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Mental Health Impact of the Fukushima Nuclear Disaster: Post-Traumatic Stress and Psycho-Socio-Economic Factors

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Fukushima Global Communication Programme

This working paper series shares research produced as part of the Fukushima Global Communication (FGC) Programme, a research initiative of the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS). The FGC Programme applies a human security approach to examine impacts of the Great East Japan Earthquake, tsunami and nuclear accident of 11 March, 2011 on people and society, and the challenges of the recovery process in Fukushima. It also focuses on issues of risk and information provision, aiming to improve understanding of how the threat of radiation is perceived, and the specific challenges of risk communication related to nuclear energy.

This working paper is an output of the FGC research workshop "Understanding and Communicating Risks Post Fukushima", held in Tokyo on 12–13 November 2015. The workshop brought together international experts to explore the specific challenges of understanding and discussing risks related to nuclear accidents, and identify appropriate and effective forms of risk communication.

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ABSTRACT

The Great East Japan Earthquake, GEJE, and subsequent Fukushima nuclear disaster forced 150,000 citizens to evacuate from radioactive contaminated area after March, 2011. Although 80% of the evacuees did not have accurate information and most of them thought the evacuation would last only for several days, more than 60,000 residents are still in evacuation status.

The authors performed the multi-method studies from the early stages; anthropological field work study, semi-structural interview study, and large-scale questionnaire survey. All these studies were conducted as a "response" to the "call" from the evacuees, victims, parties concerned, supporters, and administrators.

Focusing the results of the five large-scale questionnaire survey jointed with private support group "Shinsai-Shien-Network Saitama (SSN)" and "Nihon-Housou-Kyokai (NHK)", we determined a high-risk presence of probable Post-Traumatic Stress Disorder (PTSD) in evacuated residents. By the result of multiple logistic regression analysis, the significant predictors of probable PTSD were loss of employment, economic difficulty, concerns about compensation, and lost social ties. The serious consequences of the nuclear disaster, especially many of the socio-economic factors, were linked to psychological distress and suffering. It is known that the prevalence of PTSD from a human-made or technological disaster is often higher than the rates of PTSD from a natural disaster. Further, it is suggested that the prolonged uncertainty regarding the salvation of the deceased after the event might partially account for the prolonged PTSD that is often found. Therefore, the high levels of probable PTSD in our results are possibility related to the disaster being a human-made disaster.

According to the results of our comprehensive study, the current major issues encountered by the evacuees are; the split up of families, the disintegration of communities, and disparities in compensation among evacuation zones. Therefore, it can be determined that "structural violence" (Johan Galtung, 1969) has had a major impact afflicting victims' lives. The main structural violence affecting the victims of the Fukushima disaster stems from the government policy on "reparation" and "repatriation (returning plan)".

The evacuees' psychological and social sufferings simultaneously involve health, welfare, legal, political, economic, and moral issues. It is apparent that, they were injured and inflicted by the social forces. The mental health problems reported by the evacuees are not individual or personal in origin, but rather, they should be understood as a context of social responsibility to the disaster. Therefore, it is most important to resolve the various social issues caused by structural violence in order to decrease the various psychological stresses impacting the health and mental health of the victims.

抄録

2011年3月に発生した東日本大震災に伴う福島原子力発電所事故は、放射能汚染地域から15万人もの避難者を生み出した。国会事故調による調査では、約80%の避難者が正確な放射能汚染の情報を得ておらず、避難は数日で済むと考えていた者がほとんどであった。しかし、震災より4年が経過した現在においても、約6万人の住民が避難生活を余儀なくされている。

筆者らは、震災発生初期から、人類学的フィールド調査・半構造的インタビュー調査・大規模アンケート調査を組み合わせた多角的手法で研究を行なってきた。これらの全ての研究は、被災者・支援者・自治体等の要請に応答する形で行なわれたものである。これまでの研究として、以下の6つをあげることができる。

［研究1］埼玉スーパーアリーナ避難所における調査（2011年3月）［研究2］福島県双葉町教育委員会アンケート分析（2011年5月）［研究3］原発避難者への官民協同支援体制の構築；埼玉県を事例に（2011年10月〜2013年3月）［研究4］トラウマ物語りへの半構造化インタビュー調査（2011年11月〜2014年9月）［研究5］民間支援団体メンバーとしての人類学的フィールド調査（2011年4月〜現在）［研究6］原発事故被災者への大規模アンケート調査（2012年3月、2013年2月、2013年3月、2014年3月、2015年3月）

民間支援団体「震災支援ネットワーク埼玉（ＳＳＮ）」および「日本放送協会（ＮＨＫ）」との共同で行なってきた5回にわたる大規模アンケート調査から、原発事故被災者らに高い心的外傷後ストレス障害（ＰＴＳＤ）の可能性が見いだされた。多重ロジスティック回帰分析を行なったところ、ＰＴＳＤ可能性の予測因子として、失業、経済的困難、賠償への心配、社会的繋がりの喪失、などが挙げられた。原子力発電所事故よって発生した数多くの社会経済的要因が特に、心理的な障害や苦悩に関係していることが明らかになった。これまでの先行研究によると、ＰＴＳＤの発症率は自然災害と比較して人為災害の方が高いことが知られており、長引く不安定な社会的状況がＰＴＳＤの遷延化のひとつの要因だとも考えられるだろう。したがって、筆者らの研究で見いだされた高いＰＴＳＤの可能性は、本災害が人為災害であることに起因している可能性が考えられる。

筆者らの包括的研究によれば、被災者が直面している現在の最も大きな問題は、家族分離、コミュニティの分断、避難指定区域間の賠償格差、だと言える。この現象は、平和学の研究者であるヨハン・ガルトゥングが1969年に提唱した、言わば「構造的暴力」が、被災者らの生活に被害をもたらしているものだと考えることができるだろう。賠償と帰還をめぐる政策決定が、被災者の生活や人生を左右する主たる構造的暴力になっていると言えるのではないだろうか。

被災者の心理的・社会的苦悩には、健康・福祉・法律・経済・倫理の問題が含まれている。まさに社会的な力によって、被災者らは傷つき苦しんでいるのである。被災者らの精神的健康の問題は、決して個別で個人的な問題に起因するものではなく、原子力災害に対する社会的責任という文脈で理解されなければならない。したがって、被災者らの身体的健康や精神的健康に影響を与えている様々な心理的ストレスを軽減させるためには、この構造的暴力に基づく各種社会的問題の解決が不可欠なのである。

Introduction

As a result of the Great East Japan Earthquake (GEJE) on March 11th, 2011, the Fukushima nuclear disaster occurred. The magnitude 9.0 earthquake and major Tsunami hit the Pacific coast of northeastern Japan causing the meltdown of four reactors of Fukushima Daiichi Nuclear Power Plant from March 12th to 15th with the subsequent distribution of radioactive substances within the exposed area. This disaster has been compared to the Chernobyl Nuclear disaster in 1986 which also measured level 7 on the International Nuclear Event Scale.

The government of Japan declared a nuclear emergency on March 11th, forcing the evacuation of citizens within a 20km radio of the disaster zone on March 12th, and those living between 20 and 30km were urged to evacuate on March 25th. At the time of the evacuation, 80% of the evacuees did not have accurate information regarding the degree of severity of the nuclear accident [Kurokawa, 2012] [1]. Most of them thought the evacuation would last only for several days, and therefore they only took personal belongings and necessities with them. Later, most of the evacuees learned the details of the disaster from television news, which repeatedly showed the explosion of the first nuclear reactor. This news caused intense fear, horror or helplessness.

The termination declaration of this accident was issued by the Prime Minister of Japan on December 2011. Nonetheless, the radioactive substances were still continuously leaking into the air and the Pacific Ocean [New York Times, 2013.09.04][2]. Out of 150,000 evacuees from Fukushima prefecture, 90,000 are relocated to another region within Fukushima prefecture, and about 60,000 residents were relocated to other prefectures, such as, Yamagata, Tokyo, Niigata and Saitama.

The Impact of Great East Japan Earthquake and Fukushima Nuclear Disaster [3,4,5]

- Died: 15,882 (Miyagi:9,536, Iwate:4,673, Fukushima:1,606)
- Missing: 2,668 (Miyagi:1,302, Iwate:1,151, Fukushima:211)
- Injured: 6,142 (Miyagi:4,144, Ibaraki:712, Chiba:256, Iwate:212, Fukushima:182, Kanagawa:137, Tochigi:133, Tokyo:117)
- Disaster Related Death (Jun 30, 2015): 3,331 (Fukushima:1,914, Miyagi:910, Iwate:452, Ibaraki:41)
- Current Total Evacuees (Sep.29, 2015): 194,793 people (Fukushima:61,800, Miyagi:55,920, Iwate:25,230)

Our Research on Evacuees and Victims

The authors performed the multi-method studies from the early stages; anthropological field work study, semi-structural interview study, and large-scale questionnaire survey. All these studies are conducted as a "response" to the "call" from the evacuees, victims, parties concerned, supporters, and administrators.

Study 1 [March, 2011]: Survey at temporary shelter in Saitama [6]

One week after the earthquake, the Saitama Super Arena, which was normally used as a multipurpose hall for concerts and shows, was converted into a large temporary shelter. More than 2,500 evacuated people lived for about two weeks in the Arena. "Shinsai-Shien-Network Saitama (SSN)", one of the unofficial support groups, conducted a questionnaire survey in order to evaluate the needs of the evacuees. By the analysis of this survey, we determined the target of the support; child-caring generation mother and child and elderly generation.

Study 2 [May, 2011]: Qualitative analysis of the free-answer questionnaire by Futaba town [7]

Futaba Town in Fukushima Prefecture is located on the coast of the Pacific Ocean called "Hama Avenue", with a population of about 7,000. Two of the six reactors of the failed Fukushima No.1 nuclear power plant are located in Futaba town, and almost all the regions are within 10km of the nuclear plant. On the next day of the earthquake, 2,200 inhabitants of the town were evacuated to Kawamata town, 40km away from the nuclear plant. But as the radiation levels were also ascending at Kawamata, 1,200 inhabitants were evacuated again to Saitama Prefecture which is 200km from the nuclear plant. The functions of the Futaba town were also moved to Saitama Prefecture. Two months after the disaster, the board of education of Futaba Town conducted an opinion survey, and our team was asked to analyze it. The analysis of free-answer questions shows a great number of issues such as "no place to resettle in", "no information about schoolmates", "family members separated", "difficulty in finding employment", "economic matters", and "radioactive contamination". After this survey, the Futaba local government implemented a great number of measures, such as, school children's summer meetings, mail magazine information, and many Futaba's elementary and junior high school teachers got additional posts in Saitama and Fukushima prefectures.

Study3 [Oct, 2011 to March, 2013]: Establishment of Public-private Cooperative Systems [6]

Seven months after the earthquake, most of the evacuated people left their temporary shelters and settled-in on a long term basis as refugees in their new local community.

However, (1) lack of information and lack of social support, and (2) lack of understanding by the local population were problems. Because these two problems were found by several support groups, it was necessary to make public-private cooperative systems to support the evacuated people. As the public groups have personal information and the private groups have the know-how of concrete support, a new support system must be created by the concepts of social inclusion. In Saitama Prefecture, several local governments, professional associations and private support groups gathered by calling from Saitama Bar Association established a liaison committee on earthquake disaster countermeasures.

Study4 [Nov, 2011 to Sep, 2014]: Semi-structural interview study of "Trauma Story" narratives [7]

This study was planned from an idea of a disaster victim who said to us "memories of the disaster must not fade away and it is important to remember in the future of Japan". Fifteen informants have been interviewed already and we are planning to continue this study to follow up their life and community regeneration. The "trauma story" narratives of evacuees demonstrated the overwhelming trauma and dreadful absurdity of running for shelter. The condition of evacuation was absolutely disastrous which is similar to reports of experiences by refugees from wars or other large global disasters.

Study5 [April, 2011 still continuing]: Anthropological field work study as a member of private support group [8]

I have been working as one of the committee members of the private support group, Shinsai-Shien Network Saitama (SSN). I participate by observing several events and social support actions, and I also visit temporary shelters and temporary housings. Our group has been conducting the following five support actions. One, holding a regular consultation program with specialty collaborating psychologists and lawyers, whom victims can consult regarding any kind of trouble and difficulty in daily life. Second, organizing small social community parties and a community coffee room to encourage talking freely over sweets and coffee. Third, making a social solution list, which includes the contact address of local government, public welfare service, free consulting social support groups, medical clinics and hospital, and the address of regional community parties. Forth, publishing a community flyer called "Fuku-Tama" providing information to support daily lives. Fifth, organizing training seminars to encourage the leaders of private support groups to master the skills of psychological listening techniques and social work.

Study6 [March,2012; Feb,2013; March,2013; March,2014; March,2015]: Large-scale questionnaire survey

The first large-scale questionnaire survey was held one year after the disaster by our research team in Waseda University and Shinsai-Shien-Network Saitama (SSN). The questionnaires were distributed to 2011 households evacuated to Saitama Prefecture by the cooperation in disaster response headquarters in Fukushima Prefecture. The response rates were 24.4%. Extremely high-level Post Traumatic Stress Symptoms were evaluated. By the Impact of Event Scale-Revised (IES-R) which is the most internationally used measure in the disaster field, and the psychometric validation studies were shown in different cultural contexts. The mean score is 36.3±21.5, and about 67% evacuees are over 24/25 cut-off point determined as broadly defined PTSD which means high-risk presence of probable PTSD.

Our study makes it statistically clear the considerable influence of the social factors, on chronic physical and mental diseases rise by the nuclear disaster as well as on the stress and the PTSD found. The first one was "worries about livelihood sustainability" (OR:2.27), the second was "concerns about yet unsolved issues of compensation and reparation" (OR:3.74), and the third was "loss of their jobs" (OR:1.71). The main cause of unemployment was due to displacement and transmigration. Moreover, the subsequent delays of the monetary compensation for the nuclear accident made the economic future uncertain, keeping the stress and social factors related unsolved. The fourth factor is a "shrinking of human networks and social ties" (OR:2.27) due to being evacuated and its stigma. The evacuation events destroyed the sustaining bonds between individual and community. Several narratives recorded on free description questions included in our surveys revealed what amount harassment, discrimination and stigma suffered by Fukushima's evacuated residents, is pushing them to hide their real origin within neighborhood.

Second large scale survey was conducted by our research team jointed with Nihon-Housou-Kyokai (NHK) Japan Broadcasting Corporation two year after the disaster. 2,425 households living at temporary housings within Fukushima prefecture were asked to answer the Impact of Event Scale-Revised (IES-R) and the self-report questionnaires that we generated in order to evaluate the damage by the disaster in relation to several bio-psycho-social factors in refugee lives. There were 745 replies, the cooperation rate was 30.7%. High level PTS symptoms were found. The mean score of IES-R was 34.20±20.56, and 62.56% were over the cut-off point. By the result of multiple logistic regression analysis, the significant predictors of PTSD possibility were economic difficulty (OR:2.34), concerns about compensation (OR:4.16), aggravation of chronic disease (OR:2.94), affection of new disease (OR:2.20), and lack of acquaintance support (OR:1.92).

Table 1 shows the results of our five large scale questionnaire surveys. All the mean score of the Impact of Event

Table 1. Outline and the results of our surveys

Date of Survey	March, 2012	Feb, 2013	March, 2013	March, 2014	Feb-March, 2015
Place	Saitama	Fukushima	Saitama, Tokyo	Saitama, Tokyo	Fukushima
Collaborator	SSN	NHK	SSN	SSN	NHK
Sample size	2,011	2,425	4,268	3,599	16,686
Collecting size	490	745	530	761	2,862 (448)
Response rate	24.4%	30.7%	12.4%	23.9%	17.2%
IES-R mean±sd	36.31±21.46	34.20±20.55	31.93±21.13	31.07±21.59	25.86±19.42 ※
Probable PTSD	67.3%	64.6%	59.6%	57.7%	52.5%※

※In order to compare other four surveys, this number and rate were only calculated by the data of 448 evacuees from "restricted area that the residents have difficulties in returning for a long time".

Scale-Revised (IES-R) were over 24/25 cut-off point, and probable PTSD were around 50% to 70%.

Discussions

About four years after the Great Hanshin Earthquake in 1995, the mean rate of IES-R was 22.5 and PTSD possibility was 40% [Kato et al., 2000] [9], and about one year after the Niigata Chuetsu Earthquake in 2004 was IES-R;14.3 and PTSD possibility;21% [Naoi, 2009] [10]. Compared with these historical disasters in Japan, our data following the Fukushima disaster shows severe psychological distress among the victims.

According to the official report by the National Diet of Japan [1] the disaster of Fukushima is determined to be a human-made disaster. It is known that the prevalence of PTSD from a natural disaster is often lower than the rates of PTSD from human-made or technological disasters, and that the prevalence of PTSD following technological disasters ranged from 15% to 75% [11]. Therefore, the high levels of probable PTSD in our results are possibility related to the disaster being a human-made disaster.

It is reported that the worst rates of PTSD were from the Piper Alpha oil rig disaster in 1988. Ten years after exposure, 73% of the survivors still showed PTSD, and a complex psycho-social interrelationship was described in the study [12]. The sinking of a car-ferry in the Baltic Sea in 1994, the MS Estonia, is another tragic human-made disaster. Arnberg F., et al. [13] performed a prospective longitudinal study and found prolonged PTSD remained 14 years after the disaster with the mean IES-R score was 33 and probable-PTSD was 27%. In this sea accident, they suggested the prolonged uncertainty regarding the salvation of the deceased after the event might partially account for the prolonged PTSD found. In the same way, if the uncertainty regarding the solution of the nuclear disaster will prolong the impact of the disaster and inadequate monetary reparation will impact the victims' recovery from the Fukushima disaster.

From our studies, many socio-economic factors were linked to the psychological distress and suffering. Loss of employment, economic difficulty, concerns about compensation, and lost social ties are all serious consequences of the nuclear disaster. As one of the victims recorded his narrative in free writing section of our survey "If there was no nuclear accident, I would be living a normal life. Seems to be I am in a bad dream, to this day. By evacuation, our family was scattered and our relationship messed up", the victims would have never gotten into such a cruel situation without the nuclear disaster. If the damages were limited to only earthquake and tsunami, most of them could have lived in their own houses and would not have lost their home land.

Regarding the Fukushima nuclear disaster, the new classification of the evacuation area after 2012 indicates the residents in the so called "evacuation order release preparation area" are able to come back to designated as contaminated below 20mSv per year. The evacuation order of this "preparation area" by the government is scheduled to be lifted on March, 2017. The result of our recent study in 2015 shows the scores of probable PTSD were significantly different between each evacuation areas. The highest group were the people who were evacuated from the areas where it is expected that the residents will have difficulties returning to their home land for a very long time. The second highest group was the people who evacuated without

government evacuation order; which were called "voluntary evacuees" and therefore they did not receive compensation from TEPCO.

According to the results of our multi-method studies (anthropological field work study, semi-structural interview, and large-scale questionnaire survey), the current major issues encountered by the evacuees are; the split up of families, the disintegration of communities, and disparities in compensation among evacuation zones. Therefore, it can be determined that "structural violence" has had a major impact afflicting victims' lives. (The term 'structural violence' was proposed by peace researcher Johan Galtung in 1969). Structural violence refers to a form of violence wherein some social structure or social institution may harm people by preventing them from meeting their basic needs. This concept was used to assess health disparities and poverty in Haiti by Paul Farmer (2005), a medical anthropologist. The main structural violence affecting the victims of the Fukushima disaster stems from the government policy on "reparation" and "repatriation (returning plan)". That is, the victims' lives are at the mercy of political decisions.

Conclusions and Policy Recommendations

The Japan Times reported that the leaders of the electric company and government were not prosecuted in criminal suit [Japan Times, 2013][14]. The responsibility of the disaster is still uncertain. The evacuees' psychological and social sufferings simultaneously involve health, welfare, legal, political, economic, and moral issues. It is apparent that, they were injured and inflicted by the social forces, because the Fukushima nuclear disaster was human-made. The mental health problems reported by the victims are not individual or personal in their origin, but rather, they should be understood as a context of social responsibility to the disaster; thus fitting the description of post-traumatic stress disorder.

Our findings suggest that it is most important to resolve the various social issues caused by structural violence in order to decrease the psychological stresses impacting the health and mental health of the victims.

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On the occasion of The Great Hanshin Earthquake in 1995, he worked as a volunteer medical doctor for the victims. His original paper "Psychosomatic Problems after The Great Hanshin Earthquake in January 1995 – Physical Stress Responses. Jpn J Psychosom Med 36" was given the 1997 Memorial Award by Japanese Society of Psychosomatic Medicine. Since the Great East Japan Earthquake on March 11, 2011, Prof. Tsujiuchi has been supporting evacuees from the Fukushima nuclear disaster as a committee member of a private support group in Saitama prefecture. He led a research team in the Faculty of Human Sciences of Waseda University, and conducted a lot of quantitative and qualitative surveys to evaluate mental health and social suffering of refugees from Fukushima. In 2013, he stayed in Boston, USA as a Research Fellow of the Harvard Program in Refugee Trauma (HPRT), Harvard Medical School, and Department of Psychiatry, Massachusetts General Hospital. In 2014, he established the Waseda Institute of Medical Anthropology on Disaster Reconstruction, and started organizing holistic research to evaluate medical, mental health, socio-economic, and cultural issues after natural and man-made disasters. Email: tsujiuchi@waseda.jp

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