# To Protect the Health of the Second and Third Generation Atomic Bomb Survivors and Future Generations

# Report on the Results of the Health Study Questionnaire for the Second and Third Generation Atomic Bomb Survivors



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Note: Please see the Appendix for a list of free text responses in Japanese, but it is not translated into English because the English content is already available.

#### Introduction

#### Acknowledgement of survey respondents

We are pleased to present to you the report of the "Second and Third Generations Health Study Questionnaire" conducted by the Kyoto Association of Second and Third Generation Atomic Bomb Survivors. We hope that this survey will help us to better understand what is happening to us, the second and third generation Atomic Bomb survivors, and to get as close as possible to the truth about the harm caused by Atomic Bomb radiation, especially the hereditary effects, and to find more definitive answers to our fears, in order to protect our own health and that of our children, grandchildren, and future generations.

The request for cooperation in filling out the survey began in April 2020 and continued until 2023. There was a period of difficulty due to the spread of the new coronavirus, but through it all, we have received responses from 110 people to date. We would like to express our sincere gratitude to all those who cooperated.

Within the Kyoto Association of Second and Third Generation Atomic Bomb Survivors, we have organized a team to compile, analyze, and report on the questionnaires and have been working on the preparation of this report. We have been particularly overwhelmed by the quantity and depth of the open-ended statements received from many of them, and we have made a great effort to thoroughly read them and to clarify the reality of the second-generation Atomic Bomb Survivors from them.

We hope that this report will reach not only all those who responded to our survey, but also all Second and Third Generation Atomic Bomb Survivors throughout Japan, as well as all other nuclear victims abroad, and many other kind-hearted people. Our survey is intended to contribute to the betterment of the lives, health, and livelihoods of those who have suffered the hereditary effects of the atomic bomb radiation in Hiroshima and Nagasaki. In addition, we hope that it will help us to get closer to the truth of the harm caused by radiation exposure, especially the hereditary effects, for the sake of all those who suffer from illness or harm caused by radiation, both in Japan and abroad.

#### January 2024

Kyoto Association of Second and Third Generation Atomic Bomb Survivors

# Summary of the "Health Study Questionnaire for the Second and Third Generations Atomic Bomb Survivors" by the Kyoto Association of Second and Third Generation Atomic Bomb Survivors

# 1. Survey period: April 2020 - August 2023

# 2. Survey methodology

(1) Members of the Kyoto Association of Second and Third Generation Atomic Bomb Survivors mainly asked Second and Third Generation Atomic Bomb Survivors whom they knew through their own connections to cooperate in person or mail in filling out the survey questionnaires.

(2) In some cases, we interviewed them directly and transcribed their responses.

(3) Although most of the respondents were residents of Kyoto Prefecture, there were also some areas that requested cooperation in an organized manner, such as the Okayama Association of Second and Third Generation Atomic Bomb Survivors and the Second and Third Generation Branch of Kanagawa Atomic Bomb Sufferers Association., and the number of respondents came from throughout Japan.

# 3. Number and breakdown of respondents

(1) The total number of respondents is 110. (As of December 1, 2023).

\* 102 of them are second generation and 8 are third generation.

\* This report is limited to 102 second-generation Atomic Bomb survivors and excludes third-generation Atomic Bomb survivors. The number of third-generation Atomic Bomb survivors was extremely small, so we decided that it was not appropriate to include them in the report. The third-generation Atomic Bomb survivors will be the subject of a future report.

(2) Gender of the respondents who are second-generation Atomic Bomb survivors

\* Male 41, Female 59, Gender unknown 2

(3) Average age and age distribution of second-generation Atomic Bomb survivors

\* Average age. Male: 66.7 years old, Female: 66.1 years old,

Total: 66.3 years old

\* Age distribution

Under 50 years old: 3 50s: 18 respondents 60-64 years old: 16 respondents 65-69 years old: 22 persons 70-74 years old: 32 persons 74 years old and over: 9 persons

#### Chapter I. Second-generation Atomic Bomb survivors as seen in response data

#### 1. Percentage of those who have not experienced health problems

In this survey, we asked the respondents whether they had experienced any health problems such as in the life of Seishi Morikawa (a second-generation Atomic Bomb survivor living in Kanagawa Prefecture), and asked them to describe their actual health problems. As a result, 32 of the respondents (31.3%) did not have any experiences that could be called health problems, regardless of the method or answers. (This is the percentage of those who have lived lives up till now in good health without suffering from any major illness or serious health problems.

# 2. From Seishi Morikawa's book "Toward a Nuclear-Free Future: Message from a Second-Generation Atomic Bomb Victim "

From the book "-Toward a Nuclear-Free Future: Message from a Second-Generation Atomic Bomb Victim" (2018, Gendai Shokan) written by Seishi Morikawa, we excerpted and listed the health problems he has experienced in his life up till now and asked people who have had the same experiences to check the list.

The results are as follows.

We underlined health problems that relatively many people experienced the same as Mr. Morikawa.

* Underweight at birth.	3 people	
* Often had unexplained fevers as a child.	7 people	
* Was near death many times as a child.	3 people	
* When I was in elementary school, I was always sick in the summer because of the heat.	11 people	
* When I was in elementary school, I had stomach aches and diarrhea in the summer.	10 people	
* Ever since I can remember, I have always felt sick in some way.	6 people	
* A daily feeling of indescribable lethargy, weakness, and tiredness.	14 people	
* Whenever I caught a cold, it was always complicated by a high fever, cough, or phlegm.	12 people	
* Whenever I caught a cold, I also had acute bronchitis.	8 people	
* I often fell or injured myself by misjudging distances, etc.	5 people	
*I had a weak eye.	1 person	
* When I was injured as a child, wounds did not heal well and pus accumulated, causing inflammation.	22 people	
* I had tendonitis in my fingers, commonly known as spring toe, etc. (5th grade to junior high school)	7 people	
* Sensitive to light, sometimes felt dazzled or dizzy. (High school students, when studying for entrance examinations)		
	8 people	
Glare became so intense that I felt sharp objects poking me in the back of my head from between my eyes or		
eyebrows.	2 people	
* I suffered from diarrhea accompanied by abdominal pain from as far back as I can remember until now.		
	21people	
* I sometimes became incontinent.	4 people	
* I developed facial pain at the age of 17 and have continued to suffer from it since entering college.	4 people	
* After getting a job, I was attacked by unexplained symptoms one after another.	1 person	
* I had a sudden attack of vertigo.	5 people	
* My eyes became blurry and unfocused.	5 people	
* I woke up in the morning and had a severe runny nose that wouldn't stop.		
	5 people	

* Chlorella relieved my symptoms.	1 person
* Glasses were difficult to wear due to facial pain and tried to wear contact lenses, but the pain made it impossible.	
	1 person
* I had an irregular heartbeat.	5 people
* I sometimes felt dizzy and had greasy sweats on my forehead and other parts of my body.	2 people
* I had back pain.	4 people
* Worsened internal hemorrhoids.	1 person
* Underwent surgery to remove internal hemorrhoids.	1 people
* Pregnancies were still born or miscarried.	6 people
* I lost my voice.	1 person
* I had chronic pharyngitis.	2 people
* I had sinusitis.	13 people
* Suffered from posterior rhinorrhea.	5 people
* My health problems increased after I turned 60 years of age.	4 people
* I developed hay fever.	6 people
* I developed hay fever after the age of 60.	6 people
* I have bronchial asthma.	9 people
* Coughing for as long as 3-10 minutes.	5 people
* My hands and feet suddenly became cold.	9 people
* My heart suddenly starts beating faster and I feel like my pulse skips a beat.	1 person
* I get up to go to the bathroom due to frequent urination or a feeling of residual urine.	6 people
* Diagnosed with autonomic nervous system disorder.	3 people
* Numbness or other discomfort in the sole of the foot.	7 people
* Herniated disc.	8 people

Many people share the experience of being frail, tired easily, and often ill since childhood. In addition, once they catch a cold, it is difficult for them to recover, and many people's conditions become complicated and even develop acute bronchitis. When injured, wounds are difficult to heal and become inflamed with pus, and severe diarrhea symptoms with abdominal pain are also common symptoms of many people.

These symptoms are not limited to childhood, but are serious enough to continue as a serious affliction into adulthood.

# 3. Second-generation Atomic Bomb survivors who experienced health problems from the list of 11 illnesses that are a criteria to get the health care allowance allotted for Atomic Bomb survivors

The "health care allowance" stipulated in the Atomic Bomb Survivors Relief Law is paid to Atomic Bomb survivors suffering from the following 11 disabling illnesses. We asked the second-generation survivors whether or not they had suffered from these 11 disabling illnesses as well.

The results of the responses are as follows

- \* Hematopoietic dysfunction: 9 people
  - Aplastic anemia, thrombocytopenia, leukopenia, iron deficiency anemia, other anemias
- \* Liver dysfunction: 3 people
  - Chronic hepatitis, cirrhosis, etc., excluding alcoholic and viral
- \* Cell proliferation dysfunction: 13 people
  - Malignant neoplasms of all sites (cancer, leukemia, etc.)

Only benign brain tumors may be recognized

\* Endocrine gland dysfunction: 18 people

Diabetes, hypothyroidism, goiter, hyperthyroidism

\* Cerebrovascular disorders: 6 people

Cerebral hemorrhage, subarachnoid hemorrhage, cerebral infarction, etc.

\* Cardiovascular dysfunction: 9 people

Hypertensive heart disease, chronic ischemic heart disease, myocardial infarction, etc.

\* Renal dysfunction: 6 people

Chronic nephritis, nephrotic syndrome, etc.

- \* Visual dysfunction due to lens opacity: 17 people Only cataracts excluding congenital and diabetic
- \* Respiratory dysfunction: 0

Emphysema, pulmonary fibrosis, chronic interstitial pneumonia, etc.

- \* Musculoskeletal dysfunction: 8 people Osteoarthritis, osteoarthritis, osteoporosis, etc.
- \* Digestive organ dysfunction due to ulcer: 8 people Gastric ulcer, duodenal ulcer, ulcerative colitis, etc.

With the exception of respiratory dysfunction, all of the diseases with disabilities also affected the second-generation Atomic Bomb survivors. In particular, a significantly high number of Atomic Bomb survivors experienced cell growth dysfunction (cancer, leukemia, etc.), endocrine gland dysfunction (diabetes, hypothyroidism, etc.), and visual dysfunction due to lens opacity (cataracts).

# Chapter II: Second-generation Atomic Bomb survivors' characteristics as discovered by open-ended responses: What has happened to fellow second-generation Atomic Bomb survivors

### Introduction

In this questionnaire, we listed the various experiences and symptoms described by Seishi Morikawa in his writings and asked respondents if s/he had any similar experiences. We showed in Chapter I.2 that many people have had similar experiences, and many more have written frankly about what happened with their own bodies. Here are some of the complaints of these fellow second-generation Atomic Bomb survivors. We have summarized the physical symptoms they have been suffering from according to their characteristics, and chose specific examples of these symptoms from the questionnaires.

We would like to emphasize, however, that what we have written here is only what was described in our questionnaire, and does not represent everything that is happening to the second-generation Atomic Bomb survivors.

One of the reasons is that this is the first time we have conducted such a survey, so we have used the examples given by Seishi Morikawa as a basis, but naturally, we have not included any symptoms that have not occurred to him. In particular, since Mr. Morikawa is a man, there are no examples of women's experiences. There is no published case study of a female second-generation Atomic Bomb survivor that resembles Mr. Morikawa's experience. This is a major limitation.

More importantly, socially speaking, the survey is in its early stages, and second-generation Atomic Bomb survivors are only now beginning to reflect on their own lives, so it is still in the process of evolving. In fact, some of them, after completing the survey, have been rewriting it after being reminded of new facts through discussion and exposure to the results of others' surveys.

Some of them were things that had happened to them that they had not previously connected to the atomic bombing, but now they could see that they must have been affected in other ways by the atomic bombing as well.

This has led to the content of the answers going beyond Mr. Morikawa's account of his experiences. A prominent example of this is the issue surrounding teeth. In the questionnaire, many respondents wrote that their teeth were weak and fell out one after another, such as "I got full dentures in my 50s.

In fact, Mr. Morikawa had experienced this point as well, but it was not mentioned much in the book, and therefore was not included in our survey questions. However, many of the responses indicated this point, and people who learned about it rewrote or added to their questionnaires.

Please understand that this survey project is a work in progress. In this respect, the questionnaire is a product of our awareness of what it means to be a second-generation Atomic Bomb survivor and our efforts to establish our identity.

In this regard, I would like to ask all second-generation Atomic Bomb survivors, especially those who are reading this report, to read this report and participate in the survey as you positively accept your identity as a second-generation Atomic Bomb survivor, to establish your identity, and to grasp the process of overcoming difficulties and have a good quality of life together with your fellow survivors in the face of the various afflictions. I would like you to know that your participation in the survey is also a process of accepting and establishing your identity as a second-generation Atomic Bomb survivor, having a good quality of life with your fellow survivors by overcoming the difficulties of the various afflictions. This positive momentum is the identity we want to establish as second-generation Atomic Bomb survivors.

With these points as a preface, I would like to describe in detail what has happened to second-generation Atomic Bomb survivors.

Here are some of the items

- (1) I was weak, tired easily and suffered from various problems 9
- (2) Easily tired and often went to bed and rested a lot 9
- (3) A lot of anemia and often collapsed 10
- (4) Suffered from leg and joint pains 11
- (5) Vulnerable in summer, winter, and seasonal changes 11
- (6) Sensitivity to cold and hyperhidrosis 13
- (7) Easily caught colds and had difficulty recovering from them 14
- (8) Continued trouble and discomfort from sinusitis and other problems 15
- (9) Often suffered from dizziness and nausea 16
- (10) Easily injured and difficult to heal 17
- (11) Weak stomach and intestines, and had many troubles such as severe diarrhea 18
- (12) Had dental problems 19
- (13) Weak eyesight and extreme glare sensitivity 20
- (14) Trouble with heart, kidney, etc. 21
- (15) Suffered from cancer and benign tumors 22
- (16) Suffered a brain infarction and its aftereffects, as well as mental illness 23
- (17) Symptoms of "sudden immobility" 24
- (18) What have they been feeling as a result of these problems? 25
- (19) What were the positives of doing the survey in this situation? 25
- (20) What they have done to improve their illnesses, symptoms, and constitutions and to manage their health 26

1. I was weak, tired easily and suffered from various problems

I would like to start with a brief description of what many of my fellow survivors have experienced.

Generally speaking, they were weak, tired easily and suffered from injuries and colds easily. They have also had a hard time recovering from their injuries and illnesses and have suffered from various problems.

In more serious cases, they have had problems with their heart, liver, and kidneys, and have also suffered from cancer and benign tumors.

In addition, there are cases where parents and siblings also have had various problems, and some of the siblings were still born or were miscarriages. These problems have affected their families and childhoods in various ways.

Of course, about 30% of the respondents did not have any of these experiences and were in good health, and there are differences in the intensity of symptoms, the age of onset, and whether they experienced a few or many.

However, when we put many testimonies together, we can see various commonalities. We will go into specific examples below.

## 2. Easily tired and often went to bed and rested a lot

# For example, there is this description.

"When I was a child, I attended daycare for about six months. The rest of the days I rested a lot."

"I rarely attended kindergarten and often slept at home, side by side with my younger brother (3 years younger) due to bronchitis. Until the third grade of elementary school, I got sick easily and went to the nurse's office."

"I was taken to a chiropractic massage because I was too weak to eat. I went to a chiropractic massage because I was unable to throw well after injuring my elbow playing softball. It took me two to three years to recover, so I quit playing softball. I couldn't even do one pull up in P.E. class tests when I was a sixth grader.".

"I still sleep a lot, eight to nine hours a night. I sleep soundly. If I cut back on sleep because I'm busy, I collapse instantly."

"I was always sick in bed with colds, tired easily, and went to the nurse's office at school frequently. The same as when I was growing up."

"When I was in elementary school, I was more tired than other children after running around outside, so I often had to lie down and rest. I always went to bed after sports events and field trips."

"In junior high and high school, I would fall asleep as soon as I got home from school."

## Many of these problems have continued into adulthood.

"I wonder if there is ever a time when I don't feel sick and am perfectly healthy."

- "I think it is the extreme tiredness that has plagued me for a long time, from puberty to adulthood, when I started working and into retirement, because I lacked the physical strength of a normal person, I worked long hours in the workplace due to personnel transfers every three years, and sometimes had to take public transportation to and from work, which made me sick or seriously ill and required hospitalization."
- "In my teens, I was fine, but from the age of 22 to around 30, I was just very tired and felt heavy. It was hard. But that was normal, so I didn't think much of it."
- "When I get tired, I just fall asleep. When I am tired, I sleep as if I had fainted. Sometimes I couldn't get out of bed for a week. I don't have any perseverance."

Some people also said that they were not good at exercise because of weak stamina and physical strength.

Others say that they were not in good physical condition to begin with and only observed physical education.

Some of the students said that they could not do pull-ups or pull overs because of their weak stamina, physical strength, and endurance.

"I am not good at running, and I hate PE. (I hate physical education, but I never skip it.)"

- "I sometimes got so tired in P.E. class that I couldn't keep up with the class. I couldn't continue in athletics, so I switched from one club to another and ended up in the flower arrangement club. I felt short of breath when I walked up hills and stairs. I thought that was normal."
- "I continued to only watch P.E. class in elementary and junior high school."
- "Before the summer of my fifth grade, I was miserable because I could not go to the pool all summer because the scar from my BCG vaccination had not closed up."
- "In the third and fourth grades of elementary school, I developed seizures and took medication for about 10 years. In elementary and junior high school, I only observed P.E. class."

# There were other descriptions of their inability to do pull overs. In some cases, the joints at the base of the fingers could not be bent.

### Some said that these symptoms occur when high levels of stress are felt.

- "I had gastroenteritis and hyperventilation when I feel a lot of stress, but I didn't go to a particular hospital and just let it pass me by. The strange and sudden loss of physical balance and illness has been increasing over the years."
- "From 18 to my late twenties, I felt sluggish, my stomach was heavy, and I was vomiting. I couldn't move, and there was always one time a year when I took a leave of absence from work. People around me once suspected that I was pregnant. After about two days of rest, I would recover and feel fine. This was a symptom I had in my 20s that I felt was recurring,"
- "In my thirties, I began to miss work due to colds. I could not get well only by resting on weekends. If I was feeling well, nothing happened, and on my days off I would go running or swimming as a means of making up for my usual lack of exercise, but gradually I began to feel tired."

#### One person also said that he never had much appetite. This is also associated with gastrointestinal problems.

- "In kindergarten and elementary school, I had a poor appetite and took a long time to eat (1 to 2 hours per meal). I often couldn't finish my school lunch, and I always brought home leftover bread."
- "I always had an upset stomach, lacked energy, and was constipated. I ate less lunch than others, could not eat a lot, and had vivid memories of crying in kindergarten."

This peculiar tiredness and sleeping fitfully were known in Hiroshima and Nagasaki as "Atomic Bomb Bura Bura Disease. It was a discriminatory term against Atomic Bomb survivors by those who did not understand such suffering. The term implied that "s/he is always hanging around and skipping work. S/he causes a lot of trouble."

The term "Bura Bura means lethargic and lacking in motivation.

Since there were no physical symptoms such as keloids or other visible disabilities characteristic of Atomic Bomb victims, they were often misunderstood as "lazy," and they were often subjected to unreasonable abuse.

#### 3. A lot of anemia and often collapsed

In addition to the above, several students had times where they collapsed due to anemia after not being able to stand it for a long period of time during morning assemblies at school.

- "I am very sensitive to heat, direct sunlight, and ultraviolet rays, which causes headaches and chest pains. I also suffered from heat stroke."
- "When I was in elementary school, I often felt sick when I had to stand upright during morning assemblies."
- "When I stood for long periods of time during morning assemblies, my lower back and stomach would get very painful."
- "From elementary school to high school, I often collapsed from anemia during morning assemblies and was taken to the infirmary. I sometimes collapsed on the way to school and was taken to the hospital by ambulance several times. I was terrified of getting

on the train. I was especially afraid of riding the crowded trains to high school, as I often had to go to the restroom on the way to school. In the worst cases, I vomited because of anemia, and several times I would lose consciousness and find myself in the hospital."

"Until I was about 20 years old, I was constantly in the hospital for hypochromic anemia, autonomic imbalance, etc."

## 4. Suffered from leg and joint pains

#### The respondents had the following experience when they were children.

"I spent a lot of time crying on the way to school because my legs would get sore or sluggish."

"When I was in elementary school, I cried because my legs felt abnormally sluggish on nights when I exercised."

"Maybe around the time I was in the first grade, on my way to school, my legs hurt so much that I couldn't walk."

#### When they walked, their legs hurt and they "cried" because of the pain.

- "I have had severe joint pain since I was a child, and whenever I walked long distances, such as on field trips in kindergarten, I would have unexplained pain from the hip joint down, which continued as I got older, and to this day I have always had joint pain."
- "I was recently invited to go on a city walk. 2 days later, my right leg hurt so much that I couldn't even stand up. I stopped for a bit and then walked again, but I was told that my spine was very crooked. The pain continues to this day."
- "In my teens to my 20s I often went to an orthopedist for arthritis (limbs), but the cause was unknown. I often had fevers and thought it was just my constitution."
- "When I was 4 or 5 years old, I fractured my right clavicle from a slight impact from a fall while playing inside my house, etc. Since my 20s, I have experienced fractures of my left clavicle, right humerus, and fingers several times, even though the impact was not necessarily severe, such as falls and bruises. I am prone to fractures in my fingers, multiple ligament injuries, including instep injuries."
- "I was born with a dislocated hip. I had many ankle sprains. I played volleyball\* and often twisted my ankle until about age 10. I tripped a lot since I was little."
- \*volleyball: according to the Japanese text, this can be interpreted as either *ballet* or *volleyball*.
- "As for facial pain, my face was numb at times. I had severe pain in my legs. I also had pain in my hands while I was sleeping. I would suddenly get intense pain even when I was sitting up. It really hurts. It comes suddenly. As for intercostal neuralgia, when it hurts, I can't breathe. This continued until the seventh grade."
- "When I was in my fifties, I happened to measure my bone density, and it was low, at the level of osteoporosis. Until now, I have had four rib fractures and one patella fracture."

### 5. Vulnerable in summer, winter, and seasonal changes

Many people say that the same fatigue was and still is especially painful in summer, winter, rainy season, and also during the change of seasons. They have difficulty responding to changes in their surroundings, such as changes in temperature and humidity. Some of these tendencies continue even now. Such things were written by respondents as follows:

- "Every day during the summer I suffered from nausea, dizziness, and headaches, and before it would rain, the pain was so bad I wanted to just separate my head from my body."
- "During the summer, I lost weight (3-5 kg). I became thin, had a poor appetite, and was prone to summer fatigue; I regained weight in the winter."
- "In high school, I was anxious, depressed, and sluggish in the summer."
- "Since elementary school, I felt tired easily. I lost my appetite and weight in the summer. It was the same in high school. When

the seasons changed, I had painful cold sores around my mouth."

- "I have been weak during for summer and winter since childhood, and my body does not move much. I was often told it was just my imagination, but it was really tough and I often blamed myself. I often had hypothermia, nausea, and would throw up everything I ate. I also get severe headaches. I was so anemic that I had to have injections of iron."
- "I lived at home, especially in the summer, watching the clouds move from my window. I had little experience with swimming." "Summer is hard, but rainy season is hard, too. I get tired many times more easily than other people."
- "I joined a basketball club in junior high school and played on an outdoor court, but as soon as the summer vacation started, I became so tired that I could not get up and went to bed for about a week. I felt deeply tired. I had to crawl on all fours to the bathroom to throw up."
- "In the summer, I often vomit, especially after exercising. I am prone to vomiting after summer naps."
- "I am sensitive to summer heat and sun, so I try to rest well in the summer."
- "Even recently, there are times when I feel so ill that I can barely manage to do my daily chores. Last August was especially hard, I had eight injections, IVs, medication, and hospital visits in one month. I was born in August, but I'm weak in the summer. I have a constitution similar to my father's."
- "When I was in elementary school, especially in the summer, I got tired easily, and I was easily groggy."

#### On the other hand, there are those who say they are especially weak in winter as follows:

- "I hate winter 100%. It's painful. I hate being alive. Sometimes I freeze up and can't move in winter. I feel sluggish all the time. My body is heavy. It is hard to move. I have to work hard when I move. I feel physically and mentally tired several times a year. I am a night person, so I am weak in the daytime and strong at night."
- "I am sensitive to cold. My blood test shows that my white blood cell count is low."

### Some people say it is not so much the season as the weather - it is hard before the rain as follows:

- "In the afternoon before the rain, joints in my body, especially in my lower body, started creaking and aching, and I could not stand up due to unbearable pain. I could do nothing but cry and cry. I couldn't eat anything, and I cried myself to sleep. The pain was like an invisible man coming in and squeezing all the painful joints."
- "I am sensitive to changes in atmospheric pressure, and I suffer from lethargy and headaches when the weather changes. I am more sensitive to changes in altitude than others in the mountains."
- "I heat up the room a lot in the winter and I wear heavy clothing. I get sick and sometimes faints in the summer when the air conditioning is turned up. Temperature changes can cause asthma attacks, and cold winter temperatures can cause vomiting."

# It is very sad to hear that "Joints ache and creak, and I can do nothing but cry and cry." In general, we can see that they tend to be sensitive to changes in temperature, air pressure, and humidity as follows.

"Around the age of 32, I repeatedly caught a cold during the change of seasons, etc., and went to an ENT doctor near my workplace during my lunch break. My pharynx was swollen and painful, and I could not sleep, so I cooled my neck with an ice pack (my body temperature was normal, but that area became painful)."

- "Dizziness, lightheadedness, and headaches occur with the change of climate, with occasional rain showers."
- "In the spring of my fifth year of elementary school, I began to experience periodic headaches in the back of my head on cloudy or rainy days. In September, I was diagnosed with "viral meningitis" at the Japan Red Cross Hospital and was hospitalized for two weeks. The virus in the spinal fluid decreased and I was discharged from the hospital, but the aftereffects of my characteristic headaches remained even after I started junior high school. I received acupuncture treatment to the trigeminal nerve from an acupuncturist my mother had been seeing, and I was completely cured by the time I started high school."

# 6. Sensitivity to cold and hyperhidrosis

# Cooling of the body, feeling hot, and sweating quite profusely are also commonly reported features. However, some people have all of these, while others have only one of these. The responses are as follows:

"I have had cold hands and feet since I was a child, so I appreciated menopausal hot flashes as they warmed my hands and feet."

"Since about the third grade of elementary school, winters have been cold, and my frostbite has gotten worse. Even in high school,

- I got frostbite on my feet and was often laughed at. My body temperature seems to be gradually dropping and at present, it is sometimes as low as 34 degrees Celsius."
- "I am very sensitive to air conditioning and cold. Sometimes I suddenly can't move."
- "I have always been very sensitive to the cold. Just a shower can make me very sick."
- "Habitual diarrhea, vomiting, cold hands and feet, difficulty sweating, extreme sensitivity to cold and heat, lack of stamina, it takes more time to do anything, lack of motivation to work, fear of noise and wind."

"Until the upper grades of elementary school, but especially the lower grades, I had an excessive burning sensation in my body, and my face was abnormal. "From a very young age I do not sweat much, even in summer, I am always cold and do not like winter. I am remarkably sensitive to cold."

- "I have been sensitive to cold since childhood, and my cheeks turn bright red when I suddenly go to a warmer place. My hands and feet suffered from frostbite every winter. Even now, as I get older, I can't wear skirts or light clothing. I am forever wearing thicker clothes more than others, as if there is no spring and fall and it suddenly goes from thick winter clothing to summer. It's getting worse as I get older."
- "At the age of 23, the air conditioning in my office began to cool me down, and the coldness continued until I retired at the age of 60. Now I live without air-conditioning and have no symptoms, but I get cold in places with air-conditioning."

On the other hand, they also complained of sweating a lot, either profusely or with a greasy, sticky sweat, which cools them down. They report that their clothes get soaked, and that the corridors they walk down become sticky. One person from Hiroshima reported that although it did not happen to him, many of his classmates in elementary school were second-generation Atomic Bomb survivors, and one of them had to wear sandals to school because his feet were so sweaty. The school allowed him to wear sandals to school. Here are reports.

"I sweated a lot because I played baseball. Doctor said I have more sweat glands than others."

"I had numbness, vein irritation in hands and feet, and edema easily. I had excessive sweating, and my clothes become soaked."

- "Sudden profuse sweating, palpitation, and dizziness."
- "Sweating became worse in middle age, after a hysterectomy at age 48 for uterine prolapse."
- "I perspire more than others when I move or eat."
- "My children and I sweat a lot, and people around us are always surprised in the summer."
- "I sweat a lot on my back."
- "My hands and feet are sticky and oily."
- "My feet still get sticky when I am stressed. My socks get wet and get cold. Need to change socks."
- "My feet get sticky and my socks get wet and cold. Also, I sweat a lot only on my back. It still doesn't go away. I take a bath every day. It's not that I don't sweat. I sweat only on my back, so my T-shirt gets wet."
- "People said I made the floor of the hallway sticky because of my sweaty footprints."
- "Sweat blisters often appear on palms of hands and soles of feet."

"Excessive sweating."

### 7. Easily caught colds and had difficulty recovering from them

Along with being prone to illness, another major characteristic of the disease is that it was difficult to heal. They have had colds for long periods of time. Some of them have spent a large part of the year with the common cold. Respondents replied as follows:

- "I always catch a cold at the change of season, and recovery takes a lot of time, and I used to wonder why I was the only one who caught a cold."
- "Since childhood, when I developed any disease, it was always complicated. Whenever I caught a cold, only the cough would not go away, and in the worst cases, I coughed for two to three months."
- "I had a high fever of 39 to 40 degrees Celsius once a semester from infancy to the fourth grade of elementary school, and missed nearly a week of school."
- "When I caught a cold, I lost my voice immediately and often missed school for a long time."
- "I was weak and often caught a cold, sometimes with a high fever and convulsions."
- "Every year, I would get sick after two or three days of inoculation. I often caught ordinary colds as well. I couldn't stand to be given a shot of penicillin when I had a fever."
- "In my late 40s, I began to catch colds even more easily than before, and this escalated to a series of colds eight or nine months out of the year, regardless of the season."
- "I am prone to colds, which tends to be aggravated. Fever and difficulty breathing, like an asthma attack, follow."
- "From childhood, and even now, I have always been troubled by colds, which lead to chronic bronchitis and asthma. Slight fevers last more than a week."
- "In my sophomore year of high school, I caught a cold and was unable to participate in club activities for two months. I was on intravenous fluids (nutritional supplements) because I felt unwell."
- "At the age of 36, in early spring, I began to have cold symptoms (manifested by numbress in my fingertips) and a swollen pharynx with a white membrane that tightened around the throat. I was hospitalized at a nearby general hospital because I had difficulty in speaking and walking, and also had a symptom that my breath was coming out from the right side of my chest. I was in the hospital for 10 days, but was on intravenous fluids and slept most of the time during the day."
- "When I caught a cold, I didn't get bronchitis, but as soon as I got a flu shot, I got it. I was fine when it was going around in class." "When I was a child, if I caught a cold, my throat would immediately start to get scratchy and I would have asthma-like symptoms."
- "In my late 40s, I began to catch colds more easily than before, and this escalated into a series of colds eight to nine months a year, regardless of the season."
- "I was weak and often caught colds, sometimes with high fevers and flare-ups."
- "When I was 31 years old, I went on a two-week overseas study tour with a group, but on the second day I had a sore throat and cold symptoms and had to return home in a state of shock. I had a stomach ache and cold before I left Japan, and although I had prepared medicine in advance, it was painful."
- "When I was 15 years old, I often went to the hospital in high school. In winter, I caught a cold. There was anaphylactic shock from intravenous vitamins."

#### Many report having fevers due to enlarged tonsils as follows.

- "In elementary school, my tonsils would fester and turn white and my throat would hurt. I was advised to have my tonsils removed, but I did not."
- "Since childhood, I have had bronchitis, enlarged tonsils, and frequent fevers."
- "I have had frequent fevers since childhood. I had several fevers due to tonsillitis and pneumonia. I am asthmatic and have a

weak respiratory system."

"In my childhood, I often had swollen tonsils and high fever, and was given penicillin injections."

"I remember that I had frequent fevers (caused by cold, tonsillitis, or otitis media) until I was in early elementary school. I was absent from school at least once a month until I was in the second grade of elementary school."

#### 8. Continued trouble and discomfort from sinusitis and other problems

It has been reported that the cold symptoms in the previous section can lead to bronchitis or sinusitis in a very large number of cases. Many reports have been received from those who have suffered from these conditions due to strong discomfort, such as a runny nose in the throat.

There are many reports that this has led to nosebleeds and inner ear infection media, but nosebleeds are also seen in places other than the common cold and are difficult to classify. Respondents' answers are as follows:

- "I had been suffering from headaches since I was in middle and high school, but after the age of 40 I was diagnosed with sinusitis at a hospital and underwent surgery. Since then, the headaches have resolved.!"
- "I had sinusitis until my mid-teens. I always had a stuffy nose and a pain running from the back of my nose to my eyes."

"When I catch a cold, it usually leads to sinusitis or bronchial asthma."

- "I had sinusitis, which made it difficult for me to breathe through my nose. As an adult, I became much better, but when I caught a cold, my nasal symptoms became worse, and I was prescribed antibiotics and painkillers by an otolaryngologist. My eardrums were often cut open due to inner ear infection. My tonsils swelled and I developed fever. I was in and out of the hospital until I was in junior high school."
- "I had experienced pinpoint pain in the nasal pole area about 10 years ago and again this year. Both times, without warning, the pain gradually intensified and became intense within minutes. The pain subsided with the help of painkillers. Tinnitus has also been frequent in my adult life."
- "Nosebleeds were frequent. Nosebleeds came out in torrents when I was studying, for example. I used to get nosebleeds all the time until high school. I had chronic sinusitis, so I had surgery during the spring break between my second and third year of high school. Since then, it has stopped."
- "I had a runny nose in elementary, junior high, and high school. Now, my nose runs down my throat and my nose doesn't run. Then, no matter how many times I swallow, I always feel as if there is something in my throat."
- "On winter nights, my throat seems to have narrowed, and I often coughs because I feel it is difficult to pass saliva. I often have a sore throat, and I think it is postnasal drip. It continues to this day."
- "My father and the rest of my family often get ears and nose, infections and when they catch a cold, they immediately get middle ear infection. I also suffer from sinusitis several times each year."
- "Sinusitis causes me to lose all sense of taste and smell, which is often cured with the use of medication."
- "Sinusitis has worsened over the past few years, sometimes with fever. I repeatedly get tonsillitis."
- "The mucous membrane of the nose is inflamed, but there is no allergen. The nasal inflammation has become chronic."
- "In junior high school, there was a period when nosebleeds came out of nowhere so profusely that I could not go outside."
- "The nosebleeds didn't stop even when I was in junior high school. Every morning for one to two hours, I would bleed so much that the sink would turn red. Before starting high school, the bleeding stopped after the blood vessels in my nose were cauterized."
- "Nosebleeds have been an everyday occurrence since I was a kid. I was anemic and had low blood pressure. My anemia was cured after taking a blood booster when I was pregnant. My blood pressure is still low and my max blood pressure is around 85-95."
- "My father and I had rhinitis. When we woke up in the morning, we would sniff and sniff. But I got over it after I changed my diet."
- "Whenever I caught a cold, it usually turned into a complicated sinusitis, with yellow mucus coming out of my nose."

"I had allergic sinusitis and sinusitis as a child, and in my 50s, I had a taste disorder caused by sinusitis for about 10 years, which improved with Chinese herbal medicine."

# 9. Often suffered from dizziness and nausea

# Many people experience dizziness that makes their head spin, nausea that leads to dizziness, and headaches. They replied as follows:

- "I started feeling lightheaded and nauseous when I was in high school, and I got some relief when I was treated for orthostatic hypotension at hospital before I was 40 years old."
- "For a brief moment, my vision was distorted. I don't know if you can understand my analogy of it being like the old days when the voltage on TV would drop for a moment and then disappear. Abdominal pain and tinnitus are frequent, but not so frequent that I can't function on a daily basis."
- "When I was about 40 years old, I developed subacute thyroiditis, which put me out of work for about six months. I also suffered from autonomic dysfunction and was so dizzy that I was out of work for about a month."
- "Dizziness, headaches, and dizziness have always been severe. I have always had dizziness, headaches, and orthostatic hypotension from when I was a child until now."
- "When watching movies in the dark with blackout curtains, I felt dizzy and very sick, and also vomiting. For this reason, I used to play alone in the schoolyard during movie time."
- "I suffered from motion sickness on buses, etc., and felt very sick and vomited without fail. Whenever I went on a bus trip, I would take anti-sickness medicine in advance and take every precaution to prepare for the trip."
- "When I was in my thirties, I had trouble getting up due to dizziness after a long period of sleep deprivation. I crawled to the bathroom because the ceiling was spinning around, and I was vomiting when I walked. When I was in my 40s, I suddenly felt dizzy and lost my sense of balance while working, and had to take two days off work. I had dizziness twice after that, but it went away spontaneously after physical therapy and other treatments. However, I developed an irregular heartbeat, probably due to stress."
- "I have suffered from motion sickness since I was a child, and I was unable to take buses, trains, or boats. When I participated in a high school excursion, I was overly anxious, so I took too much anti-sickness medication and have no recollection of any of the pictures."
- "When I was overworked, I was diagnosed with rotational vertigo and herpes encephalitis (viral herpes infection of the brain), for which I took medication."
- "Sometimes everything I see turns white, and after a while it goes back to normal. This was frequent as a child, but has not bothered me since I was 40."
- "For the past two to three years, I have suffered from tinnitus and occasional vertigo."
- "I have suffered from migraines since about the eighth grade and still have them occasionally."
- "I have been diagnosed with migraines and tension headaches after a visit to the doctor because of recurring headaches."
- "In adulthood, I often vomit, which is related to my blood pressure. My blood pressure is low to begin with (60/90) and when it drops further, I tend to vomit. Vomiting is common in summer, especially after exercise. I am prone to vomiting after summer naps. When I injured finger and bled, my blood pressure drops and I tend to vomit."
- "No abdominal pain or diarrhea. I had mouth ulcers probably because I vomited often until I was in my thirties. When I was little, if I got a little sick, I would get two or three mouth ulcers and they would be connected. I got carsick a lot, and a Chinese medicine doctor once told me that my blood volume was low."
- "When I was a child, I got carsick even more than I got dizzy, and I often felt nauseous as soon as I got in the car."
- "I used to throw up a lot when I was a child. I often had a fever, and the hospital was like my friend."
- "I was at work when suddenly my mind went blank and I wondered what I was doing. Also, my poor physical condition lasted

for some time, and during that time, I felt something strange in my right ear and found a hole in my eardrum. My throat and nose were always weak."

- "I used to throw up a lot when I was a child (around elementary school age). I also suffered from motion sickness. Even in summer, I broke out in hives when I went to the swimming pool. My feet got cold., and sunlight caused headaches and nausea."
- "When I was in elementary school, especially in the summer, I had a headache all the time, so much so that I don't know what it was like not to be in pain."

#### 10. Easily injured and difficult to heal

#### There are many reports of injuries that are difficult to heal and that remain infected for a long time as follows:

"Mosquito bites cause abnormal swelling."

- "When I was in the lower grades of elementary school, in the summer, mosquito bites would get infected, and I would put medicine on them, gauze, band-aids, and I think I could have done it myself. I used to fall down a lot and my knees would be covered with scars, and my grandmother had to remove the gravel in front of our house."
- "My wounds would fester and not heal well. Even when a scab formed, it was soggy underneath."
- "The scars tended to fester and become keloid-like. Reddish-purple spots often appeared and disappeared on my legs as a child and later as an adult."
- "Injuries and insect bites swell, fester, and blister and do not heal well."
- "When I was a child, my wounds easily suppurated. When I had wounds, they were difficult to heal and often filled with white pus. As a child, I had a keloid scar from a cut I got from glass."
- "Burns and frostbite scars were persistently soggy, and the scars do not heal well. Mosquito bite scars remain until winter, and I was often asked, 'Why do you have so many scars?' I wondered why others didn't."

#### Some people have continued to worry that they may have hurt their mothers in this way.

"When I was in elementary school, my wound festered and I developed a fever. I hated having the pus drained out of me after dinner, and I hated my mother for giving birth to a child with such a constitution, and there were times when I spoke out. (I tried to apologize, but my mother had already passed away.)"

#### On the other hand, some say these symptoms are starting to occur again.

"I have the symptoms from when I was a child again. When I get burned from oil splattering on me, it becomes a serious wound and hurts. The wound has been sore for about a month. The skin's ability to regenerate wounds has deteriorated." Because of this difficulty to heal wounds, some people are wary of mosquito bites in the summer. This is because if they accidentally scratch the wound, it will become infected and remain scarred for a long time.

- "When I was 20, I had surgery for a torn ankle ligament, and when I took the cast off a month later, the skin of my leg was rotting and the bone was visible. I continued treatment, and two years later the wound was closed, albeit with an ugly scar."
- "Often when I am bitten by an insect, the wound becomes infected. This has been happening since childhood and continues to be difficult to heal."
- "In junior high school, I had a skin disease that wouldn't heal for months." In high school, I had shingles that wouldn't heal."
- "I have always had difficulty in healing wounds from injuries since I was a child. I rarely get injured anymore, but even bumping slightly into an object would cause my skin to turn blue and bleed internally."
- "If scratches and abrasions are left untreated, they fester and continue to do so to this day. After my appendectomy, the stitches weren't absorbed and the site festered, and I had to have surgery again six months later."
- "I have awful memories of my nosebleeds, which were difficult to stop when they started. Not only nosebleeds, but also

bleeding was difficult to stop, so I had to be careful not to injure myself."

"Whenever I got hurt, I was left with a raised bruise like a keloid."

"Whenever I fell and scraped my knee or other parts of my body, it would fester and I would have to see a surgeon."

"As a child, I was prone to nosebleeds."

#### 11. Weak stomach and intestines, and had many troubles such as severe diarrhea

# Many of them have weak stomachs. Some of them have sad memories of diarrhea suddenly starting after school and being incontinent because they could not make it to the bathroom in time. Many of them continue to suffer from diarrhea even after they reach adulthood, and many of them still have problems. They wrote as follows:

"I have had abdominal pain and diarrhea since I was a child, and it continues to this day."

"Abdominal pain and diarrhea are more pronounced in adults. Icy water or undercooked meat causes severe abdominal pain and diarrhea, which goes away when I excrete."

"I often had stomach problems and diarrhea was a common occurrence. I had trouble as I would soil my underwear at times."

"In the third and fourth grade of elementary school, I had intestinal inflammation, so I couldn't eat school lunch."

"I suffered from constipation when I was a child, but it improved when I changed my diet. However, I still suffer from diarrhea from time to time."

"I have had a weak stomach since high school and have had stomach ulcers many times."

"I have autonomic nervous system disorder and suffer from severe abdominal pain several times a year."

"I suffered from diarrhea and severe abdominal pain since I was a small child."

- "I had severe diarrhea and vomiting until the age of 56. When I went to see the doctor a few years ago, I had constipation and started taking medication to soften my stools and it finally passed out. The colonoscopy also showed evidence of small intestinal ischemia. There were also benign polyps in the colon."
- "I was born prematurely. I was not allowed to eat any raw food such as sashimi when I was a child because I would get sick immediately. Even as an adult, I never tasted sashimi."
- "I have had a weak stomach since I was a child, suffering from diarrhea and abdominal pain, and had to go to the bathroom frequently. I was afraid to go on business trips and travel, preferring to work long hours in the building (where I could go to the bathroom quickly) and to travel on trains with a toilet (Tokaido Line)."
- "Chronic constipation. They were separate hard lumps and my mother said she rarely had to change diapers. It was cured after I started eating brown rice. Without brown rice, my stools quickly become hard and I became constipated easily. When I was 21 years old, I was hospitalized for acute intestinal infection. I was given medicine, but I did not recover I went to a large hospital and was hospitalized immediately. The entire intestinal wall was bleeding. When I went to the bathroom, bright red blood came out."
- "I had a weak stomach and suffered from diarrhea frequently. When I was born, I had a disease called congenital esophageal atresia. My esophagus and stomach were not connected and were blocked in the middle. I had surgery when I was two weeks old."
- "I was trying to build up my physical strength, but my stomach was weak and I had a lot of diarrhea, and I often collapsed during school assemblies due to anemia."
- "When I was in elementary and junior high school, I had diarrhea easily."
- "I always had an upset stomach, lacked strength, and was constipated. I ate less school lunch than others and could not eat a lot of food. I have vivid memories of crying in kindergarten."
- "I had intestinal inflammation in the third and fourth grade of elementary school. I suffered from low-grade fever, headache, stomach pain, pain in the arms and legs, dizziness, and nausea. I would throw up food. Intestinal inflammation is a condition in which inflammation of the intestinal mucosa results in poor digestion."

- "I suffered from constipation when I was a child, but it improved when I changed my diet. However, I have diarrhea from time to time."
- "When I was a preschooler, I often had abdominal pain, which was diagnosed by a pediatrician and treated with penicillin injections."

## Some of them have had the following experiences.

One of them had this experience: "Acute diarrhea began to appear in the upper grades of elementary school (due to a quarrel between the parents). My father was not in good health and tended to take time off from farm work, and my mother often became hysterical, screaming and yelling, and as soon as I heard her voice, I had a sudden urge to go to the toilet." The fact that the diarrhea was triggered by the mother's "hysterical screeching" at the father is another double whammy. The father probably had symptoms of "diminished capacity". He was unable to work continuously, so it was often a constant struggle to make ends meet, which was probably the cause of the mother's "screeching". This was triggering the diarrhea...a tragic experience.

## Some people's lives were in danger.

- "When I was 60 years old, I suddenly developed abdominal pain, diarrhea and vomiting due to severe pain, and was taken to the emergency room at night. I underwent emergency surgery immediately. I was diagnosed with intestinal obstruction, the cause of which was unknown. If I had gone a few minutes later, I might have lost my life."
- "When I was 50 years old, I had an intestinal obstruction and had to have 1.5 meters of my intestine removed. I was rushed to the hospital by ambulance and would have died if I had gone to the hospital too late."

# There were also several reports of those who had undergone surgery for groin hernia as follows:

"In the sixth grade, I had surgery for a groin hernia, and at age 65 I had laparoscopic surgery for a second groin hernia. After the surgery, a urinary catheter was supposed to be removed the next day, but I was in so much pain that I couldn't stand it, so I asked my doctor to remove it that evening. After being discharged from the hospital, I still have strong pain in my lower abdomen from time to time."

## 12. Had dental problems

# Many people have also suffered from weak teeth. Some of them had full dentures in their late fifties. Others reported that their teeth came in late, or that they had to have teeth extracted because of protruding nerves."

- "At age 51, my teeth began to fall out, initially I had partial dentures; at age 56, the number of missing teeth began to increase, and eventually all teeth were extracted, forcing me to have full dentures."
- "Teething was late and I was slow to eat. I have a small mouth and am missing two adult teeth in the back."
- "My teeth are very weak. A back tooth spontaneously cracked vertically and had to be extracted."
- "Wisdom teeth were extracted at 19-21 years of age, with both lower left and right sides beginning to grow in. The upper right tooth was extracted when I was in my fifties because it started to grow in the wrong direction. The upper left tooth still remains."
- "In my late 40's, my back teeth began to hurt, and my dentist said I had a dental abscess, so he had them extracted one after the other. As a result, all four of my back teeth are gone."
- "Around the age of 21, I developed hypersensitivity and had the nerves removed from my two lower center front teeth."
- "The nerves were protruding from both canines in my lower jaw. The enamel was covering the ends of the nerves, but the

enamel was shattered, and the tooth eventually became extremely painful. I had to have it treated."

"A lower right back molar was missing. The tooth above it was filed off by the dentist."

- "Frequent onset of mouth ulcers, gingivitis, and other oral problems. Gums bleed easily. Gums bleed easily. I use toothpaste for gums and massage with a special toothbrush for gums to stop bleeding."
- "Teeth were found to have no enamel when I was a child, and they are in a terrible condition."
- "In my thirties I kept going to the dentist. I had root canal inflammation and was one step away from periostitis. Many teeth were extracted."

Incidentally, when we were designing our survey, we were not able to include teeth in the questions because they were outside the scope of our interest. However, there were a few reports on teeth, and we found that there are those among the second-generation Atomic Bomb survivors who have weak teeth.

If we had included this point in the questionnaire, we might have received many more reports. We would like to include this point in the next survey.

13. Weak eyesight and extreme glare sensitivity

Their eyesight may be poor and regarding their eyes, many reported feeling a strong sense of glare, even though no one around them was bothered by it, and also that the light would shine into their eyes with a strong impact. They also reported that their eyes were painful because of these factors as follows:

- "The sun's rays often caused me to feel glare from the sun when I was over 30 years old. Even now, the sun's rays are too strong, and sometimes it is so painful that I cannot open my eyes. I wear dark sunglasses."
- "When I was in high school, I wore my nearsighted glasses to class. Much later, when I was in my 40s, I was told I had severe astigmatism and had to wear glasses for a long time."
- "In my third year of junior high school, I did what looked like studying for the high school entrance exam, but I felt something strange in my right eye and went to see an ophthalmologist. I was diagnosed as having a much narrower field of vision."
- "As an adult, I was told I had a weak eye. I didn't notice it when I was a child. When I was a member of the baseball team, I often couldn't judge distances well and dropped a lot of balls. When I inadvertently closed my eyes when catching a batted ball, I got the ball. When I look at it, I drop it."
- "When I close my eyes, I can see an aura. It's the same now. I can see visual aura."
- "I had narrow-angle eye and retinal atrophy in my left eye when I was 64."
- "When I was in elementary school and junior high school, I often had chalazion. Also, I had surgery as an adult."
- "I had good vision but became near sighted in my 40s. Also, I was found to have astigmatism in my left eye."
- "At the age of 46, I developed a UV eye disease called pterygium or surfer's eye and had surgery on my right eye. I don't know anyone who has this disease in my workplace. Ten years later, I needed another surgery."
- "I have an inverted optic nerve in one eye (retropapillary), a cataract, and I continue to take eye drops for vision loss and visual field constriction."
- "Glare is problematic. When we took class photos, only I squinted from the bright light of the flash. Only I always frowned in a picture. Even in pictures taken outside without flash."
- "I have visual auras when I have migraine headaches. Something like a tear in my field of vision spreads from one point of vision to the entire area, sometimes making it impossible to stand. The frequency varies, maybe two to three times a month."
- "In the second year of elementary school, I was diagnosed with lazy eye (About 0.2 in both eyes)
- and wore thick glasses. At the time, there were very few elementary school students who wore glasses, so I was nicknamed 'Meganezaru' (Tarsiidae is the name and the Japanese translation means 'monkey with glasses')."
- "In the sixth grade of elementary school, my myopia became less than 0.1 in both eyes, and I switched to hard contact lenses.

For the next 52 years, I wore hard contact lenses."

- "Since I was in my fifties, every time I had a regular physical examination, and I was diagnosed with myopia. Due to my high level of myopia, there was a high possibility of retinal detachment, glaucoma, cataracts, and other diseases occurring, so I visited the ophthalmologist regularly."
- "At age 60, the ophthalmologist diagnosed a retinal tear in my left eye and I underwent retinal photocoagulation. Around this time, the symptoms of cataracts became more pronounced and began to affect my vision."
- "At the age of 63, I underwent surgery for cataracts in both eyes because the cataract symptoms were affecting my normal life. At that time, I requested to have varifocal lenses and not instead of glasses, but because of my high myopia, varifocal lenses were not suitable, so I was recommended to use single vision lenses and use glasses with them."
- "Most cataract surgeries are performed as a one-day procedure, but because of my high myopia, there was a high possibility of an complications occurring, so I was hospitalized for four days for surgery on both eyes, just to be safe. In fact, in the middle of the night on the day of surgery, I felt strong pain in my cornea, and I was urgently examined in the middle of the night, and the pain subsided. If it had been a day surgery, I would have had to call on ambulance to go to emergency room."
- "I still often bump into things or drop something when I hold it in my hand. I feel like I am not functioning properly. I haven't been able to judge distances since I was a child. My father used to scold me. I don't fall down, but my balance is a little off. I drop things and I was often scolded. I thought, "I'm doing everything right. My father was unreasonably angry with me and I was often scolded."

"When I was in elementary school, I often had eyelid cysts."

"Blood pressure became high before I was 60 years old. Until then, it was normal. My eyes became unfocused and I had to wear prism glasses. Myopia and astigmatism developed in junior high school. For the past three years, it has been getting harder and harder for me to see, and I am having trouble because I have reached the point where I cannot increase the strength of my prism glasses anymore. The ophthalmologist told me that the muscles in my right eye are contracting."

#### 14. Trouble with heart, kidney, etc.

Many have heart problems. Some were restricted from exercise as children because of this. Among the troubles, many have heart valve disease of the bicuspid aortic valve, and some have undergone surgery to cure it or to replace it with an artificial valve.

"I had a bad heart and was never able to run in the school marathon."

- "Growing up, I was told that I should not engage in strenuous exercise because I had valvular heart disease."
- "When I was in my late 60's, I was diagnosed with Mitral Regurgitation or "Leaky Valve". I am examined once a year."
- "I have a mild deformity of my heart valves."
- "I was always sluggish, sometimes feverish. When my third son was one year old, I was told he had a heart problem. 25 years later (at age 54) I knew my heart had finally given out. I was hospitalized in an emergency and underwent valve replacement surgery."

"The diseases listed by the respondents were hypertension, diabetes, cerebral infarction, renal infarction, hematoma, goiter, thymoma, myasthenia gravis, glaucoma, age-related macular degeneration, ptosis, and spinal canal stenosis."

- "When I was about 58 years old, my heart began to beat violently from time to time, and I was examined but the doctors could not give me a diagnosis because there were no abnormalities in my EKG. The cardiologist told me that I might have had a congenital vascular abnormality. Anyway, I had been told to take an EKG as soon as I felt any heart abnormality, so I rushed to the hospital and was admitted immediately. It was acute atrial fibrillation."
- "I had an abnormality in the position of my heart and although I could walk on level ground, I was short of breath on hills. I was told that no treatment was necessary at this point."
- "I weighed 1900 grams at birth. I had congenital heart valve disease, arrhythmia, anemia, palpitations, and shortness of breath all

my life. When I was 54 years old, my bicuspid aortic valve stopped working and I was rushed to the emergency room because I could not breathe. My heart temporarily stopped. At age 62, I underwent a second open heart surgery to replace the valve that had been replaced at that time with an artificial valve. The operation was successful, but I still suffer from atrial fibrillation, palpitations, shortness of breath, arrhythmia, and ventricular tachycardia."

- "I had microvascular angina at age 50. It was a coronary angina. I had a racking cough."
- "When I was five years old, I was examined for a cold and an abnormality was found in my heartbeat. Upon closer examination, it was discovered that I had a hole in the wall of my heart. The name of the disease was heart wall defect. (The diagnosis was that I would not live to be 20 years old, as it was inoperable under the medical care of the time. Five years later, I was recommended to have a hypothermic surgery, which I did when I was 10 years old. After that, my progress was good, and I began to be able to go on field trips and participate in physical education classes. I was able to run, swim, play baseball, and do all the sports I had been banned from. I was free from severe frostbite, chapped skin, chest pain, and seizures every winter. I was also free from the rigors of catheterization. I did not have any illnesses until I turned 20 years old."

#### Other than heart problems, appendectomy and kidney stones have also been reported as follows:

- "I had an appendectomy in elementary school. In junior high school, I got nephritis (inflammation of the kidneys) due to fatigue from club activities and was hospitalized for several days. When I was in college, I was hospitalized for a month with kidney stones. After that, I constantly had stones in my kidneys, and twice in my 40s I had gout, which I treated with medication for a while. After that, I passed kidney stones several times. Seven years ago, my stones would not budge, and I was hospitalized and had another operation. Ten years ago, my blood sugar level increased and I was diagnosed with diabetes."
- "I was diagnosed with nephritis in early elementary school and then in high school, but it subsided spontaneously. Symptoms were swollen face, and I had protein in my urine. I get tired easily. After excursions and athletic events, I would always lie down and go to bed. I was instructed to drink a lot of low salt water, and I was often given watermelon and ate them in the summer. I lost weight (3-5 kg) during the summer. I became skinny, lost my appetite, became easily fatigued in the summer, and regained weight in the winter. After that, I had high levels of protein in my urine. I had felt since elementary school that I was physically weak."
- "When I was 30 years old, I suddenly had bloody urine, and after an examination I was diagnosed with a kidney stones. Even after the stone was passed, the next stone appeared, causing repeated pain."

#### Impairment of liver function has also been reported in many cases as follows:

- "When I was a student and when I graduated, I was hospitalized for a little over a month with liver dysfunction. I was treated with an IV drip. I am still a carrier of hepatitis B."
- "I collapsed at work in October at age 23 because of a kidney stone. I was taken to the hospital by ambulance. My liver enzyme levels got worse, and my face turned bright yellow. I was diagnosed with acute liver failure. With treatment, the kidney stone passed very quickly."
- "I developed gallstones and had a surgery for gallbladder removal."
- "After I was born, I was diagnosed with biliary stricture, with jaundice that would not go away, and had to go to the hospital repeatedly. Doctors thought it would be difficult for me to survive until elementary school."
- "I was out of school in the fourth grade, recuperating from pleurisy and hepatitis."

#### 15. Suffered from cancer and benign tumors

#### Many reported their experiences with cancer and benign tumors.

"I am 68 years old, and my gastric cancer was discovered in November during a physical exam with a gastroscopy; I had a total

resection on December 19."

"I had breast cancer when I was 48."

"In 2008 I suddenly lost my voice, had a full examination and found I had thyroid cancer, I had surgery in 2008, but the cancer came back the next year, and I had another surgery in 2009. The cancer came back again in 2015, so I had a third surgery. The same year I underwent isotope therapy for the cancer not removed by surgery. I still have regular checkups."

"I was 44 years old and had severe abdominal pain from fibroids, but nothing was done for me. I collapsed in pain at home after about 6 months of enduring it. 5 days later I had surgery and finally found the cause of my pain. The location of my fibroid was not a bump on the outside of the uterus as the doctors had thought, but inside the wall of the uterus. I was in pain because of the peritoneal adhesions around my ovaries. Four days after my surgery, I developed an unexplained arterial rupture in my abdomen and was hospitalized for two weeks. My entire abdomen was purple and large and swollen and I thought I was going to die." "I currently have a tumor in my thyroid gland and it is getting a little bigger every year."

- "I was 64 years old, and after a follow-up for suspected prostate cancer, it was confirmed the following year. I was treated with chemotherapy, but at the age of 69, I had a prostatectomy."
- "I am 53 years old and have 4 cancerous sites. (liver, intestines, prostate, and stomach). I was diagnosed by Traditional Chinese Medicine. All of them were before stage 1. The liver was stage 1. I was feeling well for six months to a year with a thorough diet and other treatments. After that, I found a benign tumor in my chest, which started to grow because I was under a lot of stress, but I have repeatedly kept it under control by treating it."
- "I have thyroid adenoma disease."
- "I had leukopenia when I was in early elementary school. Around the same time, I had a heart murmur. "I was always stopped by the physical examination before the intramural marathon in elementary, middle, and high school and never ran the marathon."

#### 16. Having suffered a brain infarction and its aftereffects, as well as mental illness

- "I had a stroke, and the aftereffect of the stroke was depression. There was also a report of my father's mental illness."
- "I was hospitalized for 3 months in a mental hospital due to becoming depressed due to the aftereffects of the stroke. I was a morning drinker. I had tremors in my hands in the evening, but I overcame my alcoholism on my own."
- "I collapsed at work. I took my blood pressure, and the diastolic number went up to 200. It was unmeasurable. There were no aftereffects of the stroke. But I was hospitalized for two weeks for a suspected stroke. My work at the town hall became harder after that, and I collapsed again before I turned 34 in the summer. I had to drink, maybe three bottles of alcohol a day. I became an alcoholic, and I had a work accident."
- "When I was 58 years old, I had a stroke. I lost my ability to speak properly and was immediately hospitalized. The next day, my slurring disappeared. I was hospitalized for 5 days. Since then, I have had repeated strokes. I am 61 years old and have frequent retinal hemorrhages."
- "I am 50 years old and have had and continue to have depression. It was after I had a stroke."
- "I had a stroke at age 64, was hospitalized for a month and after about 3 months my eyes started to work normally again. My sense of balance has returned to normal after 4 years, but the numbness remains. When I was 65, I had a relapse and was treated for about a year."
- "I was 46 years old and had an intracerebral hemorrhage. My veins were severed but the veins bypassed the area spontaneously, much to the surprise of the doctors. I was treated with intravenous fluids. I suffered no aftereffects. I have a CT scan every few years. The blood tests at that time revealed I had anemia and fibroids, which I was treated for."
- "I scratch my ears too much and hurt them, perhaps self-injury due to stress. I always got a "c" rating because of it, which happened from mid-elementary school to middle school. I also tore off my fingernails due to stress."

# In addition, there were several other reports, including reports of having been subjected to psychological abuse by their parents. In such cases, it is characterized by the belief that the parent is suffering from some kind of mental disorder.

Incidentally, our survey did not include this point in the questions. Therefore, some respondents requested us to ask about mental disabilities as well.

This point is often difficult to gather answers as a problem for the person themselves, and since it tends to be the parents, relatives, and siblings who are exposed to radiation, it has been left out of this report, which gathers what happened to the person themselves.

However, as the following report shows, there are various hardships and deep psychological damage caused by the atomic bombings, such as domestic violence, depression, and suicide by close relatives.

We would like to devise a way to get a better grasp of the reality of this point in our next survey.

17. Symptoms of "sudden immobility"

In a questionnaire from 110 second and third generation Atomic Bomb survivors, one second-generation and one third generation Atomic Bomb survivor reported a peculiar symptom: "Sudden immobility".

Dr. Shuntaro Hida, an Atomic Bomb doctor, had previously discussed this symptom in detail, and I told them both that it was a symptom that had been happening to Atomic Bomb survivors. Then both of them came back to me saying, "I am encouraged to know that it is not only happening to me," and "I am glad that my suffering has been approved for the first time.

With this in mind, I also add the following report.

- "I have a hard time working and sometimes I freeze. It's like I switch off, exactly as they say in "blah blah blah disease" etc. When I am talking with friends, I feel like I stop and lose my memory. My friends think I am strange and worry about me."
- "I told my father that my body had stopped moving after I was over 40 years old. I think I had told him that I had stopped moving, although I couldn't say at the time. I also talked with my father about the contents of the questionnaire, and my father had similar symptoms and we discussed that it might be hereditary."
- "What my situation is like is that in a short distance race, I can't start at the same time as everyone else. I freeze up and stop before I start. I was hurt when my friend said to me, "Shall I have a fortune teller take a look at you?" My homeroom teacher wrote "Orthostatic Regulation Disorder" on my report card."
- "I cannot tell people much about my case of immobility. It wasn't until I was over 40 that I was able to tell people. When I heard that this was the case with many second-generation people, I was encouraged. It was a relief, a discovery, and reassuring to know that I am not alone."
- "I started to cook my own food. I don't eat processed foods as much anymore. I also started making dashi (Japanese soup stock), and I feel much better."
- "I had a lot of investigations at the hospital about the glare sensitivity in elementary school, but I was often told that there was nothing wrong with them. I hated being told that it was a migraine, even though it was very painful for me. It was also hard for me to have my painful condition not acknowledged. Now I am convinced that the symptoms were not given a name, and I feel like I am finally being acknowledged for what I was going through."

They both experienced such conditions as suddenly freezing up and being unable to move when it was their turn to talk with a friend. The third-generation Atomic Bomb survivor says this continues to this day. However, although they used to panic in their minds, saying, "What's wrong with me, I have to move," they now think, "This is the Atomic Bomb symptom I was taught. I just have to be quiet and wait for it to pass," and it has become much easier for her. I believe that there are probably people who still have the same symptoms and are living alone in the world. I would like to deliver this report to those people.

Other valuable reports that could not be categorized elsewhere are noted here.

- "I had an abnormality in my right hand, which was discovered by my grandmother, an Atomic Bomb survivor and dentist, soon after I was born. I underwent surgery under general anesthesia, but at the time there was not enough technology to completely cure an infant, so they decided to perform a provisional operation and have a full operation when I was older. After that, I lived a life without much use of my right hand; I started playing the piano when I was 4 years old, which helped me with rehabilitation, and as a result, as far as the x-rays show, it has completely healed. There is a little discomfort in the sensation. If I get tired, that finger moves slowly, and if I favor one finger, another finger starts to hurt."
- "I had terrible hives every night since about the fifth grade and could not sleep. My doctor gave me intravenous injections for a week before my sixth-grade school trip and I managed to get rid of them once and for all. Around that time, my atopic dermatitis began."

#### 18. What have they been feeling as a result of these problems?

- "I have been physically weak since childhood, and I am not confident in my health, so I have tended to avoid long trips and other activities. I would like to change my mindset and live a more positive life, but...."
- "I had been constantly going to the hospital since I was a child and never knew what was causing my illness. Only I had these symptoms. I had a very heavy heart because of this, and from a young age I felt doomed and lived with a sense of hopelessness that I would never live long or accomplish anything in my life."
- "I had no friends I could truly talk to, and I was in a constant depressed state of mind where I could not share my problems."
- "I've had more than a dozen surgeries and been hospitalized, so when I experience a new illness, I make sure to bring a notebook with me in which I jot down my medical history."
- "When my children were young, I often thought about the bruises on my son's face and my daughter's unbendable fingers that might be because of my poor food habits. When the Fukushima nuclear power plant accident occurred, I was terrified of further exposure to radiation. I raised my children to avoid X-rays as much as possible and to be careful about their diet and chemical substances. This was because they were third-generation Atomic Bomb survivors."

They describe their inability to be positive due to anxiety about their own bodies, their need to control their behavior, and their sadness at not having friends to confide in.

Another characteristic of second-generation parents is that, while worrying about their third-generation children and fourth-generation grandchildren, they tend to blame themselves, thinking that they were somehow at fault, which itself is a form of emotional damage.

19. What were the positives of doing the survey in this situation?

In the midst of all this, we heard quite a few joyful comments, such as the realization that they are not isolated from the rest of the world, through sharing this survey.

#### The following are the words of a third-generation Atomic Bomb survivor, and I note them because they are valuable.

- "I found it very refreshing to read the results of the survey! This realization is a gift to me."
- "I was wondering if those symptoms were due to exposure to radiation! Interesting! 'Really!"
- "That's amazing. It's interesting. My soul is very happy right now. I feel like a mystery is being unraveled. It is very interesting to know that this possibility exists. I feel very fulfilled at this moment."

What is apparent here is the isolation of the Second and Third Generations Atomic Bomb sufferers. In a sense, it is natural. This is because, despite the fact that it has been almost 80 years since the atomic bombing, there has been no solid research on the second and third generations of Atomic Bomb survivors.

Because of this, many second and third generation survivors are suffering in various ways, but they are forced to feel that their suffering is unique to them and that they are isolated. I believe that most of them feel this way. That is why it is very significant to expand this survey to more second and third generation Atomic Bomb survivors.

20. What they have done to improve their illnesses, symptoms, and constitutions and to manage their health Finally, several Nisei and Sansei who have been suffering from these various symptoms and hardships reported that they have been able to alleviate or suppress their symptoms by trying various things and surviving more comfortably. We also report on this point.

"I was 21 years old when I developed acute enteritis and my doctor was amazed. I was menstruating and my menstrual blood was thick and heavy, but drinking hydrogen water made it thinner. I often crave for water. I feel afraid if I don't have water."

This person's symptoms were considerably alleviated by adopting a brown rice diet and a vegetable-centered lifestyle, centered on drinking hydrogen water. Many others have taken care to avoid additives and pesticides and to choose safe foods, and each has been effective. We also heard several people say that they were helped by herbal medicines. In addition, there are reports like this.

"When I was 55 years old, I started taking propolis in addition to chlorella, which I had been taking since I was 20 years old. On the contrary, I hardly ever catch a cold, and when I do, I recover quickly by resting and taking care of myself." "Chlorella and propolis seem to have worked very well for my body."

#### In addition, there was this report.

"As for posterior rhinorrhea, it was almost eliminated by two laser surgeries when I was around 50. However, there are signs of constant sinusitis-like symptoms."

It seems that very painful symptoms such as posterior rhinorrhea persist, but these treatments may be available.

#### One case was reported in which a mother who was an Atomic Bomb survivor provided regular training for her children.

"My mother was an elementary school nurse at the time. I was put on an after-school baseball team with the upperclassmen and trained a lot. I was building up my physical strength, but I had a weak stomach and often had diarrhea, and I often collapsed at school assemblies due to anemia. Diet and medication were given to me under the supervision of my mother. This situation continued until I was in the second grade of junior high school.

I moved to Tokyo when I entered university, but I was told of the importance of health management, and from that time on, it was mandatory to have an annual physical examination (from the age of 35, a thorough physical examination was required), and the results were always sent to my mother. Because of this process, I myself was sensitive to changes (abnormalities) in my body, and I had a habit of thinking that there was something wrong with me if there was a change, and would often sleep in bed and wait for the change to pass by, as long as it did not interfere with my daily life. As a result, I have never had a serious illness from college until today (soon to be 71 years old), perhaps as a result of my mother's care."

This is another important report. It is an example of how people have been able to avoid serious illness and live better lives as a result, even when they have a clear understanding of their own condition, face various health problems, and confront them with various life wisdom, such as not overworking themselves.

Our survey this time did not include a section asking about this point. We would have received much more information

if we had included it in the questionnaire. We hope to hear more about this point next time and deliver it to the second and third generation survivors.

The above is a summary of the report on what has happened to the second-generation Atomic Bomb survivors and their friends, as revealed by the free responses.

### Chapter III: Second-generation Atomic Bomb survivors who were not able to be born into this world

The most fundamental problem for the health problems of the second-generation Atomic Bomb survivors, and the most painful fact of all, is that there are those who were born into this world but could not breathe their first breath. In other words, there are those who were not allowed to live as human beings.

It is not easy to clarify this fact with objective data. We can ask directly about those who were able to live until today through methods such as this questionnaire, but we cannot hear the voices of those whose lives were taken away before they were even born into this world, or soon after they were born.

However, the reality of the loss is not small. They are those who could not raise their voices and left this world in darkness, who are our fellow human beings. We need to take this matter seriously. We believe that we must approach the truth of this in every way possible.

## 1. In this survey, "Q17" asked if there were any siblings who were not born.

The results were as follows

- \* Older brother 4
- \* Younger brother 1
- \* Two elder sisters
- \* 1 younger sister
- \* Gender unknown: 2 respondents

Respondents total: 10

Nine respondents had experienced miscarriage themselves (or their spouses).

## 2. "Siblings Who Could Not Live," as Seen in the Free Writing Responses

In this report, we have extracted the passages in the free-writing responses to the questionnaire that mention "brothers and sisters who were not able to be born into this world " and those related to them, in order to get at part of the problem. The following are excerpts of specific response statements.

- \* My parents' first child (my sister's) was born and died within a day or two (not stillborn). I am told that she did not cry as a newborn baby.
- \* My mother was pregnant with four children, her oldest daughter and one with me (her second daughter), who was stillborn at 6 months.
- \* My brother and I are 5 years apart, but my mother told me she had several miscarriages during that time.
- \* I believe that this has been hidden because talking about the lives that were not born would spread discrimination. I also think it takes courage to link it to hereditary effects and tell the world, even if it is true, as long as scientific evidence remains unobtainable.
- \* A survey conducted by an association of Atomic Bomb survivors in Shizuoka Prefecture revealed cases of miscarriages and

stillbirths. Based on this information, the group requested the prefectural government to provide cancer screening for secondgeneration Hibakusha, and the request was granted. We would like to express our gratitude to the parents of Atomic Bomb survivors for taking action to realize the need for a system to protect the health of their children, who, we believe, are innocent of any crime.

- \* I have had two miscarriages and no children. I was quite healthy when I got married, so that is an event that made me aware of being a second-generation Atomic Bomb survivor. I told my husband and his parents that I was a second generation before we got married, and I am grateful that they treated me the same after my miscarriages.
- \* I was 28 years old and pregnant with my second child. I went for a checkup at 4 months and found nothing unusual, but at night I started bleeding and had abdominal pain and miscarried two days later. For the next year or so, I would feel anxious and inexplicably tired when I was alone. I also took a regular (local train) train to work so that I could get off immediately if something happened.
- \* Both of my siblings were unable to have children.
- \* When my child was born with extra digits, I asked the doctor if it was related to the fact that she was a second-generation Atomic Bomb survivor, and he replied that he could not say that it was not. He told me that my daughter, who was born through IVF had a uterus like that of a 40-year-old. My other daughter was born healthy, but her child (grandchild) was diagnosed with hepatoblastoma, a cancer that is said to affect only one in 100,000 people. I am not sure if such a thing can happen to a fourth-generation Atomic Bomb survivor, but hepatoblastoma is a disease whose cause is not yet understood. I think it is necessary to investigate the relationship between the offspring of Atomic Bomb survivors and such diseases.
- \* I unfortunately had no other option than abortion (my second child was diagnosed with blisters on his back from head to buttocks and would not survive).
- \* There was a baby between my sister and I, but it was a miscarriage. Also, my sister's first child died within 3 days due to heart disease.
- \* I have two children, the first died of a cellular anomaly and the unborn fetus was scraped out. And my third child had Kawasaki disease at 6 months of age.
- \* My mother had a miscarriage with my younger brother.
- \* Third child miscarried at 6 months (I don't think it was because he was second generation).
- \* My mother was also unable to give birth to her first child because she found out in utero that she had a grapevine (foamy mole).
- \* My siblings, my brother and sister, who are a couple of years older than me, died shortly after birth, I was told.
- **Note**: As mentioned above, there is Appendix with a list of free text responses in the Japanese version, but it is not translated into English because the content is already introduced.