

Report on “Radiation Disaster Recovery Studies”

Course: Radioactivity Social Recovery _____

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○Regarding “Radiation Disaster Recovery Studies”

(Describe your thoughts, the process you engaged in and your research progress regarding Recovery from Radiation Disaster.)

When decided to join the 5-year Ph.D. course of the Phoenix Leader Education Program in October 2013, my primary motivation was to learn how Japanese government and local people revitalize the affected areas after the Fukushima nuclear accident. Nearly five years have passed since I came to Japan and pursued my Ph.D. study on nuclear disaster migration; I have achieved not only the academic outcomes but also practical experience in researching in Japan in a post-disaster context. In this report, I will describe the process that I have engaged in the research about the Fukushima nuclear accident migration, the experience that I gained from doing the research as well as my thoughts regarding the recovery from the Fukushima nuclear accident.

1. The process that I engaged in the research about the Fukushima nuclear disaster migration

The motivation to pursue research about the Fukushima nuclear accident related migration emerged in my mind during my first field visit to the accident-affected areas, which was held for students of the Phoenix Program at the end of November 2013. Visiting the evacuation zone, I have seen the significant demographic decline. The evacuation order was still in effect in most areas within 20 km radius from the nuclear power plant (NPP) where some places were called ghost towns such as Namie, Futaba, Okuma, and Odaka district (Minamisoma City) because all houses were left abandoned for years. Entering to areas within 10 km radius were still restricted without official permission at that time. In areas adjacent to the evacuation zone, while a considerable proportion of people have returned, many others remained evacuated. Some questions arose in my mind: Why some people moved far away, many others displaced to locations much closer to their home? Why have thousands of people returned while many others remained evacuated? Also, what factors influenced migration decisions? Leveraging the geographical background, I decided to do research aiming at elucidating the geographical features of the population movement after the Fukushima nuclear accident. Specifically, the research targets at exploring the spatial distribution of evacuation, and the impacts socio-demographic and institutional factors on the decision of migration, including the decision to return to home.

For researching about the evacuation after the Fukushima nuclear accident, I first reviewed the statistical

data about the population and evacuees of the disaster-affected areas which is available on the websites of the Japan Bureau of Statistics, Reconstruction Agency, Fukushima Prefectural Office, and municipalities'. The second step was reviewing the literature on disaster migration as well as the previous research related to the nuclear accident evacuation. These first two steps helped me to understand the current situation of the nuclear accident and to identify the knowledge gap and the information needed for policy implementation related to post-disaster recovery. After that I chose Minamisoma City as the research location because it was profoundly affected by earthquake and tsunami; it had the most significant number of evacuees, and it spans over three different categories of evacuation areas (Minamisoma City is situated from 10-40 km away from the NPP).

To achieve the research objectives as mentioned earlier, I adopted two main research methods: statistical data analysis and primary data analysis. The statistical data is used to examine the demographic impacts of the nuclear disaster, the temporal-spatial patterns of the evacuation, and the progress of return. Thanks to the advantageous system of statistics in Japan, I could collect most statistical data needed for my research such as demographic data, data about the number of evacuees, number of evacuees by the evacuation destinations from the official online sources of relevant authorities. However, the more detailed information about the evacuation, particularly data about the demographic characteristics of evacuees, data of evacuation destinations specified by municipalities, etc...is not available from the online sources of the relevant authorities. To obtain such detailed information, I have visited the Division of Statistics, and the Evacuees Support Section of the Fukushima Prefectural Office and Minamisoma City Office several times. Due to the busy schedule of the officials in the prefectural and municipal offices, a well-prepared recommendation letter from my academic advisors was helpful to explain about my research objective and to get the support from these government offices. Besides, a detailed list of the specific data that I need and questions that I have were also used to make the communication more comfortable and to save the time of the officials.

Although the statistical data includes a significant amount of information about the entire research population (evacuees), it does not provide the detailed information about socio-economic and demographic characteristics of evacuees, their perception of radiation exposure, their evacuation progress and factors that influence evacuees' decision of migration. To obtain this critical information, I decided to employ a questionnaire survey and conduct some semi-structured interviews. My questionnaire survey targeted on two groups of evacuees: evacuees that have already returned and those remain evacuated.

To conduct the questionnaire survey, various approaches and procedures need to be done. I first came to Minamisoma City office with a recommendation letter from my professor to explain my research objectives and the survey plan. I consulted city officials about the possible ways to administer the questionnaires based on the status of evacuation and the geographical boundary of evacuation areas in the city. For the returnees, the questionnaires are distributed randomly by posting to their mailbox, and by meeting them in the public events and public spaces in Minamisoma City with the useful help from my interpreter and from a local person who kindly supported me during my fieldworks. However, I faced a significant challenge in distributing the questionnaires to not returned evacuees because they were staying in many different places. I could not have their addresses as personal information is protected by privacy law. I consulted the Minamisoma City office again to seek for their support. The survey for this group of evacuees seemed not to be done because Hiroshima University was concerned about the ethical issue. The university was afraid that the questionnaire might recall the traumatic memories of many

residents who have suffered the losses of their family members, the damage of their properties, and still currently facing difficulties due to the prolonged evacuation. Nearly three months later, after the discussion between my professor and the personnel in charge of Minamisoma City office, the city officials agreed to help me to distribute more than 1,200 questionnaires to residents who remained evacuated. They enclosed the questionnaire with a community newsletter and posted to evacuees which they did it periodically (certainly the city office posted the questionnaires without disclosing the evacuees' addresses).

In addition to the questionnaire, I also conducted semi-structured interviews with returnees and with those who migrated to disaster-affected areas after the nuclear accident during my fieldworks. The interviews are to grasp the further detailed information about reasons for returning and returnees' assessment of living conditions at their home location after returning, and the factors that motivated people from other places to move to the disaster-affected areas. To find out informants for the interviews was also a challenging task. During the fieldworks, through attending several public events to communicate with people and to observe the activities related to post-disaster rehabilitation, I have built a good connection with many local people. Because I visited the research location and attended people's activities many times, they understood my research objectives and supported my research activities. Finally, I have found the expected number of interviewees thanks to the introduction of local people and from visiting the community spaces such as Minamisoma Welfare Center (where elderly people gather twice a month), Puratto Home (a community space where people with different characteristics come to communicate, to get information related to the recovery of the town, and to attend public activities there), and Japan Agriculture Association (JA) exhibition where farmers introduce their agricultural products.

2. The progress of my research

More than two years since I started my research about the geographical features of the Fukushima nuclear disaster evacuation, I have conducted a total of twelve fieldworks in the research location to collect research data and to observe the status of the reconstruction and recovery of the city after the disaster. I have collected a significant amount of statistical data about the demography and evacuees from Fukushima Prefectural office and Minamisoma city office. I have distributed a total of 1,700 questionnaires to evacuees and received 435 questionnaires back, of which 289 are valid. I also conducted 29 interviews with returnees and 15 interviews with those who migrated to the disaster-affected areas. In December 2017, after completing the analyses of data from the questionnaires, I presented the preliminary results of the survey for 15 people including a representative of Minamisoma City Office and local people to get the feedback from them. The questions and comments from the attendants are beneficial to certify the results of my research. Moreover, I have presented the research results in 3 international conferences and written three academic papers about the demographic impacts of the nuclear disaster, the geographical features of the evacuation, and the progress of return post-disaster. I have also completed my Ph.D. dissertation based mainly on the research results (the contents are summarized below).

The research has elucidated the geographical features of the evacuation. It suggests that a nuclear accident evacuation shares the majority of spatial aspects with other kinds of disaster evacuation that in general, the longer distant location, the fewer people evacuate to, and people tend to move to the larger urban cities than less populated municipalities. The results also show that the fear of radiation exposure only influence on the distance of evacuation in the early phase of the aftermath (about four weeks) when people tried to increase their distance from

the NPP and reach their furthest evacuation distance in this period. The research also found that social networks, recommendations from local governments and acquaintances, and job-related matters are actors that influence the decision of evacuation.

The results from my study also reveal that the return of people is shaped by various institutional and individual factors. Although the evacuation order has been lifted in many previous evacuation areas, it shows insignificant impacts on the return of evacuees while the termination of housing subsidies and the compensation seem to have more critical impacts. Besides, our study found that having a strong sense of home attachment, property ownership in the home area, job obligations, and family members in the home location are significant determinants of evacuees returning to their home. Lastly, although the Japanese government confirmed the evacuated areas are safe to return to, and sufficient social services and facilities have been rehabilitated when it lifted the evacuation orders (NRA, 2013), for many evacuees, concerns about radiation still exist, and they believe the rehabilitation of infrastructure and social services have not been adequately achieved. As of May 2017, the return rate of evacuees in the previous mandatory evacuation zone was still meager with about 13% (Fukushima Prefecture Office, 2017). The research suggests that although the substantial effort has been made and significant progress has been achieved toward the decontamination and reconstruction of the affected areas, considerable challenges still exist which in turn slowing down the recovery progress. Further time and effort are required to reach the full recovery of the nuclear accident affected areas.

3. Concluding remarks regarding “Radiation Disaster Recovery Studies.”

From conducting this research, I have gained some practical experiences of the processes to research the post-disaster context. Firstly, ethical issues need to be considered to avoid the adverse effect on the disaster-affected people's emotion and recalling their traumatic memories. The consultation with local authority to better understand the situation of the victims and to find out the most appropriate research methods is necessary. Secondly, for research related to human behavior (in this research, human evacuation behavior), analyzes statistical data only are not adequate to fully explore the factors that shaped people's decisions. The combination of both statistical data and primary data analysis is crucial to achieving concrete and reliable research outcomes. Thirdly, the support from local people is vital to the success of the research survey. It takes time to establish the good connection with local people, especially in the post-disaster context where people may face many hardships in their lives and maybe tired with many research and surveys. Visiting, communicating, and engaging in people activities many times made people understand my research objectives and ultimately supported the research activities, particularly in carrying out the questionnaire survey, and in conducting the interviews.

References

Fukushima Prefectural Office (2017): Data about evacuees from Fukushima Daiichi Nuclear Power Plant Accident.

NRA (2013): Practical Measures for Evacuees to Return Their Homes. Retrieved from <https://www.nsr.go.jp/data/000067234.pdf>

○Title of Doctoral Thesis

Geographical Study on Migration related to the Fukushima Nuclear Accident

○Summary of Doctoral Thesis

(Describe so as to be easily understood, by relating it to “Radiation Disaster Recovery Studies”.)

The accident at the Fukushima Daiichi Nuclear Power Plant triggered a massive evacuation of about 164,000 from both evacuation zone and its adjacent areas. The population displacement has caused significant demographic impacts at the disaster-affected areas. As of December 2017, thanks to the extensive decontamination and rehabilitation efforts, the Japanese government has lifted evacuation orders in most areas of the evacuation zone. The lifting of evacuation orders allowed tens of thousands of people to return. Seven years after the disaster, about 60,000 people remain evacuated. Although many studies have examined different aspects of the disaster, geographical features of the disaster migration, particularly the temporal-spatial features of the evacuation as well as return migration have not been explored.

The overall aim of this dissertation is to examine the geographical features of migration caused by the Fukushima nuclear accident, focusing on four primary objectives. First, the research explores the demographic impacts of the nuclear accident in the affected areas by examining the changes in demographic characteristics before and after the accident. Second, the research examines the temporal-spatial features of the migration due to the nuclear accident and the factors that influence the migration decisions of people from the affected areas. Third, this study discusses the return progress and identifies the impacts of institutional factors and the socio-demographic characteristics of evacuees on the return migration. Finally, the research elucidates the geographical features of the Fukushima nuclear accident migration by aligning it with existing migration theories and comparing it with the geographical features of other forms of disaster migration.

This research selected Minamisoma City as the research location because the city was heavily affected by earthquake, tsunami, and nuclear accident on March 11, 2011. Minamisoma City has the largest number of evacuees among twelve affected municipalities. It also shares the majority of primary geographical and demographical features with other affected municipalities such as spanning in different evacuation areas including areas where residents were forced to evacuate and location that people evacuated voluntarily. This city had all the attributes required to be the best location for this research.

This research adopted two primary methods: statistical data analysis and a questionnaire survey. First, the research uses statistical data population to analyze the demographic impacts of the nuclear disaster, the spatial distribution of the evacuation, and the progress of return. Also, to show the impacts between different institutional interventions on the return migration, the researcher analyzed the statistical data about the evacuees to see the changes in return flow after each lifting of evacuation orders, the terminating of compensation and housing subsidies. Statistical data is collected from the National Census, Fukushima Prefectural Office, and Minamisoma City Office.

Second, a questionnaire survey was conducted between May and November 2016 in Minamisoma City; the research site of this study. The survey received 289 valid questionnaires from evacuees which provided information about where each evacuee moved and the reasons for selecting a specific evacuation destination. The

questionnaire also acquired information about characteristics of each evacuee, evacuees' perception of the radiation exposure risk, or evacuees' perceptions regarding how well living conditions have been rehabilitated in affected areas, future intentions of migration, factors that motivate them to return or remain evacuated, and factors about which people are most concerned to return. Besides, this research also collected additional qualitative information via semi-structured interviews with 29 returned evacuees and 15 immigrants in Minamisoma City were also conducted to collect information about the reasons for migrating to disaster-affected areas and their perception of radiation exposure risk as well as their assessment of living conditions in the disaster-affected areas.

This dissertation is structured in six chapters. Chapter 1 presents the research context, research questions, research aims, methods, research scope and the limitation of this study. This chapter also reviews the literature related to nuclear disaster migration to elaborate the existing knowledge and the research gap in this research domain. Chapter 2 describes the occurrence of the Fukushima nuclear accident, damage caused by the accident, responses to the accident by the Japanese government, and evacuation-related policies following the accident. Besides, this chapter gives an overview about the geographical, socio-economic, and demographic characteristics of the research area. Chapter 3 examines demographic changes before and after the nuclear accident regarding the population, population structure, and inflow and outflow of migration. The chapter also identifies what pushes people to move out (permanently) and what motivates people from other places to migrate to nuclear disaster-afflicted areas. Chapter 4 explores the temporal-spatial patterns of the evacuation with an emphasis on evacuation distances. Chapter 5 describes the progress of return migration and discusses factors that influence the decision to return. Finally, Chapter 6 summarizes the main findings of the research and generalizes the geographical features of the Fukushima nuclear accident migration. These features will be compared with the features of migration from other forms of disasters to find similarities and differences. Features of the Fukushima nuclear accident migration will also be examined in light of common migration theories to explore any possible uniqueness migration caused by a nuclear accident.

There are four key findings from this research. First, the research found that the nuclear accident has caused an increased outflow of migration, profoundly in young population due to concerns about radiation exposure and the deteriorated quality of life in the disaster-affected areas. This consequently accelerated depopulation and aging population trends in disaster-affected areas, particularly in Minamisoma City. Although there is also an in-flow of migration driven by a high labor demand related to the intensive decontamination and reconstruction work, and the sense of supporting disaster-stricken areas, it seems more temporary and much smaller in scale compared to the outflow of migration. This suggests the aging population and labor shortages in disaster-affected areas will be prolonged.

Second, the study also found that evacuees have increased their evacuation distance from the nuclear power plant and reached their furthest evacuation destinations shortly after the accident due to the fear of radiation exposure. Evacuees whose home location was in the restricted areas, those engaged in a permanent job, and those who had young children at the time of the nuclear accident tended to evacuate shorter distances. Choosing an evacuation location is strongly driven by social networks and recommendations of local government officials and acquaintances. It is influenced less strongly by job-related matters, accommodation availability, and the accessibility of social amenities. The fear of radiation exposure only had an impact on selecting evacuation destinations briefly after the accident while economic consideration shows insignificant impact on evacuees'

decision of evacuation destinations.

Third, the study elucidated how the institutional and individual factors affect the return of evacuees. The results of this study reveals that the lifting of evacuation order had a minimal impact while the termination of compensation and housing subsidies show a significant impact in pushing people to return. A sense of home attachment, job obligations, family reunification, and the ownership of house or business are also driving people to return, while the persist concern about the low-dose radiation exposure risk and the inconvenience of living conditions in the home location reduce the likelihood that evacuees will return home.

Lastly, the Fukushima evacuation's spatial features are also consistent with the migration distance decay law and the gravity model of migration as people tended to move to locations a short distance away from the disaster and to large metropolitan regions. The study suggests that evacuation after a nuclear accident shares some major spatial aspects with other kinds of disasters, including natural and technological disasters. However, the economic consideration among the Fukushima nuclear accident's evacuees seems less than that of displaced people from natural disaster. This is possibly because the Fukushima nuclear accident evacuees received monetary compensation and housing subsidies, which displaced people from a natural disaster, do not normally have. There was also a unique temporal-spatial interaction briefly after the accident when people attempted to increase their distance from the reactor and reached their furthest evacuation distance due to the influence of a fear of radiation exposure.

○Other theses published in academic research journals

- Title of academic research journals

Hiroshima Interdisciplinary Studies in Humanities

- Title of thesis

Fukushima Nuclear Disaster-Induced Migration: Motivation of in-migration to and out-migration from disaster-affected areas.

- Joint authors

None (single author)