsunami, nuclear accident. One after the other various things that have happened and we were overwhelmed by that. People said because it is Japan, Japanese people can overcome them. Most deaths were caused by



tsunami and others are disaster-related deaths that happen as secondary death. So direct, this is only part of the total casualties.

Also it was a very vast area disaster and also it was a complicated one. That was why it had long-term impacts. At the very beginning, WHO was aware of that. We had temporary houses which were required for many people. These houses were needed over a vast area and many people had to live there for an extended time period. That had big psychosocial impact. And also, there was fear and uncertainty. We also had nuclear power plant accidents.



At the time of Chernobyl, that was under the control of the Communist government of Soviet Union. Data were not disclosed. And also, Nagasaki-Hiroshima nuclear bomb, these data were not very much made available because it was what happened during the war. So, this Fukushima Nuclear Power Plant was virtually the first in human history in which we were able to have data and this data was disclosed to the public. So there was a great level of uncertainty and fear associated with that and also PSND management, elderly care, and continuity was tested.

Twenty years have passed since Great Hanshin-Awaji Earthquake. This is the 21st year. We have still reconstruction houses in Kobe. In the past 20 years, some people became independent obtaining jobs and left the houses. However, there are still a handful of people who still remain there who do not have many means to live. Even in Kobe city, it is a big problem.

Twenty years ago these people in their 50s and came to temporary houses. They lost everything. Now they are 70 years ago; or 20 years ago, 60 years old and currently 80 years old. They were low income people and they lost job and they still didn't have job. Twenty years after that still they are impoverished and they cannot leave the temporary houses. And that still exists in Kobe. So we can learn something out of that.

This is statistics for Great East Japan Earthquake as you know. The death 175,000, missing 2848, injured 6109 as of 2012 August 8th. Sixty-five percent of the dead were 60 years and older and also the socially valuable, they had higher mortality and there were differences in regions. Also, this is PSND. This is abbreviation of persons with special needs at times of disaster. There were no shelters that were adequate for them. And also, disaster related secondary deaths were a problem. So, this disaster was of vast area and very complicated. That was why there were many mid-to-long term impacts which came out of the disaster.

What can we learn from East Japan earthquake in terms of health? Mental health and psychosocial support are needed. And also, we talked about vulnerable populations and we tend to think of pregnant women and children. Of course these people are important but in addition to that the elderly and persons with disabilities we shouldn't forget the care for them.

Also medical institutions, how can we maintain them? Just as the safe hospital guide I mentioned, we need to first reconsider. Also, this is not just the WHO but Japanese government is reviewing the DEMAT system. And because we have reviewed them, in Kumamoto DEMAT is very much active.

And also, the logistics were a big problem. Just as Mr. Tachiya, Mayor of Soma city mentioned, many things would stop at a time of disaster. So, what things would be stopped and how can we ensure these necessities to be obtained. That's what we will have to think about.

And in the case of Kumamoto, there are many things that can be considered. But in WHO, in the past 10 days to 2 weeks, in spite of the scale of the Kumamoto earthquake disaster, in the space of 10 days, Shinkansen were reconnected and so were the national highways. We praise these efforts with an awe. I believe that I think that that was a lesson learned from the great East Japan earthquake and also the governance, nationwide and local coordination and collaboration were deemed necessary.

Health security and health emergencies, there are many events and there are so many events to list up. We have to actually consider our preparedness for all hazards at WHO. We don't limit our responsibility only to the natural hazard or natural disaster but all the possible hazards and risks should be actually captured and also taken care of.

Our targets are always the vulnerable people. There are common people everywhere in the world. And also that accidents

and events too take place so frequently now-a-days, we have to be aware of that. And casualties, death tolls and others are increasing. But not only that, the economic and political impact had to be also be considered. So, more than ever, a single disaster can cause so much damage and losses, and those damages and losses are really large in scale and also complex.

And also that the emerging diseases and disaster impact travel faster than ever before, like communicable diseases and pandemics are travelling faster. Disaster itself and pandemics or the communicable diseases spread a fear, actually it is really fast because of the globalization and also technology advancement and use of social media like SMS and others, so fears and worries actually spread quicker than actual disease spread. Then social impacts have to be considered in long-term basis and these are the learnings from the past experiences of disasters.

Lessons from GEJE for health



- Mental health and psychosocial support
- Care of the Elderly
- Care of the persons with disabilities
- Business continuity plans for the health organizations and facilities
- Review of DMAT system
- Disaster reference hospitals
- Logistics management for health response
- Governance: national and local coordination and collaboration

10 | World Health Organization

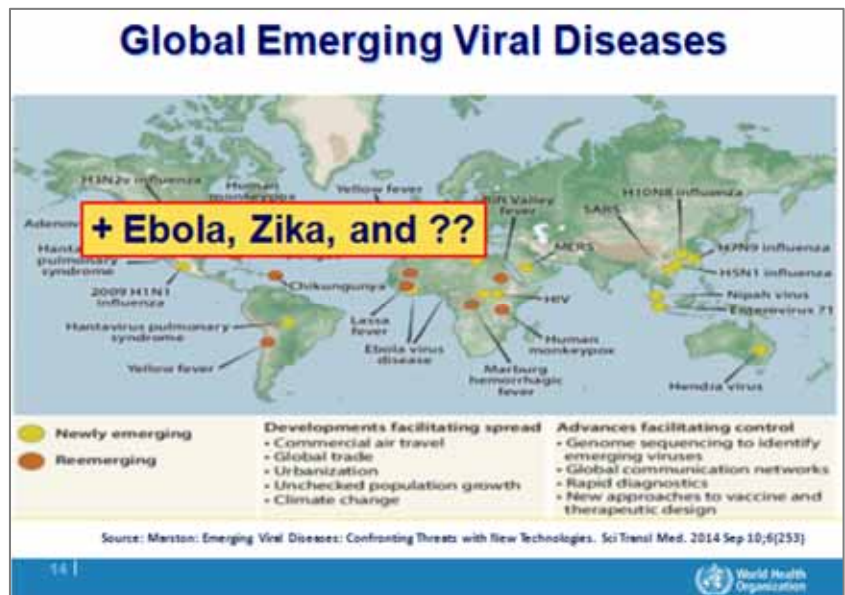
Nature of health security & health emergency events...

- **All hazards:** communicable disease outbreaks; natural disasters
- Vulnerability is *universal*
- Frequency of events increasing
- Impacts are far beyond "cases & deaths" (often huge economic, social and political consequences)
- Emerging disease *travels faster* than ever before
- Fear *spreads quicker* than disease itself
- Long term psycho-social impacts



11 | World Health Organization

In 1980-2016, if I am to pick up the health security incidents, have AIDS and Chernobyl and past and NvCJD and Nipah and Anthrax and SARS and meningitis and cholera and Animal Flu and Fukushima disaster, the nuclear accident, MERS, polio or e-coli, dengue, H71 and environmental contamination and pollution just to name a few, and recently Ebola and Zika. Almost every year, we have some kind of outbreak which really gives the impact to the health security.



WHO is focusing on the global health and security, we have the very important role to fight against the emerging viral diseases. And as you can see from the world atlas, there are so many outbreaks of new diseases in the past few years. Ebola in 2014, and last year and this year Zika, and I am sure that the new threat will emerge. In 1970s and 2007, 1420 new pathogens made news, and 2007 onwards, we had 177 new pathogens, 70% of which are derived from animals, animal origin.

This is Ebola virus. In 2014, the outbreak of Ebola fever, like Guinea, Sierra Leone, and Liberia, those three nations, pandemic emerged, and actually epicenter is somewhere around here. But other than three nations, no pandemic took place, or there effective containment was made. As for the damage, more than 11,000 dead and 29,000 affected, 10 countries and three continents were affected including capital cities. And some nations made a decision to close their borders. Liberia, Guinea, and Sierra Leone, other than those three nations, containment was successfully conducted. So in a short period of time, the problem was resolved.

Recently, the issue of Zika in conjunction with the microcephalus reported from South America, 2016 February, international declaration was made that the PHEIC was actually issued. PHEIC was the internationally concerned the public health emergency situation. This declaration which I would like to touch up later to share with you some detailed information.

Now, this one is the global cases of MERS which took place recently, MERS coming very strong in China or Korea, Malaysia, Thailand, and Asian nations. And as been reported that the spread of this disease in animal was in 2015 last year, the MERS cases was actually observed in Korea and we Japanese people were so concerned perhaps that the epidemic will come to Japan.

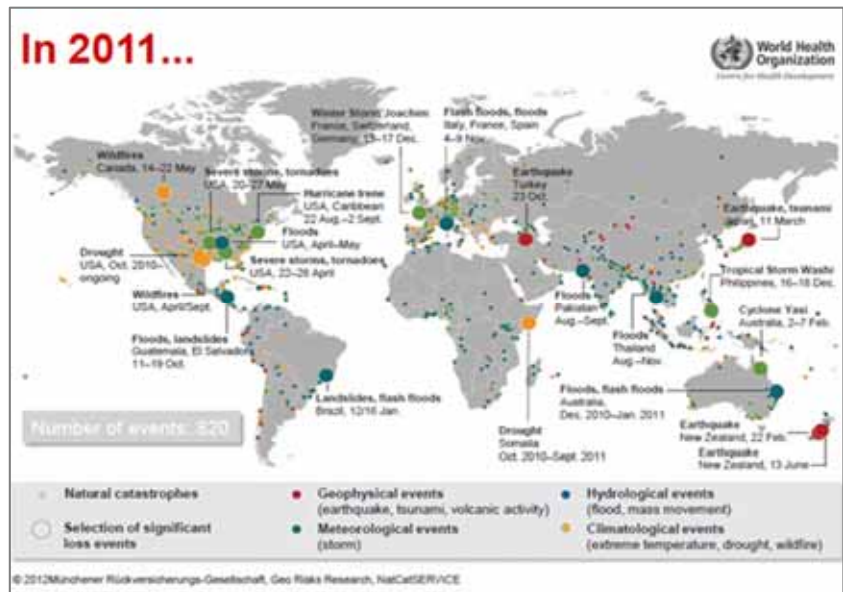
Zika fever and epidemic of microcephalus and neurological disorders

- On February 2016, WHO declared 'Public Health Emergency of International Concern' in response to the sharply increasing cases of microcephalus and neurological disorders, suggesting association of the cases with Zika virus infection
(Usually reported cases of microcephalus was about 160 cases/year, but 4000 cases were reported within 8months.)
- Zika virus rapidly spread along with the habitat range of *Aedes mosquitoes*. Until 2014, 36 countries reported cases of Zika virus infection. The infection is predicted to continuously expand across the entire globe.

A new type of influenza, H1N1 data, they were reported to the WHO. We had so many cases in the world. And death toll was also reported. Influenza had different strains and different type of flu pandemics are introduced in the world.

Only in 2011, this one year only, this is a natural disaster, natural disaster that took place in the one year of 2011.

From the year 2012, disasters had so much serious impacts which really had a damage of \$1.7 trillion and 2.9 billion people were affected by the disasters and those disasters took 1.2 million lives. Also the climate change related diseases, 3400, floods; 2689, storms; 470, droughts; 395 extreme temperatures, just to name a few. UNISDR the United Nations agency with regard to climate change received those reports. And there are so many challenges: the population explosion, drain of population, and urbanization and concentration population to the urban cities.



The urbanization and health problem or in short urban health problem is becoming very predominant. And also, along with advancement of technology or transportation means that people's mobility is accelerated and the communicable diseases to attack human beings.

All those challenges, the hazards and disasters, the health risk is increasing its magnitude. And whether we are able to mitigate those risks is our challenge and our mission. Those disasters so much impact the death of people, psychosocial stress, possible environmental pollution, exposure to toxic substances, and all those factors are very much complex. As for the outbreak of the communicable diseases caused so much economic losses, as huge as you can see from those numbers in this atlas, so from which we have a lot to learn from. Like 2014, the outbreak of Ebola, the fear actually spread faster than the actual disease and caused so much economic losses or damages.



The new planning issues we have to actually deal with, be that the communicable diseases so the natural disasters, we should build resilient health systems and maintain that system. And also to backup that, healthcare financial system has to be made. In 2014, Ebola outbreak case which I mentioned, in three nations, contamination – spread because of the inability or the vulnerability of their healthcare system is criticized.

Physicians and medical institutions are not sufficient, or the healthcare professionals are very few in number; that caused the spread out the pandemic. The situation is exactly the same with disaster. Disasters, you have to actually make sure that preparedness and prevention to deal with disasters. And then, there are chronic diseases in elderly people, people with disabilities, people who are socially weak have to be taken care and consideration and also the continuation of care provided to the evacuees or the people who are displaced, and also that long-term psychosocial impact to people should also be considered. Out of those bitter experiences in the past, we have so much learning.

As for the recovery as is written down in this slide, long-term impact is very serious on survivors. Sometimes it is overlooked and not enough research or implementation. As for the humanitarian activities, in regard to the development activities and also the confrontation between national government and local government, inability to have communication and sharing information, that kind of issue has to be discussed and resolved.

But there are good points, the bright side to it. Because of the information revolution and biotechnology revolution and also communicable diseases actually to – we actually fought for that communicable diseases and set up the international health regulation in 2005. And Sendai Framework for the disaster risk reduction was adapted in the United Nation's Congress for the disaster risk reduction took place in Sendai in 2015. The first and second and third UN Congress was held in Japan, Yokohama, Kobe, and Sendai last year. In Yokohama, the action plan was formulated, followed by the Hyogo action framework, and then in Sendai, there's another brush-up in the development of the framework declared in Sendai for the realization of disaster risk deduction.

Now, WHO has a role to play. An international health regulation was issued and around that international health regulation, those collaborations and teamwork with various other agencies outside the health issues are agriculture issues and transportation agencies. In other safety security and telecommunication, we should actually have the holistic picture in joint collaboration with other parties. And based on that international health rules, we should continue the implementations and monitoring of the health security.

International Health Regulations (2005)

Legally binding treaty •

196 States Parties •

In force 15 June 2007 •






States must prepare, report & cooperate

WHO must coordinate

38 |


Health systems + UHC = resilience

- UHC = all people have access to quality health services without financial hardship linking individual and population security.
- Reinforce health systems to ensure UHC and emergency preparedness/health security
- Manage unpredictability of events = lack of resources and attention
 - Raise political attention to IHR, Hyogo/Sendai Frameworks
- Connect different sectors, communities, families, and individuals to achieve UHC

40 |


International health regulation is a kind of agreement, a convention with 196 member countries to sign. And effective in 2008, the revised IHR was issued. And the signers, the signatory countries follow the stipulations and requirements in IHR to deal with the communicable disease possible for the outbreak and make the preparations and cooperation. And WHO is playing the role as a coordinator among those member nations or the signatory nations.

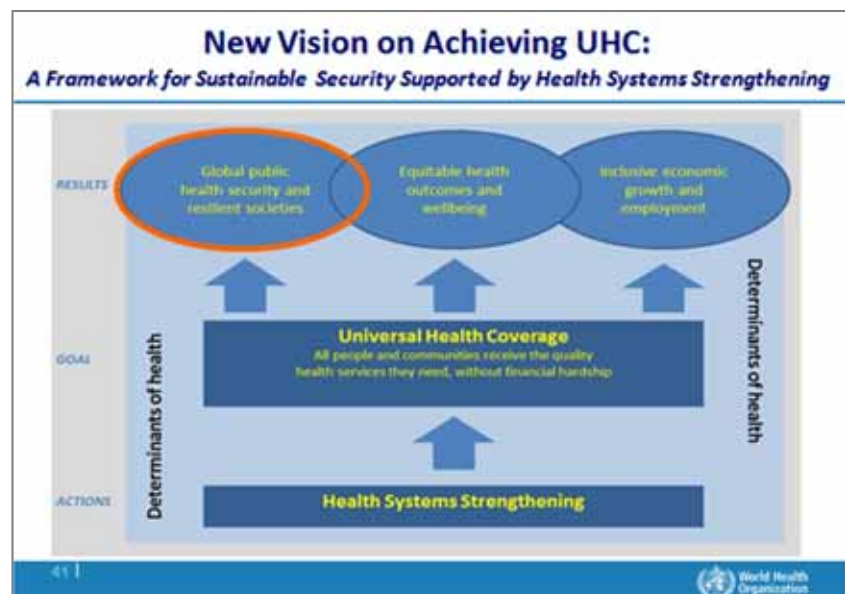
I just mentioned Ebola fever, resilient health system should be established or built and also to be maintained. That is emphasized in the international health rules, and that the continued discussion is underway. In WHO, we have emergency refill agenda and universal health coverage agenda, so that we are able to fortify the health system. This is one of the very important projects that we are running at WHO. This is a new schematic diagrams and concept of the project. This could be the outcome. To create a resilient society, we should actually implement universal health coverage and other fundamentals. You have to actually strengthen the medical system of each and every nation. That is a kind of first step to move forward.

Based on that, we would actually have to strengthen the health system nations through the ideas of universal health coverage so that we are able to actually establish and maintain a resilient health system and resilient society.

Now into the future, however that we are able to manage the disasters and diseases and various other emergencies, we have to stick to the IHR and also the evidences should be collected through various researches and surveys. In WHO, we have new WHO health emergency program, it is now being formulated and OCHA has formulated that international health emergency processes.

Out of the experience of Ebola fever, we have come up with the idea that we should come up with some kind of financial fund so that we are able to immediately dispatch the specialist team at the time of disaster and emergency, so this is a contingency fund for emergencies and World Bank also have the pandemic emergency Financing Facility.

As I just mentioned, there are many endeavors and activities going on. Please visit our website for further information. With this, I would like to conclude my presentation. Thank you very much indeed for your attention.



The Minamisoma Babies Study: Health at Birth in the Four Years Following the 3.11 Triple Disaster

Claire Leppold

Minamisoma Municipal General Hospital, Researcher



Hi everyone.

As Shibuya-sensei said, my name is Claire Leppold and I work in the research department of Minamisōma Municipal General Hospital. Today, I would like to present the results of my study on health at birth in the 4 years following the disaster. These findings are from my paper that is currently under review at BMJ Open; because it is still under review, it should be considered a work in progress.

I'm going to start with a reminder that maternal and perinatal health are two very important parts of general public health. If the mothers and babies in a population aren't healthy and well, this can have devastating effects on everyone. So to maintain and improve public health, these two groups are crucial.

Unfortunately, disasters can lead to negative health effects on everyone, and women may be particularly vulnerable in these situations. Previous research suggests that women, especially during pregnancy or when they have young children, are at increased risk of negative health outcomes in the aftermath of disasters, and this of course can have implications for the health of their children as well.

One phenomenon that has been observed after previous disasters is that there have been significant increases in the rates of low birth weight and pre-term births. It is thought that the reason for this is either through environmental exposures, as in exposure to a toxin, or psychological stress as a result of the disaster. And while most previous studies have focused on women who were pregnant at the time of a disaster, there is also evidence that these changes in population of birth outcomes can continue for years following the actual disaster.

You may look at this and wonder, why would changed rates of preterm birth and low birth-weight births be important? But the answer is actually quite interesting. There is a lot of previous research that suggests that weight at birth especially, but also gestational age at birth, can predict the long-term and short-term health of this child. Of course, weight at birth and gestational age at birth reflect the

Maternal and perinatal health in disaster settings

Natural disasters, chemical disasters, terrorism, humanitarian emergencies may lead to...




- Loss of access to healthcare
- Disruption of water, food supplies, shelter
- Injury, disease, death
- Possible introduction of environmental toxins
- Psychological stress

wellbeing of the mother as well, but they also hold key hints, like I just said, about the long-term health of newborns.

A wealth of interesting research has been conducted on this subject and it's been found that both of these factors (low birthweight and preterm birth) can independently predict mortality in the first year of life but also disease in adulthood. For example, low birthweight of less than 2500 grams is associated with increased risk of diabetes, of cardiovascular disease, of other non-communicable diseases in adulthood, which brings about the question, if disasters can change rates of preterm birth and low birthweight births in populations, does this have any long-lasting implications for the health risks of this population or the long-term health of new generations?

Birth outcomes in the aftermath of disasters

Significant increases in low birthweight births and/or preterm births have been observed after disasters, hypothesized to be caused by environmental exposures or psychological stress [1,2]



Observed increases in low birthweight may continue for years post-disaster [3]

As the entire theme of this conference suggests, we are standing in an area that was significantly affected by three disasters. The 3/11 triple disaster immediately led to damage, mostly from the earthquake and tsunami, but the long-term effects of the nuclear disaster have been particularly profound. And we have seen continuing evacuation, changing lifestyles, changing health risks and a host of mental health problems including radiation-related anxiety. So when we look at the picture of what has happened here and what is continuing to happen here after this disaster, we can wonder have there been any impacts on the health of those born in affected areas, and this was the question that I had.

I was able to find two previous studies that also asked this same question. These studies both looked at birth outcomes in the first year after the disaster. One looked at Fukushima prefecture and compared incidence rates of multiple birth outcomes to national averages at the same time, and they could find no significant differences including pre-term birth and low birthrate. Another study looked at earthquake affected areas in Tohoku compared to non-affected areas in the rest of Japan; and again, they found similar rates of low birth rates and preterm births.

While these studies both have their limitations and they are only in the first year after the disaster, this is actually quite interesting in itself because this is so different than what has been observed after other disasters. After Hurricane Katrina or after the 2007 earthquake in China, there were immediately shifts in population rates of low birth rate and preterm births that could be picked up in research. So, to see these results is really interesting and surprising and I immediately wanted to know what the long-term trends looked like. In this way the Minamisoma baby study was born.

We decided to look at maternal and neonatal characteristics of all the births in our hospital from 2008 to 2015, and our objectives were to first see if there had been any long-term changes in preterm birth and low birthweight birth rates but also to see if there are any associations between evacuation and food avoidance and birth outcomes.

I thought I would clarify the study location for those who might not know. Minamisoma Municipal General Hospital is located 23 kilometers away from the nuclear power plant and it borders multiple evacuation areas. As Hayano-sensei explained really nicely in his earlier presentation, the 20-kilometer radius of the power plant was immediately designated as a mandatory evacuation zone after the disaster, and the 20-30 kilometer radius was first an indoor sheltering zone but it became a voluntary evacuation zone, and this includes our hospital.

Of course the zones have changed a lot in recent years. The mandatory zone has expanded to include some mountainous areas but it's also re-opened for residency in some places the south. The main point of this is to just show you that our hospital borders multiple evacuation areas and it serves places that have been significantly affected by all of these disasters.

For our methods, we looked at all live singleton births from 2008-2015 and we picked up this information from patient records on maternal characteristics and neonatal

characteristics of every birth. We also classified all of the post-disaster participants based on their residential address at the time of the disaster to try and estimate whether they had evacuated or not, or whether they were forced to evacuate or not. For the pre-disaster mothers, we also put them into the same groups based on their residential address at the time of birth, just to make sure that there were no underlying trends by area.

We also used data from the whole body counter screening program. As Hayano-sensei said, whole body counter screening is a screening for internal radiation contamination; but at the time of the screening they also give a questionnaire which asks how you acquire your food products. We had a hypothesis that avoiding Fukushima food products could be indicative of radiation-related anxiety. Anxiety fits together with psychological stress, which is known to affect birth outcomes, and we thought this could have been a factor contributing to any of the outcomes in our study. So, for all of the post-disaster mothers who did whole body counter screening – and this happens in our hospital for free and all women are encouraged to undergo this screening during their pregnancies -- we picked up their data on food choices as well.

The Minamisoma Babies Study

Investigation of maternal and neonatal characteristics before and after the 2011 Fukushima nuclear disaster through a study of all births at Minamisoma Municipal General Hospital from 2008-2015.

Objectives:

1) To assess if there were long-term changes in birth outcomes in Minamisoma City following the Fukushima nuclear disaster, in comparison with pre-disaster baseline data.

2) To evaluate if post-disaster birth outcomes were associated with evacuation or food avoidance.

Maternal and Neonatal characteristics by year (n, %)

	Baseline	2012	2013	2014	P-value of test for percentage difference
Birthweight					0.52**
<2500	44 (7.6)	5 (5.6)	10 (6.2)	17 (9.6)	
≥2500	533 (92.4)	85 (94.4)	152 (93.8)	161 (90.5)	
Gestational age					0.39**
Fullterm	547 (94.8)	88 (97.8)	153 (94.4)	173 (97.2)	
Preterm	30 (5.2)	2 (2.2)	9 (5.6)	5 (2.8)	
Sex of neonate					0.57*
Male	291 (50.8)	40 (44.9)	77 (47.8)	94 (53.1)	
Female	282 (49.2)	49 (55.1)	84 (52.2)	83 (46.9)	
Delivery mode					0.32*
Vaginal delivery	449 (77.8)	75 (83.3)	123 (75.9)	131 (73.6)	
Caesarean section	128 (22.2)	15 (16.7)	39 (24.1)	47 (26.4)	
Maternal age at delivery					0.05*
<35	480 (83.2)	67 (74.4)	122 (75.3)	143 (79.2)	
≥35	97 (16.8)	23 (25.6)	40 (24.7)	37 (20.8)	
Number of prior-deliveries					<0.001*
0	214 (37.1)	34 (37.8)	74 (45.7)	97 (54.3)	
1	168 (29.1)	39 (43.3)	59 (36.4)	52 (29.2)	
More than 2	195 (33.8)	17 (18.9)	29 (17.9)	29 (16.3)	

Interpretation

- No significant change in prevalence of preterm birth or low birthweight following the disaster.
- Significant increase in the proportion of older mothers (delivery at age >35 years) ($p=0.05$) and first-time mothers ($p<0.001$).

* Chi-squared test ** Fisher's exact test

For our analyses, we first simply looked at the prevalence of pre-term birth and low birthweight births in each post-disaster year compared to the pre-disaster baseline. We also calculated weight ratios to see if there was any increased risk of these outcomes after the disaster, and we also just simply looked if there were any associations between evacuation and food choices and the two outcomes.

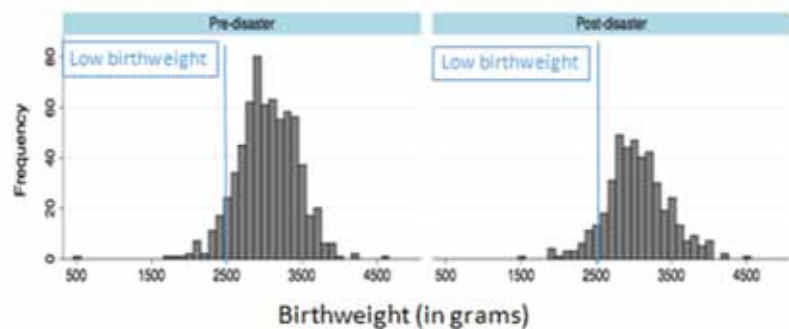
So these are our results. Overall, there were 1101 live births in the

study years. We found that 93% of the post disaster mothers went through whole body counter screenings, which is really great. And most significantly, from demographic characteristics, we understood that there were no significant changes in the prevalence of low birth rate and preterm births in pre and post disaster periods.

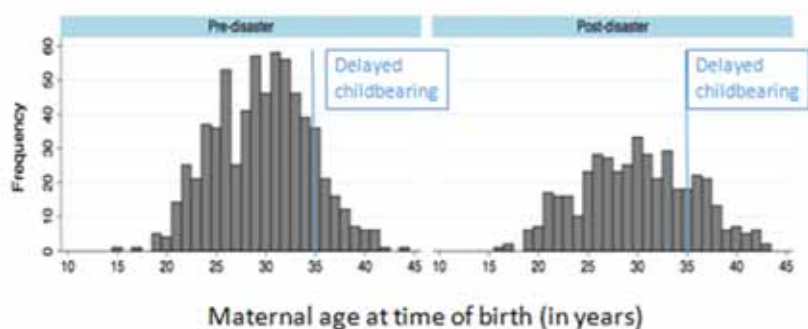
This table shows the demographics of our study population and you can see the prevalence of low birthrate and preterm births, and the lack of any significant differences by year. You also might be able to notice that there were some interesting changes in maternal demographics. We unexpectedly found that the proportions of older mothers over age 35 and first-time mothers increased after the disaster. This table is probably difficult to look at and I apologize for that, the next one is hopefully a bit easier.

This shows the distribution of birth rate in pre and post disaster periods. And again, there were no significant changes in the proportions of low birth rate. Of course, the numbers of birth themselves decreased after

Distribution of birthweight, pre- and post-disaster



Pre- and post-disaster distributions of maternal age in years



Proportions of low birthweight and preterm births by evacuation area (post-disaster)



Interpretation: No significant differences by residential area

the disaster probably due to evacuation or population changes; but again, the proportion of low births itself did not significantly change.

On the other hand, this is the distribution of maternal age. You can see it got a lot flatter after the disaster. Before the disaster, the majority of births were to mothers between the ages of 25 and 35, but this age group really shrunk after the disaster. Again, we think this is probably due to evacuation of young mothers especially. But you can see that the proportions of older mothers over age 35 therefore increased overall after the disaster. In our risk rate ratios, we again could find no significantly increased risk of pre-term birth or low birthweight birth after the disaster.

Again, we coded people by their residential address at the time of the disaster to look for evacuation but we still could find no significant associations between evacuation zones and birth outcomes. We also ran this through a regression model and adjusted for factors such as sex of the neonate and age of the mothers and still could find no significant associations. This suggests that evacuation was not associated with preterm birth or low birthweight birth.

For food choices, we also could find no associations between food choices and birth outcomes. And again, we ran this through a regression model and still could find no significant associations. This suggests that regardless of whether you were going to the store and avoiding Fukushima products or if you were directly using a farm in Fukushima, there were no significant associations with the birth outcomes.

In summary, we could find no significant increases in the prevalence of pre-term birth or low birthweight births after the disaster, and no significant associations with evacuation or food avoidance. But we unexpectedly did find an increase in the proportions of older mothers over age 35 and first time mothers after the disaster.

Proportions of low birthweight and preterm birth by food purchasing habits (post-disaster)

	A	B	C	D	P-value
Preterm birth					
Rice	7 (3.1%)	1 (1.6%)	4 (4.6%)	0	0.72
Meat	7 (2.8%)	5 (3.6%)	0	0	0.76
Fish	7 (2.5%)	5 (4.9%)	0	0	0.36
Vegetables/fruits	8 (3.4%)	3 (3.4%)	0	0	1.00
Mushroom	7 (2.6%)	5 (4.3%)	0	0	0.36
Milk	7 (3.1%)	5 (3.2%)	0	0	1.00
Low-birth weight birth					
Rice	19 (8.5%)	4 (6.5%)	5 (5.7%)	1 (16.7%)	0.55
Meat	16 (6.4%)	13 (9.4%)	0	0	0.31
Fish	18 (6.3%)	11 (10.8%)	0	0	0.30
Vegetables/fruits	16 (6.7%)	8 (9.0%)	2 (10.0%)	0	0.72
Mushroom	19 (7.0%)	10 (8.6%)	0	0	0.67
Milk	16 (7.1%)	12 (7.7%)	0	1 (100%)	0.14

A: (Supermarket)
Selection based on origin (Fukushima vs. non-Fukushima)

B: (Supermarket)
No consideration of origin

C: Using local farms or homegrown foods with radiation inspection

D: Using local farms or homegrown foods without radiation inspection

Interpretation: No significant differences between food purchasing habits and low birthweight and preterm birth outcomes **

I think the natural response to hearing results like these is “why,” and of course we asked ourselves this same question when we saw the results. These are again really different from what has been seen after other disasters and it’s quite interesting to think, how did this happen and why are we not seeing significant changes in Fukushima? I thought perhaps we could look at the reasons why it’s proposed that there have been changes in other disaster settings, and to put those reasons in the context of Fukushima to try and think about why we might not have seen changes here.

As I said, in the beginning of this presentation, the two main hypothesized pathways from disasters to changes in population birth outcomes are either psychological stress or environmental exposures. A really good example of an environmental exposure is the love canal accident which happened in the US. It was a toxic waste dumping and one neighborhood was reaffected by exposure to toxic waste, and it was found that after this accident there were dramatic increases in low birthweight and birth defects in affected populations.

After Chernobyl, it was similarly a concern whether radiation exposure would have had any effects on pregnant mothers. There's really mixed evidence for Chernobyl. While some studies do suggest increases in birth defects, others generally don't, and there have been no significant indications of any changes in birthweight or preterm birth rates. Most reviews that I read of Chernobyl concluded that there was little effect on most pregnancies. So in general, there's mixed evidence for environmental exposures, but it still remains a majorly hypothesized pathway from disasters to changes in population birth outcomes and there have been countless studies on this topic.

The other main hypothesized pathway is psychological stress, and most earthquake studies have hypothesized that this is the reason why they found changes in birth weight after earthquakes. Some studies directly ask mothers "did you feel stressed after this earthquake?" or "how much stress did you feel?" while others just classify people based on where they are living, but there are a significant number of studies that find changes after earthquakes using this reasoning.

I think a really good example of this is the Swedish ferry accident. 500 people were killed in an accident when a ferry sank in Sweden. Subsequently, there was a 15% increase in very low birthweight births in the national population of Sweden. This is really interesting because it suggests that even if you don't directly experience a disaster, so even if you don't feel the shaking of an earthquake or you are not on the boat that's sinking, you can still feel grief over these events which may in turn affect your health or the health of your children.

We can try and put these two pathways in the context of Fukushima. If we start with environmental exposures, a lot of people assume that because there is a nuclear disaster here, radiation exposure would be the biggest pathway to population health changes. But we are finding that this perspective is not so accurate. As I just mentioned about Chernobyl, there is overall really mixed results coming out of studies, but most reviews conclude there was little effect on most pregnancies. It is also important to remember that the scale of disaster is different between Chernobyl and Fukushima. The United Nations Scientific Committee on the effects of atomic radiation have actually predicted no significant effects of radiation exposure on fetal outcomes in Fukushima.

It's also worth noting that in the present study, out of all the post disaster mothers who underwent whole body counter screening, none of them had detectable levels of internal radiation contamination (cesium).

So, all of this information suggests that in our study it would be very unlikely that radiation exposure would have had any effects on the outcomes. However, psychological stress is still another big concern, and after Chernobyl, it was found that actually radiation-related anxiety, not the radiation itself, was associated with earlier births.

We were also concerned about this in Fukushima. As I said earlier, there has really been continued evacuation and changes in the lives of residents here, and we thought that this could have contributed to psychological stress. We also know from previous studies that in disaster settings, women may be more susceptible to feeling high levels of stress than men. There's also growing research on stress and birth outcomes in non-disaster settings, so general settings, finding that stressful life events prior to conception are associated with low birthweight births later in life. This suggests that stress you feel before you are even pregnant may have effects on your later births.

To take account for all of these factors, we tried to capture any possible pathways from the disaster to stress to health effects by categorizing our participants based on evacuation and food avoidance. And to look for any long-term effects, we included all the births up until 2015. But again, we could still find no changes in the rates of preterm births or low birthweight births. This result is quite perplexing because it's difficult to say, really impossible to say, that mothers in Fukushima felt not stress after this

disaster. We can't say that. Which leads us to wonder, in this situation with a huge potential for stress, why did we see no apparent effects of stress on health outcomes? This point leads us into further discussion.

The results of this research suggest that a disaster in and of itself may not lead to population level changes in birth outcomes. And this is really a call for further research. We really need to know what the exact factors are that lead from disasters to changes in health outcomes. In particular, I am curious if could there be any factors that may exacerbate or protect against the effects of disaster-induced stress. Some of my other questions are: are there any other factors that may make people who experience stress less likely to experience or be hit by the negative health implications of it? Are there any community or structural factors that could mediate effects of stress on health? And while our research doesn't have the answer to all of these questions, I think it can rather be thought of as a springboard for future studies on birth outcomes in disaster settings but also stress and birth outcomes even in non-disaster settings.

To close, we'd like to leave you with the following messages. To mothers and families in Fukushima, after this disaster we could find no significant increases in the prevalence of low birthweight or preterm births, and no effects of evacuation or food avoidance. To scientists, our data suggests that disasters did not necessarily result in changes in population level birth outcomes. This is a point that needs further research. And to the general public, we have found that health at birth in our hospital located 23-kilometers from the power plant did not significantly change after the disaster. We are surprised by this result but we find it to be something worth celebrating.

This study would have been impossible to do alone, and I am greatly thankful for the help and support of the people listed here. In particular, I would like to thank Dr. Hiroshi Anbe who has been the only Ob-Gyn in our hospital since the disaster. The health and safety of these babies is really thanks to him.

Messages

- To mothers and families:

In this study we saw no significant changes in low birthweight or preterm births after the 3.11 triple disaster, and no effects of evacuation and food avoidance on these outcomes.

- To scientists:

Our data suggests that disasters do not always result in population level changes in birth outcomes, presenting a need for further research.

- To the general public:

Birth outcomes at Minamisoma Municipal General Hospital, located 23km from Fukushima Daiichi Nuclear Power Plant, did not appear to change after the disaster. We are surprised by this result, but find it to be something worth celebrating.

28





Moderator

Kenji Shibuya

Professor, Department of Global Health Policy,
Graduate School of Medicine,
The University of Tokyo

Panelists

Gerry Thomas

Department of Surgery and Cancer,
Imperial College London

Peter Johnston

Director, Division of Radiation,
Transport and Waste Safety, Department of
Nuclear Safety and Security, IAEA

Shinjiro Nozaki

Senior consultant,
WHO Centre for Health Development

Shinichi Suzuki

Professor and Chairman, Fukushima Medical
University School of Medicine Department of
Thyroid and Endocrinology

Hidekiyo Tachiya

Mayor of Soma city

Katsunobu Sakurai

Mayor of Minamisoma city

Claire Leppold

Minamisoma Municipal General Hospital,
Researcher

Kana Yamamoto

Minamisoma Municipal General Hospital, Physician

Chikako Hokotate

Parent-teacher association of Soma

Kenji Shibuya

Five years have passed since the disaster in Soma area. Regarding the survey results of the health and health impact and countermeasures, the data was also presented and we viewed a lot of voices from the field. We'd like to divide the panel discussion into three areas: immediately after the disaster, up until now, and the future.

First, right after the disaster. As the head of the municipal government, I'd like to have comments from Mr. Sakurai first.

Katsunobu Sakurai

Before I talk about that topic, I'd like to talk about the Chile Earthquake that occurred in February, 2010, when the entire eastern Japan received a warning of tsunami. In Minamisoma city, 45 centimeters tsunami was observed at that time. However, a year later, on March 11 - I remember I had finished a speech at the graduation ceremony of Harumachi 2 junior high school a 21 meter tsunami came in Minamisoma city. This was the first huge tsunami in 400 years, and nobody was able to deal with it. As a result, 636 people were killed



and 41 square kilometers were washed away, and 111 people are still missing.

At the time of the Chile Earthquake, we established evacuation centers, to which only 15 people per center had evacuated. However on March 11, we had to accommodate close to 2,000 people at one place. We didn't imagine a nuclear accident would occur on the next year.

Let me explain how was the situation at the time of the nuclear accident. Shortly after 3 p.m., we got an announcement from the police that there seems to have been an explosion at the nuclear power plant. We instructed the firefighters to check, but thirty minutes later, they reported that they could not confirm anything at all.

We had made an evacuation order in response to the tsunami on March 11. When we got a flash report from the police, we had made an order of indoor-evacuation to the people. When it was not confirmed, we announced that 'it was a mistaken report'. But after 5 p.m., what we saw on the TV screen was the exploding reactor building. We again made an indoor-evacuation order. Such was the confusion in the disaster countermeasure taskforce.

The evacuation order within 20 kilometer zone was issued from the national government while we were still searching for those who were missing after the tsunami; 2500 people were still missing at the time. So we couldn't even notice that order so it was only after watching TV, that started to instruct the residents living within 20 kilometer radius. We had to move 14,000 people overnight. So there was a huge confusion. Everybody did a great job but still 100 people in the Minamisoma city were left within the 20 kilometer radius. Then March 14, when I contacted Mayor Tachiya, he offered former Soma women's high school as an evacuation center for those people.

On March 15, on my own decision, 1,500 people were sent to Soma, Date, and Marumori areas that day. Public buses owned by Minamisoma city, buses of Showa company and school buses of Iitate village were used to evacuate these people. The problem was that a huge number of the residents had also started to evacuate by themselves at that time. Because of the traffic jam, it took more than 3 hours to evacuate to Fukushima city- usually, it's just 1-1/2 hours. What was more difficult back then was that supplies didn't come at all into our area because of the evacuation order. We were isolated. Mayor Tachiya talked about the pharmaceutical products and drugs, but such problem was not limited to drugs. As banks were closed, we could not withdraw cash. Even if you had cash, there was no place to shop.

Finally, a week later, a store in Soma decided to open. So Minamisoma residents had to come to Soma to get commodities. So the major confusion in our area was caused by the total disruption of supply of our necessities such as water, medical supply and food, because of the nuclear accident. We were asked to get oxygen and heavy oil for the municipal hospital and butane gas for gas companies. We were in such an emergency. In the

middle of this panic, we noticed that there is no more mass media people. I tried to contact the journalist club but nobody was there. This means that the situation within Minamisoma city was not reported at that time. They reported the situation of the northern part of Miyagi prefecture (the prefecture adjacent to Fukushima), but it was not until I had sent a message through YouTube on 24th March that the global media came to our area to understand the situation in Minamisoma.



We were able to contact the national government on 13th March for the first time. It was about the supply of gasoline. Then Mr Shogo Tsugawa, a government vice minister, visited Minamisoma on 17th March. On 18th March, Mr. Ryu Matsumoto, the minister in charge of disasters came, which was the first direct access of the national government to me.

On 14th March the number 3 reactor exploded and then even self-defense forces suddenly disappeared. There was a rumor that evacuation order was expanded to 100 kilometers' radius, there was a major confusion. I contact with the Fukushima prefectural government and claimed 'The self-defense forces are leaving. What's happening? I wanted to contact the governor, but he couldn't answer the phone. At that time, they were busy trying to settle down the government officials. Someone say the situation was 'beyond our assumption', but actually, I rather say something we had never imagined did occur. In the field, we tried to deal with the situation; in the middle of this havoc, we had to search and rescue the victims of the tsunami. In Minamisoma city, 9 fire fighters and 2 city government officials and a police officer were killed. One reporter was also killed. What was happening in Minamisoma city was not reported on the media at all, but we had to save and rescue the affected people. That was the situation back then.

Kenji Shibuya

I really felt that must be quite a confusion back then. Now in Japan, there is a lot of turmoil going on at the time. And question to professor Thomas.

How did the countries outside Japan look the situation of right after the disaster?

Gerry Thomas

Immediately after the disaster or the Great East Japan disaster, what everybody saw was the huge tsunami wave. We knew there had been an earthquake in Japan but earthquakes happen in Japan quite a lot. But I think as soon as we saw the pictures on television, and this was the first time that something like this had really unfolded with us all watching. There had been the earthquake and the tsunami in Indonesia before but now we were actually seeing it in Japan and everybody was completely shaken by the fact that such a natural disaster like that could happen.



But the sad thing was that as soon as the accident in the Fukushima power station happened, information about the tsunami was in the middle pages or the back pages of the newspaper and the only thing the media wanted to talk about was the accident at the power station, and people tended to forget that there had been a huge earthquake and a massive tsunami and the death toll from the tsunami was just impossible for us to imagine. Those of us who lived in western countries cannot imagine losing that number of people in a matter of minutes. It just isn't something that happens in our countries.

And it was quite annoying to be asked all the time about an accident that was killing nobody but was making people very frightened. And I think the western media in particular have a lot of answer for this. The headlines that were coming out used incredible emotive language. They were based on very bad science. They weren't actually interested in the early phases of the accident, and in talking to the scientists; they were quite happy to listen to other people who did not really base their comments on science but could make good headlines. And I think part of the problems with people understanding what was happening was that while the Japanese press were reporting properly measured information, the international press was sensationalizing everything. So, many people who spoke both languages were in touch with me on email, saying 'Who do I believe?' The worst thing you can do to a human is to give them two sources of information that tell complete opposites. That is destined to cause fear and panic. So I think the international media have to look at the way they reported this.

Eventually, they did start talking to scientists and I think some scientists were quite reticent about coming forward. None of us like to talk unless we have facts. And because you'd had a huge disaster, it was almost impossible to get those facts out. We are used to being able to use email and fax and

things like that. When you have no electricity, you can't use anything. So it was difficult to get facts

and I think that was the problem with the natural disaster that would cause such situation more than anything else. But people liked to speculate it was for other reasons, but I think actually it was due to the fact that there was very limited communication.



Scientists don't like to speak until they have the facts and that gives other people a chance to step into that vacuum and to talk to the press and that's why you see the headlines that you saw. I think after a while the press began to realize that actually it wasn't the story they thought it was several years later. I now have journalists saying to me, "We got it all wrong, didn't we? Why did we report this so badly? What can we do to make it right?" Well, 5 years later, that's a bit too late. They should have realized that earlier. But I think we are now starting to have sensible conversations with journalists about the aftereffects and we should be focusing more on the earthquake and the tsunami. That's what caused the death toll here.

Yes, we can learn lessons from the nuclear power plant accident, but it was an accident. I think we turned it into a disaster. It wasn't the nuclear power plant itself that was the disaster, it was our actions that made the disaster. So I think there are big lessons to learn in the scientific community. We should be prepared to talk to the media. Most of us are very scared of the media. We must be prepared to talk to people. We must be prepared to listen to what the population is telling us. But I think the one abiding thing that most of us will remember is the dignity of the Japanese people. It was incredibly dignified, the response that we saw on the television, to such a huge disaster. I doubt there are many other countries that would have had the resilience to cope in the way that Japan has done.

Kenji Shibuya

I gather from both you and mayor about why we are – while he was focusing on power plant accident, people tend to forget about the actual disaster. That's one of the messages. But also you mentioned the bad science and headline stuff. And you said international media tend to focus on that. But to me that all surprise to the Japanese media, they tend to focus more on the headlines not stuff like baseline evidence. So can you just give us some examples of bad science, which you experienced during the early phase of this Tohoku disaster?

Gerry Thomas

I can remember one occasion I was actually on live television on BBC World, and we had just had a story about a Belgian minister who used the word 'apocalypse' to describe the nuclear power plant accident. And I think that tells its own story. It's the very, very emotive use of language. And unfortunately, we tend to respond as humans to the language that is being used. So, there were many people who were saying thousands of Japanese were going to die because of the radiation. That's just not true. And unfortunately, I have to say that 30 years after Chernobyl, we are still hearing bad science reported on our television screens.

Kenji Shibuya

Why is that?

Gerry Thomas

Because there is lots of papers out there, and there are lots of charismatic people who are not scientists

but who can talk to the media and talk to them well. And journalists like somebody who looks good on television; and sadly, most scientists don't look good on television. So I think we have to be prepared to engage in an awful lot more.

Kenji Shibuya

So we need somebody like you.

Gerry Thomas

Yes, in Japan, you definitely need people who are prepared to talk out.

Kenji Shibuya

Somebody like Dr. Tsubokura and these kinds of people.

Gerry Thomas

There is a problem however and I think we need to be honest about this. If you are a scientist on the media, you will become a target. You become a target for the anti-nuclear lobby. And I have heard some incredibly rude and nasty things said about Japanese colleagues that I know personally, which must have hurt them an awful lot. And I think if the media want to talk to scientists, they have to respect them too, and they also have to support people with an opposite opinion, often with a different set of values to the ones that we would hold. They want to come out and try and say something different. The personal attacks are very painful. Scientists are not used to that. That's why we stay in our labs and work. We are not good on talking to people. So when the attacks come personally, and within 2 minutes of leaving my first TV interview, I had hate mail on my phone. And I was quite taken aback. I was expecting it because I'm used to that sort of thing but it still shocked me how fast it was because of social media etc. And because academics particularly are very visible, it's easy to find my email- you just have to Google me, and it will come up. So it's very easy for people to get at you personally. We need to make sure that there is support for scientists when they speak out otherwise they will win the argument, not us.

Kenji Shibuya

Well, we listened from the administrator. So let's switch gear. And this is a question to you, Ms. Hokotate. You are representing parents at schools, what were the reactions at the time of disaster?

Chikako Hokotate

This is according to my own experience and so these things are very subjective. My house was not affected by neither tsunami nor the earthquake. The roofs were partially damaged, but the house was still standing, and none of my family members was injured. However, the nuclear power accident that occurred afterwards gave us the toll. We didn't know what we should do at that time. Because of the fear we were very much in chaos.

With regard to radiation, that was something that we had no thoughts at peacetime. I just knew it doesn't smell and is not visible. But we hadn't thought about how to manage it in peacetime. When the accidents occurred the firefighters came to us and urged us to go inside the house. So we thought, "Okay, we have to go inside the house and confine ourselves into the house." However, we still didn't know whether tap water was drinkable or not. Or we didn't know what about using the water for bath, whether that would damage us through the skin or not. We knew nothing. So our family decided to evacuate ourselves temporarily. We went out of Soma and we took refuge in Nihonmatsu. But afterwards, we have learnt that the radiation level in Nihonmatsu was higher than that in Soma. If we knew that, our action would have been different, although the absolute radiation level at that time was not something to be feared.



The schools were to be resumed some months later, and we came back to Soma. We thought that because schools were open, there would be no problem with the radiation. But when the schools reopened we had to use Geiger counters or dosimetry to measure the dose levels in the ambient

environment. I took part in dosimetry measurement, and there was a reference level; below this level it is safe, something like that. But that was the first experience for us so we didn't know whether we could trust that level or not. We didn't know either that whether the dosimetry is really accurately measuring the level or not. Negative things are easily accepted by the people but even if the authorities say, "It's okay", it is difficult to accept it; we needed courage to judge 'it's OK'.



My children were elementary students at that time, not kindergarten or nursery school or babies, but those with younger families must have had greater fear because they thought that they had the responsibility to protect their babies. So these younger parents had to make decisions on the spot whether they stay in Soma or they go out of Soma, without any accurate information.

Now I trust these figures and now I trust what the authorities said, so I came back to Soma. This is partly because my friends brought me to Dr. Tsubokura's lectures on radiation soon after the disaster. And I had the opportunity to listen to Dr. Tsubokura. That was a very fortunate thing for me. But I thought because he is a renowned doctor, I suspected that he might be paid off by the national government, and he might be only saying what the national government wants him to say before I came to know his personality. One day, he was on the move to somewhere, running in a sweat. Yes, he easily sweats, but anyhow, when I saw him sweating and running, I was somehow convinced that this person will never lie. So from that point on, I trusted him 100%.

Kenji Shibuya

Yes Dr. Tsubokura's lectures on mothers, what were the things that impressed you the most?

Chikako Hokotate

The doctor himself took the dosimetry and he himself inspected the produces. And because these produces are safe, he's eating them himself. He also told us that if there is no radiation at all in the atmosphere, worms do not reproduce, so radiation is sometime harmful to ourselves, but there ought to be a certain low level of radiation. So I learned that we do not need to eliminate radiation but be careful that radiation level is lower than reference level.

Kenji Shibuya

Mayor Tachiya, the mayor, it's your turn. Immediately after the accident, there was a big chaos and the information was crisscrossing, and as a mayor, what did you think was the priority issue?

Hidekiyo Tachiya

Well, I may be a little bit the sidetracking from what we have been talking. Dr. Tsubokura is a physician and he was much fatter. Now he is slimmer now. But we have to talk about acute phase, subacute phase, and chronic phase separately.

In the acute phase, radiation is only a part of many problems. When we have disasters, there is no written scenario. This is particularly true with the triple disasters, and the most severe damage was tsunami. Fortunately Ms. Hokotate's home was away from the coastline but as a mayor I looked at the city and the most affected areas were those affected by the tsunami. So the first priority is to rescue the survivors and to prevent secondary deaths



among the evacuees in the the shelters. So radiation was not the priority immediately after the accident or disaster.

Administrators need to get an overview and prioritize policies. What is the most urgent issue? That is what we have to think about. The basic rule of decision making is probably to consider whether that is fatal or not and whether that leads to the death or not. The other thing is overlooking the current state of the disaster effects. But then, the next problems would emerge.

For example, while we are thinking of preventing secondary deaths among people surviving tsunami in the shelters, next wave of damage, a radiation issue from the nuclear power plant accident, arrived.



As professor Thomas and Ms. Hokotate mentioned, before, the major problem was a severe lack of information. Soma city had no radiation countermeasure headquarter, and there was no expert on radiation protection. So we needed to consult with the Fukushima prefectural government, but no information came from them. Ms. Hokotate mentioned that the mothers were very anxious because of lack of information, and that was because as a mayor I was not able to have the answer to lay down these anxieties. To overcome the problem, Soma city began dosimetry measuring.

two days after the nuclear power plant accident. At that time accuracy of the measurement and validity of the formula that we used for calculation might not have been guaranteed, but we needed to decide whether to evacuate the hospital inpatients. Hospital evacuation itself has a risk, so we needed to choose the measures with less risk. That was why we collected information in order to execute that measure. That was a continuous process of thinking what was the priority issue and what was the thing that we needed to do urgently. This process was required not only in managing radiation issues but also managing other newly emerging problems such as PTSD. As a mayor of Soma city, first I tried to have a grip on the overall picture then consider the priorities and implement these priority measures on my own responsibility.

And information is the key to these decision makings, just as professor Thomas mentioned. I was watching TV news and felt that what the commentators are talking was not at all helpful. The commentators on TV predict the worst case scenario and mention what to do to prevent the case. The commentators on TV predict the worst case scenario and mention what to do to prevent the case. Making any plans is never free from risks. However, there are also risks of not having any plans at all. So while agonizing ourselves, we make temporary decisions and implement these priority measures.

During such days, we have to give top priority to avoid risks of radiation exposure among children. We were not so much confident about our knowhow, knowledge, and technologies we had; to what extent we can address these issues. Especially we were not very confident in the mid-to-longer term. As Ms. Hokotate said, we didn't know what to believe. But I could feel the concern of the citizens in my bones. If I can say something with confidence, that would be better, but I was not confident at that time. Then we received support. Dr. Tsubokura he worked very hard to provide radiation education to the residents. Judgment to avoid risks as much as possible for a mid-to-long term was needed and I had struggled to make the best judgment and we were able to overcome the super acute and acute phases. I am not sure whether our judgment was correct. It must be proved in the future generations. But as Soma city office, we struggled to think, and asking you to stay in Soma city.

Regarding children, I think it is important to investigate and study carefully to send out a good message based on the evidence to take action. That is going to be the best approach. From across Japan, we had

physicians. Thanks to their support I think we have been able to do this in both Minamisoma and Soma city.

Kenji Shibuya

Thank you very much. We have to give top priority to life to make a judgment under these circumstances, according to Mayor Tachiya.

Then from the super acute to chronic phase, you decided to give higher priority to children's health. Going back to topics of countermeasures against health for children, municipalities took health measures. We had cases presented in each lecture. Based on the contents of the lectures, Dr. Suzuki, could you share the current status of thyroid screening and also back then how was it started? It's impossible to eliminate the risk to zero so you have to consider tradeoffs, but initially what was your idea to proceed with the thyroid screening? Could you look back upon the past to share with us?

Shinichi Suzuki

Right after the disaster, Dr. Yamashita and Dr. Takamura came from Nagasaki University, and Dr. Kamiya from Hiroshima University as advisors of the Fukushima Risks Communication Council. They also gave lectures to the residents in Soma and Minamisoma city. I was attending the lecture as a disaster medicine coordinator of Fukushima prefectural government. I was able to learn how to make risk communication or what the residents were thinking through this process.



Then thyroid cancer became to cross the lips of the residents. But right after the disaster, during such a panic, it was impossible to talk about conducting investigation and screening. We just tried to be close to people because of the concern. Then we gathered experts from across Japan to hear their views on how to conduct screening. People wanted to have the screening as soon as possible, but we cannot do this overnight. If we do this all at once, the quality would be down and there can be variance in the results. You have to use the same standards. Just doing a token ultrasound screening is meaningless. We need a certain level of precision and we have to continue it for the future. We consulted with many experts at that time.

At first, I and a few other experts and non-experts in my university as well as experts from all over Japan worked together to educate others so that more physicians would become able to conduct standardized form of screening three years later. As Dr. Shimura presented this morning, many physicians are now joining in the screening, and support structure has also improved.

This project got started on 9th October. We did a lot of simulation before starting. For example, when we simulated how to provide the information, the staff members brought their children and conducted drills together with the mothers. After simulation, we received lots of feedback. Even with this preparation, we got a lot of claims when we exerted the screening on thousands of the residents. We decided to change where possible to make progress little by little. We couldn't look back upon the past until now but thanks to support from all across Japan and also from people in Fukushima prefecture we have come to the third round of the screening.

The problem was that the frequency of A2, most of which were benign cysts, was higher than expected, and it was a big topic in the world. Some experts suggested that even when we explained this is benign, some people would be worried and take the ultrasonography repeatedly. Then if cysts that they didn't have before were detected, they would become more worried. This concern was turned out to be correct. Although we started based on various scenarios, not all the people fully satisfied with the screening. So we struggled a lot, but we shouldn't stop, because it was not us who decided to conduct the screening. We started in response to the opinions from many people and with approval for many people.

Now a lot of data has been accumulated. Looking back at the beginning, we could not expect this result when we had started. From across Japan, we invited experts. All of them are specialists. They had many

patients because they are specialists. They had to leave their patients behind to come to Fukushima. That means that there are colleagues across Japan at hospitals to support those specialists and they decided to come to Fukushima to continue these efforts. Every day it was difficult to secure enough human resources. Sometimes we have to go and leave our work to help the staff. Finally, it's becoming more stable.

Kenji Shibuya

Dr. Thomas, based on the experience in Chernobyl regarding thyroid cancer, regarding the recent thyroid ultrasound screening was started, you talked about it. How do you perceive the screening in Fukushima right now?

Gerry Thomas

I think the thyroid screening is going to give you an awful lot of data but you have to interpret that data for the media and for the public. And I think one of the early problems that we had is that people have taken the figures from an ultrasound and compared it with figures from operative cancer, and the two of them are not comparable at all. And as I showed in my talk, when you screen, it changes the curve, it moves the curve to the left, and I think explaining that to the public and to the media has been very challenging.

When you talk about human health, nothing is ever simple and so it becomes very difficult to explain to people. But I think, you know, you have experts. You have the world experts in thyroid in Japan. You have the world experts in using ultrasound to screen patients. Very often they will give the presentations at international meetings because they know more about it than the rest of us. So, I think you can be very confident in the people that you have doing the screening. I think the difficulty becomes in the interpretation of the data. And you could say maybe you should have done mass screening elsewhere in Japan to make it easier to explain that actually what you are seeing is a result of screening, not as a result of radiation. But I spoke to a young mother once in Iitate, who said I do not want another mother to go through what I went through. It was so stressful as a parent seeing that. And I think she had a very good point. As scientists, we may see the world in one way but you need to speak to the people who are actually going through the procedures to understand whether you have it right. And I think a lot of discussion is now going on with the people who are in the screening program as to how they want to have the results presented, how they want it discussed with them. And I think the world will learn an awful lot from this and we should be learning an awful lot.

Kenji Shibuya

You are exactly right that we didn't have the exact choice to how to proceed, and we have really a broad way but we have some mission to fulfill that kind of effort like a thyroid examination problem.

Now Claire-san, from standpoint of health management, maybe you can actually share your view because you came from outside this region. I am sure that we expect that you have fresh perspectives, and that you engage in that kind of health management from the standpoint of women as well.



Claire Leppold

Lot of us have already discussed the importance of information availability, especially right after the disaster. And one thing that I've really learned since I came here is the importance of sharing science with the public and sharing results of studies with the public and making science accessible for everyone, particularly in the case of Fukushima with the result of the whole body counter screenings or the baby scans. Really, people need to know the results of these and the importance of the results and then the importance of their continued participation. So I think, thinking of important areas of health from here on out, in Fukushima I would say there's a really big importance on continued work to track the health of affected populations but to also make these results available for everyone. That's my general impression.



Kenji Shibuya

As Dr. Thomas mentioned, the scientist should be at the forefront of the communication to the general public and it has to be very effective. Now, what about the situation of the children in Soma?

Hidekiyo Tachiya

About 3 months after the disaster, the members of parliament from the Niigata prefecture visited us and she insisted that all the children in Fukushima should be evacuated. She said it is the safest way to safeguard the health of the children. But the children's health has to be evaluated in a holistic way. If the children are separated from their parents, or leave their own hometown, this doesn't actually serve right, like a psychological stress can easily be anticipated. The issue of radiation exposure, as Dr. Tsubokura mentioned, is considered with regard to the total amount of exposure and incremental probability of health problems.

As I have just mentioned, in disaster management, you have to compare risk and choose the option with smaller risks. So, the decision of Ms. Hokotate was not wrong. You can evacuate and if you think Soma is safe, then you can come back.

At that time, no one, including administrators, was confident in the decision they made. We had some information and data available to make the fine judgment that the dose level was not as serious to evacuate all the children from this district. However, we cannot measure people's anxiety. Therefore, if someone were worried, we don't deny their decisions to evacuate, because the situation was so uncertain.



But the city government must make the accurate measurement of the dosage and share the results with the community. We measured the external and internal exposure levels of the residents and air dose rate. Meticulous efforts were needed to see whether the trend was aggravated or improved. We have been measuring air dose rate since right after the disaster. When the dose aggravated, our decision would have been different. But luckily the dose was going down as time went by. So we made a decision to stay. From this experience, we learned that we should have scientific measurement and research so that we can be afraid properly and reduce risks wisely. In the areas with little bit high air dose rate, there is a tendency that the rate by windows is higher than by corridors. If that is the case, then the children's bedroom should be closer to corridor to reduce the amount of radiation exposure.

Of course, people would say that if there is some amount of radiation, it is better to evacuate children with all means. But considering that the exposure level is minimum, and that there is also the risk of children to be separated from the family or from the home, we may make the wise decision and option.

We actually have made a decision based on that evidence. For example, we offered the option to the families living in the areas with higher air dose rates to evacuate to the area within the city with relatively low air dose rate.

Kenji Shibuya

Soma city was really proactive and participatory, and deal with that situation by conducting internal and external radiation exposure measurement. They also openly shared the results with public since the very early stage after the disaster. So Ms. Hokotate, can you tell us what made up your mind that you and your family came back to Soma city.

Chikako Hokotate

Well, not only the information from the municipal, but also the measurement conducted by the school gave us assurance. The measurement was done at every school and on every corner on the street to the school. The results of the measurement was disclosed and that really gave us the peace of mind and we felt secured and that all information is shared with citizens. We were very thankful for the city government, which made a great effort to create environment in such a way so that children can live safely.

As for the food selection, there was a concern of food contamination. So soon after the disaster, I asked my relative living away from this city to send us rice. I cooked the rice for my children, and the adults ate the local rice. So we had two rice cookers. And at school lunch, the old ingredients were disclosed so that some measurement data was actually shared with us and all those efforts by the city government made us more secure of the situation, keep track of the situation.

Kenji Shibuya

Now, outside Japan, what was the situation? How the disaster in Fukushima was announced and also reported? Question to first of all Mr. Johnston. How the Fukushima incident was communicated?

Peter Johnston

I think the first thing to say is that we were only interested in the radiation, particularly the nuclear safety side of the accident. We were aware of course of the terrible tsunami and of the terrific loss of life. But the normal orthodoxy was that if there was going to be a nuclear accident, it would happen in a single nuclear power plant. It would involve a release of radioactivity over a short period of time, and then there would be countermeasures put in place and it would be controlled.



And that's not what happened of course. We had a power plant which was damaged by water where multiple units had failures. There was very little information provided to the international community and so people really had little idea of the status of the plants. Most of the people who knew what was going on worked for governments and so weren't allowed to talk to the press. And so, people were thinking very bad things, and as a result of that, for example, the United States imposed a 50 mile exclusion zone for Fukushima Daiichi nuclear power plant. And the instant that happened, the Australian government did exactly the same thing. And so there was really a lot of concern. A lot of Australians lived in Japan and a lot of Australian companies had major offices in Tokyo. And the questions were, should those people leave? Some of the foreign embassies in Tokyo left, and so a lot of confusion.

The current situation from an IAEA perspective is we remain very concerned about the fact that there is something like 100,000 people who are still displaced from their homes, that's a very bad situation.

We don't think about the situation in Soma city. We think about the situation in Fukushima prefecture. We think on a much bigger scale I guess. And also, we are really aware that there is a very long way to go to decontaminate areas so that all of the communities can be restored. And there are enormous problems with respect to waste and soil collection and water. Water is obviously going to be a really big issue in terms of the release of water that is being purified at the plant. And then there is the long-term decontamination. So, from the international perspective, we see significant progress but we also see an awfully long road ahead with many technical problems.

Kenji Shibuya

Dr. Nozaki, what is the world view on the situation in Fukushima?

Shinjiro Nozaki

Well, probably from the viewpoint of WHO I'd like to speak. I was in Geneva at the time of accident. In the Fukushima Daiichi nuclear power plant, the roof blew off with the explosion. That image spread through the world. Rather than the word 'the Great East Japan Earthquake', people all over the world said 'Fukushima', 'Fukushima', and they focused only on the nuclear power plant. In the case of Sumatra earthquake in Indonesia, there was the earthquake and tsunami and all the people throughout the world came to rescue and the WHO was also there to do the investigation.



But WHO does not have such office for advanced countries, such as Japan office. And if it were earthquake and tsunami only, the role of WHO would be just to gather information of damage and recovery. However, unfortunately, there was the nuclear power plant, and after that all attention was paid on Fukushima. Since immediately after the disaster till 4 years later, there were people with signage saying 'Fukushima' in front of WHO in Geneva office everyday. So every day during the commute I saw the signage of Fukushima, so I thought that WHO will have to investigate the situation in Fukushima.

Initially people thought that it is the same as Chernobyl, but there were many WHO reports and thanks to that, the current understanding of the world about Fukushima is that the radiation level is low enough not to cause the health effect. So that is no more panic in the world.

Kenji Shibuya

Mr. Johnston mentioned about the 50 mile evacuation zone which was advised by the US government. On which basis did they decide to set the 50 miles evacuation zone? We now understand the exposure, radiation level is very low, but we didn't know that at that time.

Peter Johnston

That's right, and it wasn't based on the radiation dose level. It was based on the fact that the US NIC had formed the view that one of the spent fuel ponds had cracked, and that there was a possibility that all of the spent fuel in that pond would deflagration and burn. And we did modeling in Australia all the time about what was happening at Fukushima. And if that eventuality had happened, the plutonium annihilation plume would have gone at least 100 kilometers, at a level which would have been dangerous. So that was the Americans really adopting a worse case approach and putting the dose limit and Australia followed because it could. There were only a few hundred people within that radius who were Australians, but of course for Japan it was impossible.

Kenji Shibuya

Professor Thomas, what about UK perspective, what about the UK views on Fukushima now?

Gerry Thomas

...very different perspective on the accident which is why the British embassy didn't evacuate from Tokyo. We are lucky in the UK in that we have scientists, working scientists in each of our government

departments. So, the first thing that happens when there is bad news somewhere, whether it's a new disease or whatever, is that the prime minister will call a meeting of the working party, which is really to advise governments on what its action should be. And the advice of our chief scientist, and he'd spent most of the night on the phone to experts about reactor safety. And in the UK, because we were early adopters of nuclear technology, we have quite a lot of good experts. So he spent most of his time talking to people about nuclear reactor safety and he was able to put a worst case scenario from the British perspective, which was very different from the American perspective.

And said, what do we need to do to make British people safe, because that's always the concern of a foreign government is their own people. And the decision was taken that Sir John Beddington who was the chief scientist at the time would video link in to Tokyo, that that could be provided as a video link to anybody who wanted to listen to it, whether they were British or not. And the advice was stay where you are, do not try to get on a flight home. You will have more of radiation dose on the flights.

Kenji Shibuya

So it was quite opposite to the other countries.

Gerry Thomas

Absolutely, yeah, very opposite, and I don't know why the scenarios that played out were so different. But there is a very interesting video that I saw when I was in Tokyo on the fifth anniversary, that when the British embassy team went to Sendai to look for British people that we knew were in this area, and there were quite a lot of British people in this area, they filmed what happened, and it is now used as a training video for disaster management. And it was quite incredible to see it actually unfolding in real time and you can understand why people were so worried.



But now, we know what the doses are. We have lots of very august reports that have told us what the doses are. And I think most people in the UK now understand that those doses are very low, that there will be no visible health effects from it. There are still some people who are nervous but I think we have been allowed a lot of media access after Fukushima to try and explain what is happening. And it's interesting now, when you see the anniversary, it's not a story about the nuclear accident any longer. It's a story about the earthquake and the tsunami and that's really what we should be talking about, not the nuclear disaster as people like to call it. It's an accident and it's interesting how that has changed over time. First year, first 2 years, it was all focused on the nuclear, now it's focused on the tsunami and how well Japan is recovering from that.

Kenji Shibuya

Thank you very much. As Dr. Thomas said, the dose was relatively low, but we were able to tell only after measuring. Initially we didn't really know. Thyroid screening and as Dr. Hayano showed the data, the air dose rate was not so high. So with regard to communication with the general public what was the issue and what should have been done better? Dr Suzuki, what could have been done better based on your experience in the field?

Shinichi Suzuki

That's a difficult question. First of all, regarding radiation level, external and internal radiation exposure levels were measured several months after the disaster. ¹³¹Iodine has very short half-life time, so measurement of external exposure to ¹³¹Iodine for each of the affected residents was impossible. But it is Iodine ¹³¹ that affect the thyroid the most. We have several research with small sample size and we

had some estimated data, but the variance was too big to apply the result to each individual. So that was part of the difficulty.

Communication changes by time, and timing is very critical. We need to ‘read’ the atmosphere around us, which changes over time, and make an appropriate explanation and address this situation properly. Our explanation may not have been sufficient, but we tried to be more meticulous in explaining.

Kenji Shibuya

I see. Dr. Thomas, sorry to ask you many times, but in crisis communication, in UK scientists find it difficult to communicate about thyroid screening. Despite the low dose, crisis communication was also difficult in Japan. You came to Japan many times. You also have experience in UK about the study in Chernobyl. So, what should we have done better in the crisis communication?

Gerry Thomas

As professor Suzuki has mentioned, it is very difficult to tell you what you should have done, but I will share one thing with you. The year before Fukushima happened, there was an International Thyroid Congress in Paris. I was there as were most of the thyroid community around the world, and we heard that because the following year was the 25th anniversary of Chernobyl. We heard from the Japanese and we heard from the French what they would do in the event of a nuclear accident. So I knew what the Japanese plans would be, which gave me great confidence to be – and I knew the people who would be involved, so it gave me great confidence to be able to speak out on the media. And I think it’s a shame that that plan had not been shared with the Japanese people beforehand.

So I didn’t understand at the time but I think I understand now, it’s difficult for us from a different culture to know what is going on in another country. And I think the thing that was missing in Japan was the elements of risk communication. When we do anything in business, in academia, we have to draw plans that assess all the risks and have what we call business continuity plans now. People don’t like using risk assessment any longer. It’s business continuity is the term we use. And so that means for absolutely anything that we do, we have to assess the risks and be able to say what we will do to reduce those risks, and I don’t think that culture existed in Japan before 2011.



Kenji Shibuya

You mean the contingency plans?

Gerry Thomas

No, risk assessment and then how you are going to alter that risk and how you are going to communicate that risk. So that's all part of what we do in everyday life virtually. So I think that's partly it. I was shocked when I heard from Japanese nuclear industry that they had told everybody that nuclear power was completely safe. There is nothing in life that is completely safe and we may as well accept that – going home on the plane in a couple of days, going home on the train is not completely safe. So I think that was a myth that didn't help. I think if the plans had been known, I think people would have been a little more relaxed. They would still have been worried. And I think one of the things that we have to understand is a nuclear power plant is not a nuclear bomb, and the two things have been confused in our minds. And we have to understand that the doses that we get from a nuclear power plant accident are very, very small and it's the individual dose that matters to the risk for health.

I am a pharmacologist originally so I understand dose response curves but that's not something that everybody else understands. But we have to get the concept over that a small dose equals a small risk and a small effect. A big dose equals a big effect and a large risk. And I think we have a problem and it's not just Japan. It's everywhere. We all share the same misconception that from a nuclear power plant the individual dose is very large. That is not true.

Kenji Shibuya

We talked about the situation since the disaster till now, so those who have moved to Soma area, Ms. Kana Yamamoto and Ms Claire living in Minamisoma city, what made you decided to live in the city, what was your concern and what has changed on your mind after actually living in Minamisoma? First Yamamoto-san?

Kana Yamamoto

I began to live in Minamisoma city, 1 year and 1 month has passed. I am in the second year as an intern at Minamisoma Municipal General Hospital. When I was a university student, I had a chance to listen to Dr. Tsubokura's speech on radiation. So I was not worried when I came here. But on my way here, my mom asked me 'You are not willing to get married? Are you okay?' My university professor also asked me 'Do you know how near Minamisoma city is from the nuclear power plant?' And my friend also told me 'It's close to the nuclear power plant. I wish you good luck.'



But personally I was not concerned. My concern is whether I can do well in my first year of my career, whether I would be accepted by the hospital staff. And because of my ignorance, I thought Tohoku is a snowy region, so I wonder whether I can endure winter.

It's a kind of promotion, may I? On April 19th, I published a book about anemia from Kobunsha publishing company. Right after the national exam I began to write this book. Dr. Kami gave us advice so that I can write this book. There were deadlines. I was managed to send the draft by the deadline. And there is a Facebook post by the doctor. I say sorry, the deadline is approaching. I wondered whether I would be able to complete. So there is no regret after coming here at all.

Kenji Shibuya

Any difficulty? What about your parents?

Kana Yamamoto

No further misunderstandings. Initially they were worried. Are you living okay? Do you have people around you? They didn't really understand, so I continued to send delicious sweets from this region for months. And I sent photos with my colleagues at the hospital and photos taken by Dr. Oikawa, and then my parents came here so they understood my situation.

Kenji Shibuya

Claire-san may have a different perspective, coming from Edinburgh, what was the reaction of your parents and friends there?

Claire Leppold

Many of my friends were really surprised when I came to Fukushima. I came here because I met Dr. Tsubokura, so fortunately I was able to learn a lot from him before I came. And of course I read everything that had already been written about this place and so I felt pretty well informed and I didn't have particular worries myself. But of course my parents were shocked, and my response to their shock was to actually send them all of the papers I had found. And my mom is a nurse, so she has some medical knowledge and she can read scientific papers and understand them. My dad was particularly worried because he's actually very anti-nuclear and he's the type of person who thinks everyone should put a solar panel on their house and not use any other type of power. So he was really worried and it took him a long time to kind of accept that I decided to come here.

But recently, he finally got used to the idea of me being here, and he read as much as possible himself as well and it made himself informed of the reality.

My friends first lost their words – one of my friends joked that my future children would be born with birth defects, and I saw the problems of stigma.



Kenji Shibuya

Now the next part of the panel discussion will focus on social impact of disaster and challenge and into the future.

So I would like to ask once again the passionate, the Mayor of Minamisoma, Mr. Sakurai. After 5 years, what social impacts remains? What is the current situation? What will be the future hld, your comment is very much welcome.

Katsunobu Sakurai

As I said yesterday, 20 km or 30 km divisions were made within my city. All those zones were designated by the national government. This also draw lines in the hearts and minds of our citizens, which caused psychological impacts. For example, monetary compensation was not given to those who were living more than 30 kilometers away from the nuclear power plant. Medical fee and fee for nursery is also free for the people living within 30km zone. So to speak, these residents were not treated as citizens of Minamisoma. the treatment is totally different from one zone to the other. Within 30 km distance, long-term care, insurance fee were all free. There is a totally different treatment, no grants, no subsidies

outside the 30km zone. This sense of discrimination prevented us from talking this issue openly. There is a division, division of relatives, division between parents and the children.

With regard to radiation, we started monitoring since July 2011, following instructions of experts. Parents of small children in Minamisoma now understand that the health impact by radiation is small. However, there still are psychological barriers, especially among those who are still evacuating. At maximum 60,000 people evacuated from the city, though residents living in the mandatory evacuation was only 14,000. These 14,000 people are not allowed to return to their homes yet.

In addition, 636 people lost their lives by the tsunami. Part of these victims' houses exist in the 20 km or 30 km zones. This complexity is hardly understood by people outside. Among those who lost their families and houses, compensation is quite different whether or not they live within 20km zone or not. Those within 20km zone get 100% compensation of the nuclear power plant accident, even when their houses were not damaged. But those families who lost everything by the tsunami were compensated only for the land. This situation is causing sense of inequality among the residents.

In such a situation, residents' needs vary depending on age. For example, elderly people living in temporary housings want to return to their home and end their lives at their own home. But parents who want to avoid health risks of their children are more likely to decided to leave; 9500 people totally left from Minamisoma, which is 1.5 times larger than that of Iitate. Minamisoma actually evacuated, 9500 people left the city and 11,000 people are living outside of Minamisoma. In addition to this, 7,000 evacuees from 20 km zone are evacuating within Minamisoma. In total 27,000 evacuees- this is the worst number among the affected cities.

Particularly, 13,000 people of productive age are lost from Minamisoma. Therefore, how to compensate the loss of human resources is a key to the recovery of Minamisoma. We need to invite people from outside. Sharing scientific data to actually assure people outside that living in Minamisoma is safe, and letting people like Yamamoto-san and Claire-san spread the message all over the world, is important. This is why I need support from your cooperation, specialists, and then the industries, we have so many industries there in Minamisoma. Why don't you come over and join us.

In order to fulfill our objectives, we decided to team up with the national government and the prefectural government and make test fields for innovative science. We are also planning to build international research institute in Minamisoma. In agriculture, plants factories will be open. Before the disaster, we focused on farming of the crops but now that we have new kinds of crops that we are growing, that's the rapeseed flowers to make the rapeseed oil and soap out of that. We have to create a new job, new industry. So such series of new challenges and new innovation is needed for us to realize our dream to recover and reconstruct Minamisoma.



In Edo era, the Soma clan experienced a severer famine and so many population was lost. Then the migration policy was taken and they invited migrants from outside. So that's just like Yamamoto-san and Claire-san, the great resources coming from outside really contribute to the great future of Minamisoma. Also, in that city we have to provide better education to nurture and foster the future human resources. That means that the population, 71,000, has actually shrunk to 57,000. But this number is not so bad. There are some new entrants. I think this is partly because the city functionality was maintained and thanks to the Tohoku Electric Power, there was no blackout. That resulted in the resumption of the water services or the recovery of the social infrastructure.

All those recovery, and reconstruction work was done by city staff members, but city staff members, who were often the target of criticism by citizens, have to actually retire due to stress. But it is due to the efforts of those public servants that we are able to really retain their population. They were the great driver to keep us going with grand plan for the future.

Kenji Shibuya

Thank you very much indeed. The health effect is one and also that social discrimination, and that the future, city development and perhaps introducing people from outside the city to Minamisoma.

Now I would like to ask a question to the people living outside this region. Question to Dr. Thomas. Now that's the 5 years after the disaster but we have to continue the effort for the total recovery of this region. From the world, what is the difference in the viewpoint between people inside and outside?

Gerry Thomas

First of all, I think you are really lucky to live in Japan, a beautiful country. I think you have fantastic resources with the investment that is going in. There are still people who query whether it is safe to eat Fukushima food and when they ask me, I say, "Not only is it safe to eat the food but you should come to Fukushima to eat it. Food is always best where it's grown so why don't you come and visit the place for yourself." There will be nervousness on behalf of some people and some people you will never persuade to come back. But I think you need to carry on doing what you are doing. You need to really sell this area. You are putting in new infrastructure, new jobs. Why would you not want to bring your family here? It's much better than Tokyo or Sendai? To live in the country is what most people would want. So why do people not want to come here? And I think you have to keep reinforcing that and I think eventually you will find the population comes back. I certainly can't think of a much better place to be. It's beautiful here.

Kenji Shibuya

Would you like to stay?

Gerry Thomas

I would like to stay and, even better, I might get my son to come here. Hopefully, if he gets the grades, he is going to do German and Japanese. I brought him to Japan when he was a young boy. He loves Japan. I have to have a separate bag when I go home to take food for him because he loves Japanese food, and he's so in love with the country, he wants to come and live here.

Kenji Shibuya

What about Mr. Johnston?

Peter Johnston

I think I am seeing lots of good investment, and lots of good facilities here in Soma city. I can see, however, that for the areas where there has been evacuation, the redevelopment of those areas is going to be quite different because I think the returning population is going to be small and I am sure the ministry of environment is actually thinking about these issues going forward.

A horrible reality of a disaster is that things are never the same after the disaster. You build a new situation. You build a new community, but it's not the same as the old community. It's changed.

Kenji Shibuya

Okay. Just as Sakurai-san mentioned, there are two immigrants, or two young aspiring persons have immigrated to this city, and so these younger people coming back and they work and they have families, they raise children, and these two could be the role models, Yamamoto-san and Claire-san. So you are younger people with lot of things in the future. What are the good things that the city will have to say to the outside world in order to convince the people coming back or outside people immigrating in this region? First, shall we start with Claire and then Yamamoto-san.

Claire Leppold

What's important for people going anywhere or for people to live in any place is to have good jobs, good places to live and accurate safety information or information about risks in a place. So I think for Minamisoma, if we are going to increase the number of young people, we really need to create a good environment; but also, like I said earlier, the spread of accurate risk information. And I think those are truly the most important things and all of those things are what helped to bring me here as well. And I think it's going to be true for young people from other places in Japan to come here, or for people originally from here to come back are those three points.

Kana Yamamoto

I am still a fresh person in second year, so I do not have strong opinion like other panelists. What I have to do is to fulfill my mission in the hospital. I want to become the Ob-Gyn and I worked as a resident in Minamisoma Hospital. There is only one Ob-Gyn doctor and he is really busy. And some patients asked me until when I will work in the hospital. I was very much wanted, that's what I felt. Also I had the overnight duty under supports not only by the doctor but nurses and the patients themselves, and that's what I feel every day. It was quite a good luck that I was able to come here and also I got acquaintances with the city hall people and the civil servants in the Soma city.

So that was good luck that I had and that sort of destiny I should meet you in this wonderful place and I feel very lucky myself about that.

Kenji Shibuya

Ms. Hokotate, as a mother, I believe that one of the main topics is to send out the message to the world. So you live in Soma region and you are a mother. What is your message to the world? If not to the world, to other people. So what about your personal view? Your message to the world.

Chikako Hokotate

First of all, ever since the disaster, we have received a great deal of assistance from throughout the country and throughout the world. And as an ordinary citizen, I didn't speak up much, I would like to take this opportunity to thank them all.

During this 2-day symposium I was able to listen to what the people with different background thought and acted. My children are participating in El Sistema, and SEISA group also invited my children to the place where they can play outside with no concern.

I personally feel that Soma is safe enough for me to raise children, but to prove this, I have to remain healthy and lead a happy life. I believe that that would be the best return that I could give back to those who have helped us.

And of course, still many people are working to stabilize the Fukushima Daiichi nuclear power plant. But of course, there is a long way to resolve the situation completely. So what we can do is we will keep receiving the test screening using the whole body counter and the glass badges to monitor our radiation exposure levels.

If people say it's safe *after* an accident happens, we may not be able to accept these words. As there are nuclear power plants throughout the country, throughout the world, all the people will have to educate themselves before accidents happen and these sorts of learning processes can be part of everyday life.

I heard companies are still building new nuclear power plants, so I want them to develop more robust disaster plans in case an accident happens. As long as there are nuclear power plants, there is a possibility of accidents anywhere at any time. So we will have to prepare before accidents happen.



Kenji Shibuya

Before we close, we would like to have a message from each panelist. First, Dr. Thomas.

Gerry Thomas

I think I'd like to see this place to return to how it was. I came here in September 2011, and (in today's short sightseeing tour) I didn't recognize where I had been until we suddenly realized that we'd been to the same place and it looks totally different. We remember the (abandoned) bus. We remember the ship, but now it looks a lovely seaside town. So I hope in the future that with all of the efforts you are putting in, that you will invite people back, that they will come back and that you will have a thriving young population here. I could see no reason why that should not happen, and it should be happening now already. There will be jobs in this area. There will be jobs associated with the power station because it has to be decommissioned. Those will be good jobs, highly paid jobs, skilled jobs and there should be no reason why you shouldn't be able to bring an awful lot more people back to live in this lovely area.

Peter Johnston

Thank you. I just wanted to reassure everyone here that in fact many lessons have been learned in the nuclear safety area from what actually happened at the power plant, and the safety standards have been reviewed and updated. And with this accident we have learned things and we will put the lessons into practice.

Shinjiro Nozaki

Keyword is that Soma is the only area in the world with unprecedented disaster and we have a mid- to long-term initiative. We need to continue for the future as well. To the world, this experience must be shared. You have to send a message. You are working on this aggressively. This is great. WHO Kobe center would like to cooperate with you as we proceed for the future. So, we appreciate your continuous collaboration.

Shinichi Suzuki

We have to continue screening as was mentioned this morning. I heard that Soma Central Hospital will start screening from next week. This means you can get screening from the nearby doctors who you know well. So we can do this more locally. That is going to happen from now on. Next issue is about collecting data. We have to gather data to report so that you can evaluate. We would like to continue

these efforts. All the more, we shouldn't allow the quality to go down. We have to continue in the same way so that we can do the same assessment.

Claire Leppold

First, I hope that this place can continue recovering and that young people will come back here and that we can continue learning lessons and sharing lessons from the situation and to not forget what has happened, but what also can be recovered and what can be done from here on.

Kana Yamamoto

I came from outside. I would like to communicate the real situation of Minamisoma area with the rest of Japan.

Chikako Hokotate

I thought I didn't have to talk anymore. I thought that was my last turn. Some people may still have some worry to live a healthy life. So I'd like to send a message to them. And also, we received a lot of support but still I'd like to ask for continued further support.

Katsunobu Sakurai

Within 20 kilometer radius, animals and plants were sacrificed. Cows were sacrificed and they were forced into famine. Plants were in ruins. Can we live in a society where we just value the human life? As Mayor Tachiya said, we have to value the life. But human beings are supported by all other living creatures, and we should not have a society that thinks about only human beings. Like the lesson from the nuclear accident, we must educate all people how human beings should live. At the same time, we have to make efforts to give a future to young people, who should have future. For elderly people, time is running out. So how to ensure sense of safety for them is important. So we have to make every effort to achieve these goals. We have to work with people around the world and also people across Japan to send out the message that here is a great region. This is what I'd like to do.



Hidekiyo Tachiya

This symposium has the capability to disperse so much information and data message, and that will be proceedings later so that we really invite you to actually go and see the result of this symposium. Many people died and lost their lives because of starvation. Elderly people who were bedridden and those abandoned people died because they were not able to get food. That is why we have to make decision on which risk should we choose. That's the ultimate question. During these 2 days, we have had so

many discussions, and as we came to the conclusion that radiation should be fared with properly and be avoided in a reasonable way. I'd like to repeat this message.

Yesterday, at the onset of the symposium, I touched upon the story of the relief surprise to Kumamoto. We sent gypsum panels but they didn't know the panels is to use as the partition to secure privacy at evacuation centers. On 5th of May, I convinced a mayor in Kumamoto prefecture to convince them that the gypsum panels

should be used and used wisely. All efforts we have paid in the past 5 years were not effectively communicated and shared in the disaster management, the disaster preparedness. That is really unfortunate.

So, I think the result and the outcomes of this symposium and also the lessons learned have to be evaluated by whole the society. I am so grateful for Ms. Hokotate for her contribution to the symposium. She emphasized the importance of the radiation education and also disaster education training.

We are grateful to take many presentations and recommendations from the floor during these two days. We'd like to send these messages from Soma area to the rest of the world.

Kenji Shibuya

Thank you very much. Very rightly and a very powerful concluding comment by the Mayors. Ladies in gentlemen, please join me for the appreciation of the contribution given by the panelists.



Masaharu Tsubokura Secretary general



Now that this international symposium on disaster management and recovery for children and communities 2016 has now successfully been concluded, I thank you very much indeed for your attendance to the 2-day symposium, to squeeze time out of your busy schedules. It is a truly international conference with English and Japanese and interpretation, translation. It was a dizzying experience for me but I hope that this symposium has served the

purpose to provide you the information and message.

The moderators, panelists, and speakers, keynote speakers, I'd like to sincerely express my heartfelt gratitude. We have the session 1, 2, 3, and presentations from four mayors of the municipalities, panel discussions, and keynote speeches. Personally, I had two learnings out of this symposium: one is that there are so many issues remaining but 5 years have passed since the disasters and slowly but steadily we are moving a step forward. Of course, it is unlikely that the radiation will be reduced to zero, but the dosage is coming down and the industries have revived and the people are doing their utmost effort to really continue their lives.

Second point is that people cannot live alone. They can live with the support of others, neighbors, and friends to move ahead, inspection, monitoring, screening and all the industries and every one person cannot live alone. He has to be supported and he has to support other people around him.

Now this symposium was made possible with the cooperation of so many people. Two beautiful moderators, students working as volunteers. Transportation was actually provided by Seisa-group. And you actually enjoyed the lunch curry. The cooks were working very hard early in the morning to prepare the tasty seafood curry for you.

And then there are interpreters. Interpreting work is quite consuming work because the interpreters have to keep up the pace of translating from my very quick Japanese into English. And also the city staff member and also the staff members from the municipality, governments and those guides and escorts, all those people really contributed their power and their enthusiasm to make this symposium a truly successful one. I sincerely hope this information and data, a message will be a foundation for us to really make the great future.

Thank you very much indeed.



Executive committee



Press release



Venue -Soma Civic Center-



Symposium (May 7)



Symposium (May 8)



Excursion to the disaster/recovery area



Reception Party



Lunch time lecture



Display panel- Lunch time lecture -



Toho Bank Ltd.
Action for the revival



IHI Co.
Correspondence and lesson to an earthquake disaster



Soma Kyodo Power Company Ltd.
The damage situation at the time of the earthquake disaster of Shinchi power station and the revival situation



FRESCO Kikuchi Co.
Messages from a visitor



El Sistema Japan
State of the activity



Foundation for Global Children
Support activity or radiation briefing session



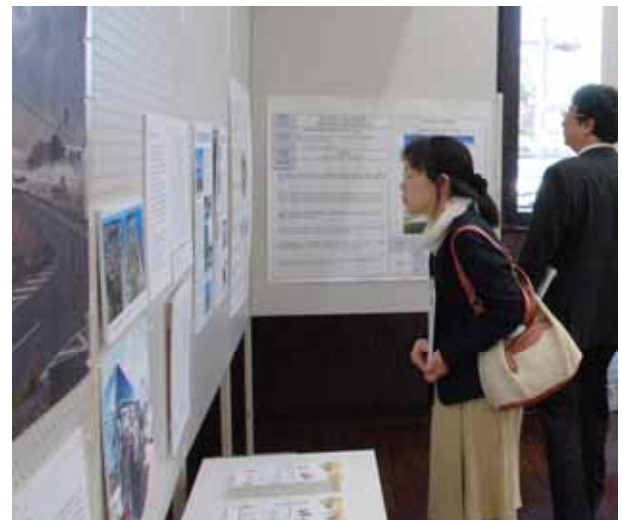
Tokyo University of Agriculture
Soma (TUA) method of salt removal from flooded land, The radioactivity measurement every rice field



Soma Fisheries Cooperative
Fishing trial; The present situation



Soma City
The damage situation and the revival situation



Minamisoma City
Earthquake disaster-related document, introduction of the revival allied enterprise



Shinchi Town
The damaged situation, reconstruction contracts



Iitate Village
Record magazine after the disaster, Trend of the village after the disaster

International symposium on disaster management and recovery
for children and communities 2016
-History of the five years of the Soma Area-

Record magazine

Publication: Executive committee of International Symposium on Disaster
Management and Recovery for Children and Communities

Address Kitamachi 63-3 Nakamura, Soma City,
Fukushima 976-8602, Japan
(Soma Area Council of Local Governments)

TEL 0244-35-4021

FAX 0244-36-8932

E-mail symposium.soma.area@gmail.com

HP <http://www.soma-area4.jp/symposium.html>