Gender Difference in Risk Perception following the Fukushima Nuclear Plant Disaster

Rika Morioka Myanmar Partners in Policy and Research

ABSTRACT

This study examines gender difference in the perception of health risk of radiation in the aftermath of the Fukushima nuclear disaster in Japan. While mothers expressed their concerns, fathers tended to be uninterested in the health effects of the radiation. Fathers whose traditional bread-winning role was at the core of their masculinity came into conflict with the traditional role of mother as a caretaker making it harder to protect children. The study sheds light on the construction of masculinity historically linked to the economic interests of the nation state. The findings illustrate the importance of social context in which gender identity and cultural values are manifested in risk percep-tions.

抄録

本研究は、日本の福島原発事故による放射能が及ぼすリスク認知のジェンダー差異を検証する。母親が懸念を表明する一方で、父親は、放射能の健康リスクに関心を示さない傾向がみられる。生活費を稼いでくるという伝統的な役割を中心とする男性的な父親の役割が、家族の面倒をみるという母親の伝統的な役割と相容れず、子どもたちを守ることが難しくなっている。本研究は、歴史的に国家の経済的利益に結び付けられてきたマスキュリニティ（男性性）構築とリスク認知との関係に焦点を当てる。本研究の成果は、ジェンダーアイデンティティと文化的価値がリスク認知に表われる社会的文脈の重要性 を例証するものとなった。

Introduction

Three months after the explosion of the Fukushima Daiichi Nuclear Power Plant in Japan on March 11th, 2011, Goto Yukiko, a thirty-five year old female kindergarten teacher, organized mothers in the city of Sendai, 58 miles north of Fukushima, and marched into the government building to demand accurate information on radiation levels and ac-tions to protect children from radiation. The local govern-ment had been refusing to measure the levels of radiation on the ground. The government's inadequate responses to the radiation threat and its emphasis on economic recovery from the disaster suggested that the nation's economy took precedence over concerns for people's health. The group submitted an official letter of request for the measurement of radiation in public places and the provision of Geiger counters to schools. Unable to ignore the mothers' de-mand, the prefectural government distributed the counters to all cities and townships.

On October 3, 2011, Japan's national public broadcast-ing company NHK reported the lifting of the shipment ban on beef from Tochigi Prefecture (where radioactive cesium in the beef far exceeded the national provisional safety limit) that had been put in place only two months earlier. To encourage consumers to buy and eat beef, the national news reported that Kanuma City in Tochigi Prefecture served the beef to elementary school children in school lunches. Alarmed by the state sanctioned feed-ing of possibly contaminated foods to children, Professor Takeda Kunihiko of Chūbu University, a well-known writer on environmental issues, urged fathers to stand up and join the mothers' protests. "Strangely, fathers are not interested in children's health," he wrote. "They [the government, producers, distributers, and the media] have shouted down mothers who search for radiation-free foods… Again, I want to appeal to fathers. Please return to the frontline [of the protest]" (Takeda, 2011). His call was unheeded, and efforts to minimize radiation exposure mostly remained a mothers' movement.

While far from clear, past nuclear incidences suggest the seriousness of the potential health consequences of radia-tion exposure, and the amount of radiation fallout was not negligible. How then did fathers perceive the risk of radiation? Why did so few fathers of young children take action to prevent harm? These questions have important implications not only for the individuals' abilities to protect themselves from harmful radiation exposures, but also on the management of environmental and health risk at the larger societal and institutional levels where men dominate leadership positions.

Discussion

Gender Difference in Risk Perception is Found in Many Industrialized Societies

Studies in the field of psychology have consistently shown men express lower levels of concerns toward health risks posed by technology than women do (Kleinhesselink and Rosa, 1991; Flynn et al., 1994). Men employed full-time are less concerned about environmental risks than are women employed full-time, showing the persistent influence of gender beyond employment status (Mohai, 1992). The authors suggested some relevant factors in explaining the gender difference, particularly the importance of social roles and everyday activities. Women's social responsibili-ties are still typically defined in terms of daily activities in the domestic sphere, with concerns about child rearing, food production, health and housekeeping. Men's social responsibilities are viewed as the breadwinner for family and engaging in the public sphere of business, politics and science.

The findings of the 'white male effect' in the US highlight the importance of power and structural factors in risk perception (Flynn et al., 1994; Finucane et al., 2000; Kalof et al., 2002; Satterfield et al., 2004; Palmer, 2003). White

males with better education, income, and conservative views put more trust in the authorities and have less concern about environmental risks. Their historically privileged position and membership in the most advantaged group socializes them for risk taking while women and the disadvantaged who experience social subordination rely more on collective resources (Kalof, 2002). Kahan et al. (2007) argue that the white male effect may be explained as motivated cognition aimed at protecting identities through commitment to social and economic activities and cultural norms. The mechanism of identity-protective cognition works as a self-defense against challenges to beliefs important to one's identity, which are also connected with membership in a group that provides material as well as nonmaterial benefits such as self-esteem.

The white-male-effect points to the significance of one's relationship to dominant institutions and power. Central institutions are dominated by males, and their perceptions influence what is defined as risk. Professionals in science have been found to perceive risk less than the lay public (Slovic et al. 1985, Kraus et al. 1992). Among them, male experts perceive risk less than female experts (Flynn et al., 1994; Kraus et al., 1992; Slovic et al. 1995). People's perception of environmental risk and their sense of personal agency to take meaningful action are also strongly linked to the level of trust in controlling and regulatory institutions (Bickerstaff, 2004). Men are more trustful or confident than women in institutions involving government, science and technology (Flynn et al., 1992; Fox & Firebaugh, 1992).

The privileged social positions of men and their need to maintain a sense of control and stability can influence their evaluations of risk created by central institutions. Giddens (1991) refers to trust in institutions as a 'protective cocoon' that guards over the self against overwhelming threats of change. In the field of social psychology, system justification theories hold that the need for stability gives rise to a motivation to perceive the system as fair, legitimate, beneficial, and stable, as well as to the desire to maintain the status quo. Those who are advantaged by the system and subscribe to the 'dominant social paradigm' typically engage in system justification more enthusiastically than those who are disadvantaged (Jost et al., 2008). In the U.S., conservative white males have disproportionately occupied positions of power, and their greater tendency to deny environmental problems (McCright and Dunlap, 2011), to justify existing systems (Jost et al., 2008), and to dislike change (Amodio et al., 2007) has been noted. System justification can lead people to rationalize the social system even in situations in which they are harmed by it (Feygina et al., 2010). Research also suggests that the dynamics of risk perception is not always a conscious process but often unconscious through the workings of affect and anxiety (Hollway et al., 1997; Slovic, 1999; Parkhill et al., 2011).

Confronting the radiation risk from Fukushima requires accepting the possibility for fundamental changes. As Faygina et al. (2010) point out, the acceptance of environmental risk not only requires acknowledgement of the scope and unpredictability of the problem, but also of challenges to the foundations of existing socioeconomic system. The inclination of industrial corporations, market-based businesses, national governments and leaders for defensive system justification that may inhibit a realistic assessment of environmental and health risk has been suggested (Feygina et al., 2010; Jost, Blount, et al., 2003). The 'stigma effects' of nuclear has caused products as well as persons from contaminated regions to suffer economic ill effects (Petterson, 1988). The existence of radiation from Fukushima is a threat for economic instability and change. A survey in Tokyo showed that 63% of male respondents affected by the triple disasters wanted to get back to 'life before the disaster' compared to 38% of women (Dentsu, 2012). The threat of change may stimulate defensive, system-justifying responses and, therefore, continued denial of potential radiation risk from the wrecked Fukushima plant. Decision makers in central institutions are overwhelmingly males, and men are more likely than women to see an environmental risk as being counterbalanced by economic benefits (MacGregor et al., 1994).

The progress made by social psychological research points to the complex nature of individual risk perception, and the need to take into account the sociocultural context in which meanings of gender and risk are constructed. Connell (1987) asserts that masculinity is an aspect of institutions produced in institutional life, as much as it is an aspect of personality. In this view, gender is a normative category of thoughts, feelings, and actions that are adopted and reinforced through social interactions (Gerson and Peiss, 1985). Based on this perspective, men's risk taking behaviors can be seen as a means to demonstrate masculinity (Courtenay, 2000). Hegemonic masculinity, gendered practices that ensure the dominant social position of men, is historically associated with industrial capitalism (Faulkner, 2000). It discourages men from doubting institutions in control of risk management, and emphasizes technical management of risk problems through mastery over nature rather than concerns for broader social and ecological considerations (Henwood et al., 2008).

What and how individuals perceive risk are influenced by social context in which the problem is framed (Pidgeon et al., 2003). Social problems 'do not spring up announcing themselves' into the consciousness of people, as Gusfield (1984) points out, but are the result of a process by which various 'realities' are interpreted and responsibilities are fixed. It requires a process by which events are construed as a problem to be solved. The sociocultural approach to risk perceptions emphasizes the fact that the individuals' risk perceptions reflect their commitments to visions of how society should be organized (Douglas & Wildavsky, 1982; Rayner, 1992). An individual's perception of risk is based

upon the sociocultural environment in which individuals construct their understanding of the world and themselves (Douglas, 1992).

The Case of Japan: Fathers' Preoccupation with Work

Extreme events such as a nuclear disaster make obvious what is normally hidden in day-to-day practices (Oliver-Smith and Hoffman, 1999). Gendered institutional norms that expect full-time male employees to prioritize work over private life and narrowly define the masculine role as breadwinner shaped their reactions to the nuclear threat. Fathers in the affected areas were reluctant to acknowledge the potential danger of radiation as they saw the radiation risk as economic rather than physical and a threat to their masculine identities. Nakayama in Tokyo, the father of a two-year old, felt that most men prioritized work over their unease.

> Men are not doing anything… They must feel some sense of alarm, but they say they have work to do. They generally don't try to move away from hotspots (high radiation areas) or anything… Even when things are not safe, they are still prioritizing work. They intuitively understand, but don't act on it.

Kurimoto, mother of a six-year-old girl in Tokyo, echoed Nakayama and complained about her husband's reaction to the radiation problem.

> He is not worried. Rather than thinking about radiation and things, he is more like 'I have to go to work'… Within the 24 hours of his time, the proportion that work takes up his time is huge, and he is not thinking about anything else.

The fathers' disinterest in the radiation risk created tension in many households. While some mothers seriously considered evacuating their children to safer locations, fathers often showed reluctance.

It was not uncommon to use the term *mendokusai* [too much trouble to deal with, a pain in the neck] to describe the fathers' attitude. The use of the term is rather shocking when one considers the gravity of the consequences of radiation exposure. Yet many fathers found it too much to think about despite the fact that almost half of Japanese men surveyed viewed nuclear energy unfavorably (The Ashahi Shimbun, 2012). The term reflected the extent of the gulf between the perceptions of mothers and fathers nurtured in two separate social worlds in Japan.

There was a fundamental difference in what radiation risk meant to husbands and wives. While women were concerned for physical health, the risk of radiation meant economic instability for men. Men's sense of responsibility was described in economic terms - work and livelihood. In fact, it was difficult to describe men's attitude towards the risk of radiation without referring to their work. For Tahara, father of a four-year boy in Tokyo, his job was too important for him even to entertain the idea of evacuation.

> My wife and son evacuated to Hiroshima, but I didn't go because I had my work… My wife says we can always sell the house, but I value the work I do now. It is because of my work that we have been able to live the way we do… For my child, I do need to be careful. I need to pay for living expenses, mortgage, and school fees. If I was alone, I think I could make a living anywhere. But I have to think about my child's future. I am not worried about myself.

His sense of responsibility as the provider for his family permeated his statements.
The financial future of his child, not the health threat of radiation, was his main concern, and financial security was his priority in the midst of uncertain future.

Furthermore, Tahara's job was not only a means for livelihood, but also the source of his identity and self-esteem. As one of the salient characteristics of the majority of Japanese workers, Inagami (1988) pointed out men do not regard their jobs simply as a means of earning income but a source of more intrinsic compensation. While Tahara did wish to protect his child from any harm, his reluctance to evacuate was also rooted in the importance of work to his sense of self-worth.

> I am not a university graduate. It's not that I had special knowledge that I studied for, and came to work for this company. Because I learned many things along the way, I am who I am now. Now I came to a point where I can train those who are my junior. Honestly, I think it was this company that made me who I am today… I was able to grow this much because of this company… The part that my work occupies in my life is huge.

His reaction to the radiation threat had much to do with what work meant to him. Information about risk can be processed in an identity protective fashion, and cognitions that are protective of one's identity will induce individuals to credit or dismiss scientific information on its adherence to cultural norms (Kahan et al. 2007). A large segment of Japanese men whose masculine identities were rooted in work organizations were prone to identity protective processing of health risk information.

Concerned mothers found it difficult to take preventive actions without their husbands' cooperation and felt frustrated. Sitting on a bench near Fukushima station, where a Giger counter in a small plot indicated 0.8 microsieverts an hour, Mrs. Nonaka lamented that her husband's parents made her cook and eat vegetables grown in their

garden, which she suspected were unsafe. Her husband's insistence on the safety based on the government's claim isolated her in her family. She was also worried about her children being forced to play outdoor in school every afternoon, but the public school insisted on not even discussing the issue. Only way for her to take precautions for her children was to divorce her husband and move away, but it was not economically and emotionally possible for her.

> My husband does not say anything even though he has seen the photograph of the plant exploding. He said to me, 'if the government says everything is ok, we don't have to worry.' They make me cook and eat vegetables grown in their garden. I don't think it is safe… I want to move away, but I can't convince my husband. I am told that my being worried is the problem. Most mothers here feel cornered and can't move [*ganji garame*].

In many cases, fathers were not only disinterested in the issue, but made it difficult for mothers to express their concerns. Some fathers became angry at mothers' persistent worries and criticized them for being "*shinkeishitsu*" [neurotic and obsessive]. Schur (1983) argues that women in general are vulnerable to labeling and stigmatization due to their subordinate social position that makes it harder for them to achieve their desired goals.

The fathers' risk perceptions were strongly influenced by the "corporate-centered" social structure in Japan. The degree to which work obligations dominate men's life (physically and mentally) is extreme and does not easily allow for a balanced sense of masculine identity or lifestyle. Japanese fulltime workers, particularly men, put in long work hours, averaging 52 hours a week including unpaid overtime (the Ministry of Internal Affairs and Communications, 2011). Long work hours and the inability to enforce labor laws reflect the corporate driven national policies that prioritize economic stability and growth. The resultant work culture extols masculine self-sacrifice to the company and pushes male workers to adopt the perspectives of "corporate warriors" (LeBlanc, 2012). The phenomenon called *karoshi*, deaths from overwork, is one reflection of the "corporate-centered society" which distorts workers' health risk perceptions (North & Morioka, 2016, in press). Hidaka (2010) depicts Japanese salarymen as "beneficiaries of the patriarchal dividend" expressed in power and material resources, but who are also expected to put loyalty to their companies above personal and family needs. The author reveals how the male and corporate centered society ensures that men's ambition for work is not distracted by the cost it imposes on family members. Fathers' disinterest in radiation risk can be viewed as the cost for the "patriarchal dividend" that families pay under the banner of economic recovery. As described in detail below, once fathers decided to trust the government and accept official interpretations of the facts the authorities (government,

media, corporations, and universities) gave, it became too much for the fathers to listen to mothers' concerns.

Masculine Norm in the Workplace

The individual perception of risk is influenced by the society's treatment of the risk. Normative beliefs about what others think one should do and what others in one's social networks are actually doing can be important factors in health behaviors (Fishbein, 2007). Similarly, group membership is found to affect how people process information about risks (Baumeister and Leary, 1995). For Japanese men, their workplace masculine norms exerted a strong influence over their attitude towards radiation. Male informants explained men in work organizations were trained to adjust to others, and this was an important attribute for success at work. Mr. Tahara described how his colleagues influenced his behavior.

> I have many opportunities to work with people in [an area with a high radiation level]… But once I heard from them, I found out that even people over there were beginning to work. They were working as usual. When working with people like that, I, too, behave in that way.

His business associates' attitudes influenced his perception more than his wife did. He considered his wife and others who were concerned as the minority, not the mainstream opinion. Indeed, his colleagues provided him a reference point.

Corporate culture stresses masculine toughness and economic prowess. There was a mood in work organizations which rejected the feelings of concern or open discussions of the radiation problem. Tahara told of his colleagues who were in denial.

> There is a colleague in my office who says 'it is troublesome that some people are creating maps of radiation levels, asking for the measurement of radiation in milk provided in school lunch, and removing contaminated soils. I don't like it.' I think he doesn't like it because if something comes up, he would have to do something about it.

In the disaster affected areas of northern Japan, people self-censored what to say to others as if talking about it would aggravate the situation, and refused to discuss the threat of Fukushima radiation in the attempt not to "make matters worse" (Morioka 2013). In the offices in Tokyo, the situation was not so different. Tahara continued:

> I think everyone wants to believe things will be ok. I regrettably said something that made a person I work with worry, and I feel bad about it. He has three children, and I told him the radiation in the

park near his house showed a very high level. I will not say more because I feel bad making him worry. … People might have thought that I was annoying.

Compared to his colleagues, Tahara initially seemed more concerned. He had information from his wife and tried to share it in his office. The cold reception at work, however, eventually stopped him from talking about it. The problem of radiation often takes discussions beyond nuclear, leading to underlying issues such as *keizai-yusen-shugi* [the principle of economic supremacy] that prioritizes economic prosperity above all else.

At the deeper level, it was a concern for jobs, industries, and the economy that made people silent despite the profound sense of alarm expressed by worried mothers. Mr. Kato, who used to work in the fishery industry in northern Japan, made this point clearly:

> It is the easiest to say that you are worrying too much. The government says everything is ok, so. If you make a fuss about it, it would make a trouble for the people in agriculture and fishery. People say the locals should eat local food. We have to recover from the disaster. Since the government says it is safe, so it must be safe, that's how most people think… Men around me don't show much interest in the issue. For men, work is the priority. After coming back from work, it is too much to think about it with mothers. It is easier to say things are ok as the government says so. Everyone is tired from work and feeling like being cornered, and unable to discuss with mothers whether it really is safe or not.

Not all fathers resisted taking precautions. Mr. Yamamura, a freelancing professional, let his family evacuate. When his action was not understood by others, he attributed this to the fact that most men worked for *kaisha* [a company] and are "shackled" by work demands and by a corporate culture that emphasized masculine toughness and economic stability.

> They don't ask why not evacuate or if it is stupid not to. If death is certain, they would run away. But when I say something, they would say "what about my livelihood, are you doing to take care of us?" The media and the government subtly take advantage of this.

He stressed that being a freelancer made it easier, not harder, to evacuate his family though his income was less stable than those of *salarymen*. He thought most men working for companies were unable to speak up about their worries or take action, even if they so desired because of the corporate environment that explicitly downplayed the risk. Nakayama felt that if one works for a company, a con-

versation about radiation would put him in an "uncomfortable" position: "If you talk about it, you end up stirring up trouble". The notion that open discussions of radiation risk might make things worse for others constrained people's behaviors and kept them from doing what they could do to minimize the harmful effects.

Men working for dominant institutions that prioritize the economy have built the system that created nuclear energy plants. They believe in the system and have invested their life work within the system. If radiation from Fukushima proved to be harmful to their families and could eventually destroy the economy, they would have to fundamentally re-evaluate their role. To consider the threat of radiation from the technology they have created is to doubt the system in which they help maintain, as well as their values and life choices.

Nation State at Home

The nation state has been the overpowering frame of reference for Japanese masculinity since the late 19th century (Fruhstuck and Watlthall 2011). Mason (2011) argues that there is a symbiotic relationship between individual and national bodies in Japan: The nation's strength and moral rectitude is articulated through citizens' physical and spiritual inheritance, and unfavorable conditions or weaknesses in individual bodies is seen as crisis in the national body. Japan's body politic in the earlier part of the last century especially engaged the male body in its imperialist and militarist rhetoric, eventually shifting to the realm of the economy and businesses. For the second half of the twentieth century, the salaryman (white-collar breadwinner ideally employed by a large corporation) marked the epitome of masculine maturity (Fruhstuck and Watlthall 2011). The ghost of the salaryman still haunts contemporary Japan in unexpected ways (LeBlanc 2012), from a new ideal of technologized masculinity of the *otaku* (men with obsessive interests particularly with virtual realities), with nostalgia for happy modern marriage (Napier 2011), to rejection by workers of new masculinity models proposed by labor unions in favor of the dominant salaryman ideal (Gertis 2011).

Economic stability and work have been an integral part of Japanese masculinity. Masculinity can be understood as an aspect of institutions produced in institutional life, as much as it is an aspect of personality (Connell 1987): it is performed and achieved through social processes (Fruhstuck and Walthall 2011). Work organizations have been playing an important role in this process. Japanese men's single-minded attitude toward work is rooted in the breadwinner role in the family that depends on the stability of company, the futility of the land, and in turn the nation's economy. In the collective efforts for development and stability, postwar ways of working tended to disregard

individual differences and needs, and work became the central life interest for men. Fulltime members of workplaces, by definition, have little discretion over their time and long hours are accepted as a condition of membership (Hisamoto 2003). Freelance writer Kou Suzuki (2012) posits that Japanese men had learned to conflate their work organizations (*kaisha*) with the society (*shakai*) as a whole. In the minds of Japanese men, work organizations and the nation are synonymous, and the fate of both are closely tied to nuclear energy.   Japanese employees thus come to believe that the fate of their companies, the economy, and the nation all rest on their shoulders as male breadwinners, and came to rationalize nuclear risks despite their ambivalence towards it.

The rising level of the radiation from the Fukushima plant that endangered the health of the land was often interpreted as a threat to the national body particularly by those in government and businesses. Beck (1992) argues that physical risks are created and effected in the very social systems designed to manage the risk activity. As Beck posits, the issue of trust is at the core of technological risks in modern societies because physical risks arises from social dependency upon institutions that are often inaccessible to most people affected by the risk. Japan's single-minded focus on the economic recovery has been termed "disaster nationalism" and drawn the concerns of many nations (Hornung 2011). Government's claims to safety, along with the dominance of pro-nuclear scientists and media [*daijyōbu no gasshō*], set the backdrop for the fathers interviewed, who also sought to downplay the risk of radiation and resume economic activities.

Conclusion

In the aftermath of Fukushima disaster, Japanese men not only expressed less concerns about radiation from Fukushima than women, but also interpreted the presence of radiation as a threat to financial stability rather than to physical well-being. Their sense of invulnerability to physical harm was expressed in terms of their emphasis on work and breadwinner role that defined masculine identity. Furthermore, men's diminished sense of physical risk and their dismissal of mothers' concerns constrained the ability of women to take desired preventive actions. The disaster exposed the gender schism that was hidden under the guise of the traditional division of labor between men and women, and created a social condition in which the traditional notion of breadwinning fatherhood came into conflict with the traditional role of mother as a caretaker, making it harder to protect children from potential radiation exposures. When the crises forced spouses in uncertainty to make urgent decisions about critical issues that encompassed both men's and women's spheres of lives, they found it hard to openly discuss and make consensal decisions about how best to protect their children from the imminent threat of radiation.

Gender is known to be a key factor in decision-making under disaster settings in intimate relationship. This study suggests that gender can impact national responses to disasters with far-reaching and unintended consequences beyond the family and intimate relationships. The experience of Japan illustrates how a serious risk of radiation exposure can be ignored at both individual and institutional levels if the risk is interpreted as a potential threat to masculinity rooted in the dominant politico-economic system. The influence of hegemonic masculinity in this process has wider societal implications including the frequently observed discrepancy between the lay public's perception of environmental risks and those of scientific or policy experts. The issue is particularly important when one considers how political and scientific spheres are dominated by men, and the perceptions of risk by lay people, including the concerns of mothers in Fukushima, tend to be dismissed as a consequence of ignorance or misinformation by authorities and experts.

To be sure, the division manifested in the nation was not just along gender lines. Many men opposed nuclear energy and many women agreed with government and corporate policies. Yet the gender gap was important because it pointed to masculine norms as key drivers of the nation's responses to a major nuclear disaster. The reluctance of the local government to measure radiation levels, the immediate post-disaster increases in allowable maximum radiation limits in food, and the promotion of potentially harmful local agricultural and fishery products by the authorities are each examples of public policies reflecting the values of a government overwhelmingly run by men and of fathers like those discussed in this paper. Like fathers, the government sought to protect hyper-masculinized notions of economic recovery and national stability, primarily by reinforcing traditional notions of masculinity and the gender division of labor in private and public life.

Japan's conflation of masculinity and economic competency led to the narrowly focused debates over the polarized choice between economic recovery and lives of citizens after the Fukushima disaster (LeBlanc, 2012). While it seems extreme, the underlying mechanism is applicable to the rest of the world that is facing countless environmental and occupational health hazards. As Giddens (1991) argues, the 'mechanisms of self-identity' including masculinity shaped by modern institutions play a critical role in risk society. The consequences of narrowly defined manhood can be unexpected, far-reaching and damaging.

Policy Recommendations

1. Ask not only 'why do women worry more' but also 'why do men worry less' in research and disaster communication and responses

2. Place risk communication in social and historical contexts in which men's and women's risk perceptions are formed, and focus on trust building by presenting balanced views from differing perspectives

This study reveals the differing meanings of radiation risk to men and women and the importance of presenting balanced views in communicating risks. The potential risk of radiation was interpreted as a threat to the economic health of the families, businesses, and the nation by men while it was interpreted as a potential health threat by women. The differing interpretations were rooted in the social roles constructed and propounded for national development in the history. Similarly, the loss of public trust did not occur in a historical vacuum, but within the context of decades-long national nuclear policy. Emphasize trust-building in risk communication by presenting historically contextualized opposing views on facts, clearly communicating scientific uncertainties, and assisting how to interpret this information from the perspectives of both genders.

3. Define resilience to disaster in terms not only of ability to withstand disasters and return to pre-disaster states, but also ability to transform and emerge stronger, and put women at the center of resilience-building

Disasters and catastrophic events can provide "windows of opportunity" for transformation and growth as a society. The Rockefeller Foundation defines resilience as the following:

"The capacity of individuals, communities and systems to survive, adapt, and **grow** in the face of stress and shocks, and even **transform** when conditions require it. Building resilience is about making people, communities, and systems better prepared to withstand catastrophic events – both natural and manmade – and able to bounce back more quickly and **emerge stronger** from these shocks and stresses"
The Rockefeller Foundation; www.rockerfellerfoundation.org/our-work/topick/resilience/

Research suggests that women are critical to building resilience and should be at the center of resilience building efforts. While women are the most likely to suffer from disasters, they are also often on the front lines to responding to these events on the ground. Ensure that their voices are heard and their perspectives are incorporated in decision-making and risk communication processes by which disaster resilience are built.

4. Make a concrete institutional commitment to gender balanced perspectives and ensure that decision-making personnel involved in risk communication and emergency responses have a formal responsibility to consider

gender relations at all stages of disaster response and recovery

To ensure gender balanced perspectives, it is essential to have an institutional commitment that instigates a formal responsibility of those in authority to analyze gender relations and incorporate gender perspectives at all stages of disaster responses.

5. Similarly, work towards correcting gender imbalances in governmental decision-making roles by setting target quota/percentages of women in positions of authority, particularly in government disaster planning and response agencies that are communicating risks

Women often contribute considerable work in relief and recovery efforts, yet are excluded from disaster response decision-making and planning activities (Enerson 2007). Even under normal circumstances, Japan consistently ranks among the worst along gender equality measures. For example, United Nations Development Programme's Gender Inequality Index (2013) reveals that less than 10% of parliament seats are occupied by women in Japan (UNDP 2013). In contrast to low levels of female political participation, women perform 87% of household labor (Fuwa 2011). Further, the Gender Gap Report produced by the World Economic Forum ranked Japan 105th out of 136 countries in gender equality index in 2013. As discussed above, these patterns prove important in decision-making around disaster communication and response. Place target quotas for the percentage of women occupying the positions of authority, particularly in ministries important to disaster management and recovery.

6. Manifestations of gender gaps become extreme in disaster contexts. Promote Japanese "men's liberation" from work that reduces gender segregation in politico-economic spheres and domestic spheres in non-emergency time.

The sexual division of labor that has hitherto been taken for granted became a schism between fathers and mothers in the disaster context. The gender gap manifested was rooted in the separate spheres that men and women live Japan. Liberate men from overwork and desegregate the gendered spheres of fathers and mothers. Japanese men still work an average of 52 hours a week including unpaid overtime (the Ministry of Internal Affairs and Communications, 2011). Workers typically use less than half their annual leave, taking only nine of their 18.5 days average entitlement (Japan Times, February 4, 2015).

The gendered spheres and overworking is not exactly due to individual choices, but a result of complex history and culture (see Morioka, 2016 in press), and must be addressed at the national level. As discussed in this study, the gender-segregated lives have profound impacts on dis-

aster policy and the recovery process. Whole-hearted and serious efforts to desegregate the gender divide would strengthen the effectiveness of risk communication and the resilience of the nation to disasters.

7. Support research that addresses interactions among influences of dominant institutions, gender differences and imbalances, and disaster resilience

Further analyses of disaster responses and risk-taking that are influenced by dominant institutions and masculinity are critically needed. Masculine workplace norms that have a significant influence on men's attitude towards radiation risk may warrant further studies. This is particularly important in light of the preliminary observation of this study that the minority of men who supported mothers' protests were non-members of dominant institutions such as freelancing professionals, retirees, and students. Occupationally disaggregated data with a statistically significant sample size on risk perceptions may provide an entry point to further inquiries on the role of powerful and dominant institutions such as corporations, media, and the government on gendered responses to disasters.

Rika Morioka is a PhD Sociologist in Medical and Cultural Sociology, working in the field of international public health. Her publications range across a variety of topics such as death from overworking in East Asia, health legal activism among Japanese housewives, gender difference in perceptions towards radiation risks in post-disaster Japan, and recovery processes in drug addiction treatment programs in the US. In addition to academic research, she has been actively serving international non-governmental organizations as well as the United Nations. She currently leads a research agency in Myanmar. Email: rikamorioka@gmail.com

Notes

References

Beck, U. (1992) *Risk society: towards a new modernity.* New York: Sage.

Bickerstaff, K. (2004). Risk perception research: socio-cultural perspectives on the public experience of air pollution. *Environment International, 30*(6), 827-840.

Brown, P., & Mikkelsen, E. J. (1990). No Safe Place: Toxic Waste. *Leukemia, and Community.*

Courtenay, W. H. (2000). Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Social science and medicine,50* (10), 1385-1402.

Dentsu Marking Insight. (2012). *Shinsaigo 1nen no ishiki chousa.* [the attitude survey one year after the disaster]. Retrieved January 27, 2013 from http://www.dentsu-mi.co.jp/release/20120308.pdf

Douglas, M., & Wildavsky, A. (1982). Risk and culture: an essay on the selection of technological and environmental dangers. Berkeley, Cal.: *Univ. of California Press.*

Finucane, M. L., Slovic, P., Mertz, C. K., Flynn, J., & Satterfield, T. A. (2000). Gender, race, and perceived risk: the 'white male' effect. *Health, risk & society,2*(2), 159-172.

Fishbein, M. (2007). "A Reasoned Action Approach: Some Issues, Questions, and Clarifications." In I Ajzen, D. Albarracin, and R. Hornik (eds) Prediction and change of health behavior: Applying the Reasoned Action Approach. Hillsdale, N.J.: Erlbaum.

Frühstück, S., & Walthall, A. (Eds.). (2011). *Recreating Japanese Men.* University of California Press.

Flynn, J., Slovic, P., & Mertz, C. K. (1994). Gender, race, and perception of environmental health risks. *Risk analysis, 14*(6), 1101-1108.

Fuwa, M. (2004) *Macro-level gender inequality and the division of household labor in 22 countries", American Sociological Review, Vol. 69, No. 6,* 751-767.

Gerson, J. M., & Peiss, K. (1985). Boundaries, negotiation, consciousness: Reconceptualizing gender relations. *Social problems*, 317-331.

Gertis, C. (2011) Losing the union man: class and gender in the postwar labor movements" In: *Recreating Japanese Men.* (eds.) Frühstück, S., & Walthall, A. University of California Press, Berkeley.

Giddens, A. (1991). *Modernity and self-identity: Self and society in the late modern age.* Stanford University Press.

Gifford, S. (1986). The Meaning of Lumps: a Case Study of the Ambiguities of Risk. In CR Janes, R. Stall, SM Gifford. *Anthropology and Epidemiology: Interdisciplinary Approach to Study of Health and Disease.* Reidel Publishing: 213-46.

Gordon, A. (1997). Managing the Japanese household: The new life movement in postwar Japan. *Social Politics: International Studies in Gender, State & Society, 4*(2), 245-283.

Gustafson, P. E. (1998). Gender Differences in Risk Perception: Theoretical and Methodological Perspectives. *Risk analysis, 18*(6), 805-811.

Hornung, W. (2011) 'The Risks of 'Disaster Nationalism'', *Pacific Forum CSIS*, Number 34. Available from <http://csis.org/publication/pacnet-34-risks-disaster-nationalism>. [12 December 2012].

Hidaka, T. (2010). *Salaryman Masculinity: The Continuity of and Change in the Hegemonic Masculinity in Japan* (Vol. 29). Brill Academic Pub.

Hisamoto, N. (2003) *Seishain runesansu* [regular employee renaissance] Tokyo: Chuko Shinsho.

Inagami, T. (1988). The Japanese Will to Work. *Inside the Japanese System.* Stanford: Stanford University Press: 32-35.

Ibaraki Prefecture Public Relations Division. (September 2011). Kensei yoron chosa. Shoku no Anzen. [Prefectural administrative survey. The safety of food]. Retrieved on February 18, 2013 from http://www.pref.ibaraki.jp/bukyoku/bugai/koho/public/opinion/h23/.

Ibaraki University Institute of Regional Studies. (November 2011). *Genpatsujiko to nichijyouseikatsu ni kannsuru anketo chosa kekka no gaiyo* [the summary results of the survey on nuclear disaster and daily life]. Retrieved on August 27, 2012 from http://irs.reg.ibaraki.ac.jp/tokai/2011kaken/mitogenshiryokuchousa2011gaiyou.pdf.

Kahan, Dan et. al. (2007). Culture and Identity-Protective Cognition: Explaining the White Male Effect in Risk Perception. *Journal of Empirical Legal Studies*, Volume 4, Issue 3, 465–505.

Kleinhesselink, R. R., & Rosa, E. A. (1991). Cognitive Representation of Risk Perceptions: A Comparison of Japan and the United States. *Journal of Cross-Cultural Psychology*, 22(1), 11-28.

LeBlanc, R. M. (2012). Lesson from the Ghost of Salaryman Past: The Global Costs of the Breadwinner Imaginary. *The Journal of Asian Studies.* September 2012: 1 15

Mason, M. (2011) Empowering the would-be warrior: bushido and the gendered bodies of the Japanese nation" in *Recreating Japanese men.* (eds.) Frühstück, S., & Walthall, A. Berkeley:University of California Press.

Mash Research. (2011). *Shinsaigo no seikatsu ni kansuru anketo.* [Survey on life after the earthquake disaster]. Retrieved February 18, 2012 from http://www.marsh-research.co.jp/examine/ex2306.html.

MacGregor, D., Slovic, P., Mason, R. G., Detweiler, J., Binney, S. E., & Dodd, B. (1994). Perceived risks of radioactive waste transport through Oregon: Results of a statewide survey. *Risk Analysis, 14*(1), 5-14.

Mikanagi, Y. (2011). *Masculinity & Japan's Foreign Relations.* Boulder: First Forum Press.

Mohai, P. (1992). Men, women, and the environment: An examination of the gender gap in environmental concern and activism. *Society Nat. Resources 5*:1–19.

Morioka, K. (1998). *Kigyo Chuushin Shakai no Jikan Kouzou* [Time Structure of Corporate Centered Socieity]. Tokyo: Aoki Shoten.

Morioka, R. (2013). Mother Courage: Women as Activists Between a Passive Populace and a Paralyzed Government forthc. in Tom Gill, David Slater and Brigitte Steger (eds): *Coping with Disaster: Ethnographies from a Tsunami and Nuclear Devastated Japan.* London: Peter Lang.

Morioka, R. (2014). Gender Difference in the Health Risk Perception of Radiation from Fukushima in Japan: The Role of Hegemonic Masculinity, *Social Science and Medicine,* 107, pp.105-112

Morioka, R. (2016, in press). Japanese Families Decoupling Following the Fukushima Nuclear Plant Disaster: Men's Choice between Economic Stability and Radiation Exposure. In: Men, Masculinities and Disaster: Revisiting the Gendered Terrain of Disaster, Elaine Enarson and Bob Pease (Eds.), Routlege.

Ministry of Internal Affairs and Communications (n.d.). 2011 Survey on Time and Leisure Activities, Retrieved October 20, 2012 from http://www.stat.go.jp/english/data/shakai/2011/h23kekka.htm.

Oliver-Smith, A., & Hoffman, S. M. (Eds.). (1999). *The angry earth: disaster in anthropological perspective.* New York: Routledge.

Palmer, C. (2003). Risk perception: Another look at the 'white male' effect. *Health, risk & society, 5*(1), 71-83.

Petterson, J. (1988). The reality of perception: Demonstrable effects of perceived risk in Goiania, Brazil. *Practicing Anthropology, 10*, 3-4.

Rayner, S. (1992) Cultural theory and risk analysis in Krimsky, S., & Golding, D. *Social theories of risk.* Westport, CT: Praeger.

Slovic, Paul. (1999). Trust, emotion, sex, politics, and science: Surveying the risk-assessment battlefield. *Risk analysis, 19*(4), 689-701.

The Asahi Shimbun Digital. (2012, March 12). Asahi Shimbun Yoron Chosa [Asahi Newspaper Public Opinion Survey]. Retrieved December 4, 2012 from http://www.asahi.com/special/08003/TKY201203120551.html.

Takeda Kunihiko. (2011, October 4). *Rinri no ōgonritsu to gyūyū, kona miruku.* [The golden rule of ethics and fresh and powdered milk]. Retrieved January 22, 2012 from http://takedanet.com/2011/10/post_d5f2.html.