Submission to the UN Human Rights Council by Greenpeace Japan

30 March 2017

The Fukushima Daiichi nuclear disaster and violations of survivors' human rights

Introduction

The 2011 Fukushima Daiichi nuclear disaster is one of only two INES[1] Level 7 events in world history – the other being Chernobyl. The radiological catastrophe has resulted in an ongoing human security crisis due to the failures of successive Japanese governments to protect the human rights of survivors of the Fukushima nuclear catastrophe. While the disaster had an undeniably enormous impact on all those in the affected communities – whether they chose to evacuate or to stay – the burden and consequences have created a disproportionate and continuing impact on vulnerable populations, notably women, children, the elderly, and the disabled.

Greenpeace is particularly concerned with the violations of women's and children's rights, both in the immediate aftermath and as a result of the current reconstruction policies, as they are more vulnerable to both the health effects of radiation exposure and are at greater economic and political disadvantage. These violations include: the right to the highest attainable standard of physical and mental health, including the right to information and participation in matters impacting one's health; the right to a healthy environment; the right to housing; the rights of Internally Displaced Persons – including the unique needs of vulnerable groups, such as the right of women to be protected from gender-based violence; and the rights of the Child to participation, health, survival, and development – including the right to play.

A decade prior to the Fukushima Daiichi disaster, the government of Japan had been warned of serious policy failures regarding its civil nuclear program and emergency planning by the UN Committee on Economic, Social and Cultural Rights.[2] These issues included a lack of transparency regarding the safety of nuclear installations and a lack of adequate preparation and early response in the event of a nuclear accident. These problems were not adequately addressed, which resulted in numerous human rights violations when the disaster occurred.

While the violations that occurred in the aftermath of the disaster can largely be characterized as systemic policy failure and lack of legislative action on known issues, the current policies of the Abe government on nuclear reactor restarts and the repopulation of the contaminated zones can only be characterized as deliberate, structural violence against the victims of the Fukushima disaster.

In the emergency phase of the accident, the Japanese government redefined the acceptable level of radiation exposure to 20 mSv/year for Fukushima-impacted areas.[3] Thus, designations for evacuation zones were quite limited – restricted to areas where cumulative yearly doses would reach 20 mSv or above. Those who evacuated from contaminated areas that fell under this significantly increased limit became so-called "self-evacuees", as they were not subject to a mandatory order. The current repopulation policy means that Fukushima victims from within the designated areas will lose their already inadequate compensation payments one year after the evacuation orders are lifted. Evacuees from outside the evacuation order area are currently facing with the loss of their housing support. Women, already at a severe economic disadvantage, will be more heavily impacted. Many may be forced to return to Fukushima against their wishes.

This impossible dilemma – whether to return for economic reasons or to try to stay in the uncontaminated community to which they evacuated without any support – is a looming human rights crisis. And, it is but one in a successive list of human rights violations perpetrated by the Japanese government against the Fukushima nuclear victims.

Political & Legal Framework

Japan is party to the International Covenant on Economic, Social and Cultural Rights; the Convention on the Elimination of All Forms of Racial Discrimination; the Convention on the Elimination of All Forms of Discrimination Against Women; the Convention on the Rights of the Child, including its two Optional Protocols; and the International Convention for the Protection of All Persons from Enforced Disappearance. These treaties obligate Japan to uphold citizens' right to health, defined as the: "right of everyone to the enjoyment of the highest attainable standard of physical and mental health."

Inherent in the right to health is the right to knowledge and participation, so that individuals may make informed choices regarding their health.

Japan's constitution, Articles 13 and 25, also enshrines the protection of Personal Rights – so much so that a district court judge ruled in 2014 that the threat to individuals' personal rights, particularly the threat to health and lifestyle, by an impending restart of the Ohi 3&4 nuclear reactors violated Japan's constitution.

In addition, while Japan's Diet unanimously approved a special law, the Nuclear Disaster Victims Support Act of 2012[4], to ensure long-term support for the disaster victims and to guarantee them necessary information to enable them to make freely informed decisions about where to live, their domestically guaranteed rights under this law are being violated at the same time as their international human rights are denied.

Lack of Participation and Representation

Women were, and continue to be, significantly underrepresented in decision-making bodies for emergency planning, evacuation center leadership, and reconstruction. Thus, in the emergency response in 2011, women had little say in decisions that immediately affected them, as was noted in the 2013 report by the UN Special Rapporteur on the Right to Health[5] Anand Grover following his visit to Japan to assess the situation of Fukushima disaster survivors.[6]

This lack of representation and opportunity to participate in decisions that directly affect the lives of women has persisted in the Japanese Government's reconstruction efforts. The Reconstruction Agency's senior management, including the federal Minister, State Ministers, and Parliamentary Vice-Ministers are all men.[7] Further, the regional bureau and branch chiefs and vice-chiefs are also all male.[8] The national Reconstruction Promotion Council[9], a Ministerial-level entity headed by Prime Minister Shinzo Abe, which includes all 19 Ministers, eight of the Vice-Ministers, and the Deputy Chief Cabinet Secretary, does have three women out of its total 29 participants. This is solely because it is a cross-agency council, and the Defense Minister, the Minister in charge of the Tokyo Olympic and Paralympic Games, and the Minister for Internal Affairs and Communications/Minister of State for the Social Security and Tax Number System are women. This body is responsible for the coordination and implementation of the reconstruction efforts. Further, the Reconstruction Promotion Committee[10] – which monitors the reconstruction progress and acts as an expert advisory body to the Prime Minister – does include five women on a committee of 15 people. Yet even here, women are outnumbered 2 to 1.

Given this gross underrepresentation of women in the decision-making and advisory bodies that are creating and implementing the reconstruction policies, including the lifting of evacuation orders, the opportunity for women's interests, needs, and concerns to be reflected in formal policies is all but non-existent.

Radiological Contamination and Resettlement

While environmental contamination, even to known carcinogens such as radiation, is impossible to link definitively to individual cases of cancer or other known health outcomes, numerous epidemiological studies of chronic low-dose exposure across diverse populations have demonstrated significant effects on human health. Concern regarding the exposure of vulnerable populations to the significantly raised, post-disaster 20 mSv/year limit was expressed by the Japan Medical Association early on.[11] This was echoed in UN Special Rapporteur Grover's 2013 report to the UN.[12]

Despite this, the Japanese government has maintained its post-disaster elevated limit of up to 20 mSv/year as its resettlement standard. It is important to understand that an area with a 20 mSv/year dose rate in 2011 would result in a much lower lifetime dose for someone residing there than an area at 20 mSv/year in 2017. This is because an area with contamination causing dose exposures up to 20 mSv/year in 2011 would include both long- and shorter-lived radionuclides. For these areas, fairly rapid reductions in radiation levels would be expected in the next 5 years due to the fast decay of these short-lived radionuclides. In contrast, in 2017, as short-lived radionuclides have largely decayed, contamination is primarily from long-lived radionuclides that persist in the environment for decades to centuries. Thus, an area with contamination causing dose exposures up to 20 mSv/year currently will remain persistently contaminated at high levels for the foreseeable future, with very gradual reductions largely following the long decay times of the radionuclides present.

Women and children are more vulnerable to the effects of ionizing radiation than are adult men. Further, female fetuses, infants and girls are at far greater risk than their male counterparts (See Annex A). It is particularly important for women who are pregnant or may become pregnant to avoid unnecessary, i.e. excluding medically required, ionizing radiation

exposures, both internal and external. Thus, the violation of women's human rights in the wake of the Fukushima disaster and the Government's resettlement policy is particularly pointed in this area: while radiation exposure poses a myriad of potential health risks for all people, it is women and girls who are most vulnerable to its effects – the same population that is less able, as a whole, to protect themselves from radiation exposure due to unequal power distribution between the sexes within households and in broader Japanese society.

The Greenpeace Radiation Protection Advisors team[1] has conducted numerous radiation monitoring surveys in the contaminated region starting from two weeks after the disaster began, including in Iitate Village where orders will largely be lifted on 31st March 2017, apart from Area 3. Due to significantly delayed evacuation in 2011, the people of Iitate were the most exposed population in Japan to the radiological contamination from the Fukushima nuclear disaster. The lifting of evacuation orders will move forward, despite the fact that only 24% of the total area of Iitate has been decontaminated (5,600ha[13] out of a total area of 23,013 ha[14]). Even after decontamination work is completed, radiation levels remain too high for citizens to safely live there. A year later, former residents of the areas lifted will lose their compensation payments, whether they return or not.

The most recent Greenpeace case study of houses in Iitate where orders will be lifted showed that if residents were to move back, they would receive a lifetime dose over 70 years, beginning from March 2017, of up to 183 mSv.[15] This would be in addition to the unknown, very high doses received in the month or more they resided here after the disaster began in 2011. This also assumes they remain in the areas decontaminated, and do not venture into the untouched and heavily contaminated forests. In this rural community, the forest was an integral part of life for the villagers, including not only livelihoods dependent on forestry, but also providing seasonal wild foodstuffs and wood burned for heating. Further, the recontamination of decontaminated areas is an ever-present risk, and one that increases with spring snowmelt and autumn typhoons.[16]

The resettlement policy does not acknowledge this increases risk to women and children living in a contaminated environment, but actively downplays those risks. Children appear to be particularly targeted by this effort. As was noted by UN Special Rapporteur Grover misleading information was presented to children in their textbooks as mandatory reading.[17] This means that decisions taken by children cannot be said to be freely made as they are likely based upon inaccurate or incomplete representations of the facts. Rather than the situation improving, it would appear the desensitization of children to the risks posed by radiation exposure is both systematic and increasing (See Annex B). This lack of accurate information, paired with the loss of housing support for those evacuated from outside the designated zones in March 2017, and the loss of compensation payments to evacuees in the areas where orders are scheduled to be lifted in March 2018, presents an urgent and immediate threat to survivors' right to life, right to health, right to housing, and right to environment.

Mental Health

It is quite clear that the mental health consequences of the Fukushima disaster are pervasive and potentially life-threatening. In a region of Japan that already was economically disadvantaged[18] and had suffered much higher suicide rates before the disaster than the average for Japan, the ongoing radiological crisis has exacerbated the problem.[19] In 2014, the suicide rates in the three hardest-hit prefectures (Fukushima, Iwate, and Miyagi) ranged between 110 -138 suicides per 100,000 people. The average for Japan that year was only a fraction of that at 19.9 suicides/100,000 people.[20]

Post-disaster mental health assessments of Fukushima victims have shown shockingly high rates of depression and PTSD symptoms. One case study of survivors from Hirono in Fukushima prefecture found that: "53.5% [of participants] exhibited the clinically concerning symptoms of PTSD, and among them 33.2% indicated clinical PTSD symptoms. Additionally, 66.8% reported symptoms of depression, and among them 33.2% showed mildly depressive symptoms, while 19.1% and 14.5% demonstrated moderate and severe depressive symptoms, respectively."[21] Women, particularly mothers, are also one of the highest risk groups for mental illness resulting from the disaster (See Annex C).

[1] The Greenpeace Radiation Protection Advisor (RPA) is an international team comprised of highly-trained, expert staff members that advise Greenpeace offices working in potentially contaminated environments. In the wake of Fukushima, this team led the Greenpeace emergency response and radiation monitoring work in the disaster zone. It is helmed by Dr. Rianne Teule.

Disproportionate Economic Impacts

Disasters exacerbate underlying social issues within a society[22] – and the ongoing Fukushima nuclear disaster is no exception. Women in Japan are at a significant economic disadvantage due to the enormous disparity in earned income between the sexes.[23] As a result, women were in a uniquely disadvantaged position for coping with the impacts of the Fukushima Daiichi disaster according to their own wishes. This disparity was exacerbated in the aftermath of the disaster when initiatives for industrial recovery in the impacted areas were suspended. As funds dried up, temporary workers were targeted for termination – and women made up 70% of those temporary workers. It was their employment and income that faced the greatest insecurity and was most impacted.[24]

Compounding these economic hardships, the Japanese Civil Code treats each household as a unit. Support and compensation payments are directed solely to the head of household, which is typically the adult male. This worsens unequal household power distribution and decision-making ability and is particularly cruel in domestic violence situations.[25] Female Fukushima evacuees thus face a unique set of circumstances that place them at greater risk for poverty, including: significantly less pre-disaster income than their male counterparts; loss of income and property post-disaster; marital discord resulting from differences of opinion on radiation risks and whether to evacuate resulting in a potential split with the primary income earner in the household; lack of access to compensation money and/or inadequate compensation; and relocation and child rearing costs.[26]

The Japanese government continues to fail to address this problem. According to a 2013 analysis by Y. Ando, of the Fukushima Bar Association, in the disaster recovery efforts: "[t]here is no emphasis however, on assisting women to become financially independent, women's workplaces and the conditions and foundations for business start-ups by women are not being supported, and many women are now left facing poverty. Single mothers are especially challenged by these conditions."[27]

Recommendations

Greenpeace urges the Human Rights Council to call upon the Japanese government to take immediate action to:

1. Ensure survivors are fully compensated for their losses – including continuation of compensation payments and housing support for those who choose to remain evacuated, and compensation for those returning for their loss of community, in order that individuals may freely exercise their right to choose where to live; and,

2. Provide full, complete, accurate, and easily accessible information regarding radiation levels, the scope of decontamination efforts, and radiation risks to the public, including age-appropriate materials for children; and,

3. Provide full, readily available access for Fukushima victims to their own and their dependents' medical files and test results; and,

4. Reduce the acceptable additional annual exposure level in Fukushima-impacted areas to a maximum of 1 mSv/year, which would reflect the international standard; and,

5. Ensure full and equal public participation and a formal role for women as well as men in all decision-making processes regarding future lifting of evacuation orders, emergency planning schemes, and nuclear restart decisions; and,

6. Ensure the equal representation of women in leadership positions on emergency planning entities, and full consultation and inclusion of the elderly and disabled; and,

7. Develop and support initiatives aimed at helping Fukushima-impacted women achieve financial independence including, but not limited to, supporting women's startup businesses, addressing income gaps, and improving the conditions and workplaces of women; and,

8. Appoint a public ombudsperson for children, responsible for safeguarding the rights of children and young persons, especially those affected by the Fukushima Daiichi nuclear disaster.

[1] Defined as a "major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures." INES: The International Nuclear and Radiological Event Scale User's Manual. 2008 Ed. IAEA-INES-2009; 206 pp.; 7 figures; Date Published: 2013. Pg. 3. *International Atomic Energy Agency*. http://www-pub.iaea.org/books/IAEABooks/10508/INES-The-International-Nuclear-and-Radiological-Event-Scale-User-s-Manual-2008-Edition

[2] Japan Federation of Bar Associations. (17 February 2012). "Submission to the Pre-Sessional Working Group of the Committee on Economic, Social and Cultural Rights." Pg.100. http://www.nichibenren.or.jp/library/ja/kokusai/humanrights_library/treaty/data/Submission_to_the_PSWG_of_CESCR_en.pdf

[3] Istituto Internazionale Maria Ausiliatrice (IIMA). (14 October 2012). "The Situation on the Rights of the Child in Japan." *Submitted to the Human Rights Council: Universal Periodic Review of Japan*.. http://lib.ohchr.org/HRBodies/UPR/Documents/Session14/JP/IIMA_UPR_JPN_S14_2012_InstituInternatioMariaAulistair_E.pdf
See also: Save the Children. (November 2012). "NGO Submission to the Universal Periodic Review of Japan - November 2012." *Submitted to the UN Human Rights Council*. http://www.savechildren.or.jp/scjcms/dat/img/blog/864/1340084800334.pdf

[4] "Act on Promotion of Support Measures for the Lives of Disaster Victims to Protect and Support Children and Other Residents Suffering Damage due to Tokyo Electric Power Company's Nuclear Accident." *Act No. 48 of June 27, 2012. http://www.japaneselawtranslation.go.jp/law/detail/?kn%5B%5D=と&re=02&ky=株式&page=2*

[5] These failures resulted in a lack of preventative measures to mitigate gender-based violence, a lack of support networks for victims of sexual and domestic abuse, an inability to access resources, as compensation payments were predominantly distributed to male heads-of-household (a particular problem in domestic violence situations), and a lack of basic needs being met in evacuation centers, such as the provision of sanitary materials and privacy for changing clothing and breastfeeding. See, Grover, A. (2 May 2013). "Report of the Special Rapporteur on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, Anand Grover. Addendum. Mission to Japan (15 - 26 November 2012)." Human Rights Council. United Nations. Twenty-third Session. Agenda Item 3. Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development. http://www.ohchr.org/Documents/HRBodies/HRCouncil/RegularSession/Session23/A-HRC 23-41-Add3_en.pdf

[6] Unequal Impact: Women's and Children's Human Rights Violations and the Fukushima Daiichi Nuclear Accident. March 2017. *Greenpeace Japan*. http://www.greenpeace.org/japan/Global/japan/pdf/Uequal-impact-en.pdf

[7] Reconstruction Agency: About Us. English. http://www.reconstruction.go.jp/english/topics/About_us/ *Accessed 17 March 2017.*

[8] This information was not available on the website or in any readily accessible document. Greenpeace, thus, called the three regional bureaus directly (Fukushima, Miyagi, and Iwate) to request this information for both the regional and branch offices. This statement is based on the verbal information provided by the three regional offices in March 2017.

[9] 復興推進会議 構成員 http://www.reconstruction.go.jp/topics/main-cat7/sub-cat7-1/20170310_sankoushiryou1.pdf

[10] 復興推進委員会 委員名簿 http://www.reconstruction.go.jp/topics/main-cat7/sub-cat7-2/20170306_fukkohsuishin-iinkai.pdf

[11] "The scientific basis for choosing the maximum amount of 20 mSv in the band of 1 to 20 mSv is not clear. The government's action should be more carefully deliberated considering the fact that growing children are more sensitive to radiation exposure compared to adults. We as a nation should make the utmost effort to reduce the exposure to radiation of children, as well as adults. We are responsible for the children's health and life. . . We urgently request that the Japanese National government strive to reduce children's exposure to radiation in the fastest and most effective way possible.[*translated from Japanese]*. ***See,*** 文部科学省「福島県内の学校・校庭等の利用判断における暫定的な考え方」に対する日本医師会の見解 (12 May 2011). http://dl.med.or.jp/dl-med/teireikaiken/20110512_31.pdf ***See for translation:*** The Fukushima Network for Saving Children from Radiation, et. al. (17 August 2011). "Violation of the Human Rights of the Children of Fukushima" NGO submission to the Office of the High Commissioner for Human Rights/OHCHR. http://www.foejapan.org/en/news/110819.pdf

[12] The report stated: "However, life span epidemiological studies of survivors of Hiroshima and Nagasaki bombings point to causal links between long-term exposure to low doses of radiation and the increased incidence of cancer. ***The Special Rapporteur considers that disregarding these findings diminishes the understanding of and increases vulnerability to health effects of long-term exposure to low-dose ionising radiation*** [emphasis added]." ***See***: Grover, A. *op. cit.* (2013).

[13]住民の皆さまへ 安心できる毎日を。除染情報サイト。飯舘村。http://josen.env.go.jp/area/details/iitate.html *Accessed 27 Jan. 2017*

[14] Ministry of Agriculture Forestry and Fisheries. Iitate Village. *Government of Japan.* http://www.machimura.maff.go.jp/machi/contents/07/564/details.html *Accessed 27 Jan. 2017.*

[15] "No Return to Normal: House Case Studies of the Current Situation and Potential Lifetime Radiation Exposure in Iitate, Fukushima Prefecture." February 2017. *Greenpeace Japan*. http://www.greenpeace.org/japan/Global/japan/pdf/NRN_FINweb4.pdf

[16] "Radiation Reloaded: The Ecological Consequences of the Fukushima Daiichi Nuclear Disaster – 5 years later." *Greenpeace Japan*. (March 2016). http://www.greenpeace.org/japan/Global/japan/pdf/GPJ-Fukushima-Radiation-Reloaded-Report.pdf

[17] Grover, A. *op cit*. (2013).

[18] Goto, A., E. Bromet and K. Fujimori (2015). "Immediate effects of the Fukushima nuclear power plant disaster on depressive symptoms among mothers with infants: a prefectural wide cross-sectional study from the Fukushima Health Management Survey." BCM Psychiatry (*for the Pregnancy and Birth Survey Group of the Fukushima Health Management Survey*). 15:59. DOI 10.1186/s12888-015-0443-8
See also: Tetsuya, T. (2014, May). "What March 11 Means to Me: Nuclear Power and the Sacrificial System." Asia-Pacific Journal: Japan Focus. Vol. 12, 19:1. http://apjjf.org/2014/12/19/Takahashi-Tetsuya/4114/article.html

[19] Worland, J. (11 March 2016). "This May Be the Biggest Health Threat From Fukushima—And It's Still Ongoing." *TIME*. http://time.com/4256088/fukushima-mental-health/

[20] "TABLE: Suicide deaths in prefectures affected by the earthquake and tsunami of March, 2011." *Sourced from Cabinet Office, Japan & Japan Reconstruction Agency.* http://www.thelancet.com/action/showFullTableImage?tableId=tbl1&pii=S0140673615608902X

[21] Kukihara, H., et al. (2014). "Trauma, depression, and resilience of earthquake/tsunami/ nuclear disaster survivors of Hirono, Fukushima, Japan." *Psychiatry and Clinical Neurosciences*; 68: 524–533. doi:10.1111/pcn.12159

[22] Wisner, B., et al. (2003). "At Risk: Natural hazards, People's Vulnerability and Natural Disasters. 2nd Ed. Pg. 11. http://www.preventionweb.net/files/670_72351.pdf ***See also***: Ando, Y. (30 April 2013). *"Fukushima and Nuclear Crisis 2011 with Gender View."* Fukushima Bar Association, Japan. Chapter 15. Healthcare Management and Economics: Perspectives on Public and Private Administration: Perspectives on Public and Private Administration. Merviö, Mika Markus.. IGI Global. http://www.igi-global.com/book/healthcare-management-economics/72354

[23] "Data: Gender Wage Gap." *OECD: Gender Equality*. https://www.oecd.org/gender/data/genderwagegap.htm

[24] Ando, Y. *op. cit.* (2013).

[25] *Ibid.*

[26] Greenpeace Japan. *op. cit.* (March 2017).

[27] Ando, Y. *op. cit.* (2013).

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Annex A: Health and Ionizing Radiation Exposure – women & children at greater risk

In the immediate aftermath of the Fukushima Daiichi disaster, the Japanese government raised the acceptable level of exposure for the general public to 20m/Sv per year as an emergency measure. It should be noted that the 20 mSv/year standard is the same level as nuclear workers' annual limit, averaged over a 5-year period, per the International Commission on Radiological Protection (ICRP) recommendations.[1] For children aged 16-18 that are in apprenticeships for radiation-related fields, the International Atomic Energy Agency (IAEA) stipulates that exposures should be no more than 6 mSv/year.

This low-dose, chronic exposure of nuclear workers has well-documented health consequences. For example, a 15-country collaborative research study of 400,000 nuclear workers, which encompassed 5.2 million person-years of follow-up, a significant association between radiation dose and all-cause mortality was found.[2] This was primarily due to dose-related increases in all-cancer mortality, excluding leukemia.

The increased mortality risks of long-term, low dose exposures for nuclear workers is obviously concerning. Yet, it is quite a different situation for employees to willingly accept these increased risks than it is for the public, including women and children, to be exposed in their daily lives to the same radiation risks as nuclear workers. In addition, the current resettlement limit of up to 20 mSv/year is 20 times higher than both international and Japanese standards (outside Fukushima-impacted areas) for "acceptable" exposures of the general public to human-made radiation, and also long-term decontamination targets for the contaminated region.

Epidemiological studies of atomic bomb survivors have also clearly shown a strong dose-response relationship, as well has the greater vulnerability of women and girls to radiation exposures. According to a report from the U.S. National Academy of Sciences (NAS), which examined an enormous body of research on atomic bomb survivors: "dose related increases in both cancer and non-cancer mortality imply that longevity is related to dose . . . there is a clear decrease in median life expectancy with increasing radiation dose . . .[3]

The NAS analysis noted that there were 10 cancers related to *in utero* radiation exposure, with a statistically significant dose-response correlation; the findings for fetuses were not significantly different from those exposed at 5 years or younger. However, ***9 of these 10 cancers occurred in females, and the significant difference between the sexes persisted even when female-specific cancers were excluded (breast, ovary, and uterus).***[4]

Further, the decrease in risk for developing leukemia with attained age was more rapid for men than for women.[5] The Excess Relative Risk (ERR, which quantifies the increased risk for persons with a given radiation dose compared to non-exposed persons) for all solid cancer mortality, excluding leukemia and other hematopoietic (i.e. blood) cancers, for females was double that of males.[6]

For site-specific cancers (stomach, colon, liver, lung, and female breast) the largest ERR per Sievert radiation dose (ERR/Sv) was for breast cancer.[7] Proliferative breast disease, both in general and atypical hyperplasia (i.e. precancerous accumulation of abnormal breast cells), was positively associated with radiation dose, with the strongest association in the 40-49 age-at-exposure cohort.[8] Researchers hypothesize that this is related to the age-at-exposure risk for radiation-induced breast cancer, and that potential cancers induced in this age group received too little hormonal exposure to progress to full-blown cancers.[9]

The ERR/Sv for females for stomach cancer was found to be about three times that of males.[10] The sex association for lung cancer is similarly strong, with female ERR/Sv at about 4 times that of males.[11]

It is also worth noting that, despite misleading information presented to Fukushima survivors – including pregnant women and children – regarding risks at doses below 100 mSv, the report highlights research that found evidence of a statistically significant dose-response ratio for solid cancers at low radiation dose levels (0 - 100 mSv).[12] Statistically significant dose-response was also found for nervous system cancers and schwannomas[13] (i.e. nerve sheath tumors) at low dose levels (less than 1 Sv).[14] Similarly, while non-cancer radiation-induced diseases were not found to differ significantly between the

sexes, researchers did note statistically significant dose-response relationships for heart disease, stroke, respiratory disease and digestive disease.[15]

The increased vulnerability of women to the impacts of radiation exposure is further corroborated by studies of diagnostic medical exposures. One study of CT scans found that though there was variance of exposure levels between hospitals and procedures, women – particularly young women – were at significantly greater risk than men for developing cancer from diagnostic procedures.[16] For example, for women who underwent a coronary angiography CT at the age of 40, their risk of developing cancer from the procedure was 1 in 270. For men, the risk was 1 in 600. For 20 year olds, the risk doubled.

Further, fetuses, infants and children are particularly vulnerable. One study analyzed the lifetime cancer mortality risks of individuals who had undergone pediatric (under 15 years at the time of the procedure) CT brain and/or abdominal scans.[17] It concluded that the lifetime cancer mortality rates attributable to the CT scans were an order of magnitude higher for pediatric patients than for individuals who were adults at the time of receiving the scan. Women were also at greater risk for developing cancer as a result of the pediatric CT scans, though this increased risk was primarily for abdominal examinations.

Other studies appear to show that fetal low dose exposures seem to confer greater health risk than for any other group, including infants and children. Studies have also shown that a single x-ray examination of the abdomen of a pregnant woman increased the likelihood of childhood cancers by 40-50%.[18] These studies also found that the risk for childhood cancers increased proportionately to the amount of in utero x-ray exposure.

The placenta can also transfer radionuclides that have been ingested or inhaled to the developing fetus.[19] Radionuclides that accumulate in the bladder can cause radiation exposure to the nearby fetus as well.[20] Depending on the stage of development and the dose received, such exposures can result in a wide range of impacts, such as pregnancy loss, malformations, neurobehavioral abnormalities, fetal growth retardation, and cancer.[21]

One study appears to show the effects of the Fukushima nuclear disaster on pregnant women less than a year after the disaster, albeit the researchers conclude the observed effects were likely a result of the impact on sperm and ovum, rather than on embryo and fetus.[22] The authors had noted that in the aftermath of the Chernobyl disaster, perinatal mortality rates increased after a 10-month time lag. In an effort to determine whether a similar uptick in perinatal deaths was evident after the Fukushima disaster, the researchers analyzed perinatal mortality data for the 47 prefectures of Japan from live births at 22 weeks of pregnancy to seven days after birth from 2001 - 2014. The data was solely sourced from the Japanese government's records. The study compared unaffected and less affected prefectures nationwide with the heavily contaminated (Fukushima, Gunma, Ibaraki, Iwate, Miyagi, and Tochigi) and moderately contaminated prefectures (Chiba, Saitama, and Tokyo).

To evaluate the impacts of the tsunami and earthquake, which might also influence perinatal mortality, the authors further divided the heavily contaminated prefectures into two groups based upon the number of dead and missing. Group 1 (Iwate and Miyagi) suffered the high rates of dead and missing due to the tsunami and earthquake. Group 2 (Fukushima, Ibaraki, Tochigi, and Gunma) were heavily impacted by the nuclear disaster, but suffered casualty and missing person rates 20 times lower than those of Group 1.

The results showed that for Group 1, there was a significant increase of more than 50% in perinatal mortality immediately following the earthquake and tsunami in March and April 2011, with no further increases the rest of the year. In Group 2, there was no significant increase in perinatal mortality in the immediate aftermath and for the remainder of 2011. However, all six of these heavily contaminated prefectures showed a long-term jump in infant mortality rates 10 months after the nuclear disaster, from January 2012 onwards, of approximately 15%. In the less contaminated prefectures of Chiba, Saitama, and Tokyo, perinatal mortality also increased 10 months after the disaster, albeit at the lower rate of 6.8%.

In these prefectures, perinatal mortality has steadily fallen, though at an elevated rate from previous trends.
No similar jump in perinatal rates was observed in prefectures unaffected by the disaster, where perinatal mortality continued to steadily fall with national trends over the time period studied. The authors conclude that these findings are consistent with those seen in Europe following the Chernobyl nuclear accident, though more study is needed. Given the 10-month time lag, the authors also note that this suggests an impact on ovum and sperm.

Further, children are at greater risk for developing thyroid cancer following exposures to radioactive iodine (^{131}I), as was seen in Chernobyl.[23] The risk can be greatly reduced if stable iodine pills are distributed immediately following an accident, which saturates the thyroid and inhibits the uptake of ^{131}I. In Fukushima, orders to distribute the iodine pills that were waiting in stock in the towns in the emergency planning zone were delayed until 5 days after the accident. By then, many residents had already fled the nuclear disaster area, and the window had passed for the pills to be effective in their preventative role.[24] This likely meant that many children were exposed to preventable high doses of radioactive iodine.

In June 2011, the Fukushima Prefectural People's Health Management Survey was launched to conduct thyroid screenings of people who were under the age of 18 at the time of the radioactive releases due to the triple reactor core meltdowns. The study was headed by Professor Yamashita Shunichi and Prof. Suzuki Shinichi, who stated that its purpose was, "to calm the anxiety of the population" and to convince the public that "the health impact of the nuclear accident of Fukushima can be assumed to be very minor."[25] The credibility of this research has been called into question by outside observers,[26] given that the head researchers began with the commitment to a stated outcome before the study even began – much less any results known.

But perhaps the worst aspect of this study is the difficulties for patients and their parents have faced in gaining access to their own medical files. While patients were given a poor-quality print of their ultrasound results (supposedly to prevent forgery), they have been forced to file Freedom of Information (FOI) requests to gain access to their own complete medical files.[27] This is not only wholly unfair, but is a gross violation of their right to health – including their right to information.

There is an ongoing contentious debate over the causes of the higher-than-expected thyroid abnormalities and cancers amongst Fukushima children. It is unclear whether this is a result of radiation exposure or of screening bias (i.e. more abnormalities and cancers are found due to widespread screening). As of December 2016, 145 children were found to have thyroid cancer.[28]

Numerous bodies and scientists have proposed that the increase in the detection of thyroid abnormalities in Fukushima children in the years immediately following the accident is due to screening bias and more sensitive ultrasonic testing.[29] The Fukushima prefectural review panel conclusion is that the results can be most likely explained through the screening effect and is unlikely to be due to radiation exposure.[30]

This is not the view of others, who contend that the incidence of thyroid cancer detected in Fukushima, when compared to national levels, cannot be explained solely based on screening. These experts assert that the high incidence can be explained, to a significant degree, by exposure to radiation.[31]

The French national nuclear research organization, Institute for Radiological Protection and Nuclear Safety (IRSN), analyzed studies of children from four prefectures not effected by the Fukushima Daiichi accident, as a control group. IRSN then concluded that it would appear the increases were due to screening bias due to similar results in nuclear disaster impacted areas and those prefectures that were not affected.[32] At the same time, the IRSN also holds that the screening program must continue and that, "a connection with the Fukushima accident may only be made if the annual incidence of thyroid cancer in children increases starting from the period 2016-2018."

This is recognition that thyroid cancer has a long latency period. In fact, significant increases in thyroid cancer incidence for those who were children and teenagers at the time of the 1986 Chernobyl nuclear disaster did not become evident in most regions until between 4-5 years after the disaster.[33]

As such, these next years will be critical for the continuation of the robust screening program for thyroid cancers in individuals who were children at the time of the disaster. Test results and complete medical files must be easily accessible to patients and/or the parents/legal guardians of dependent patients.

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Annex B: Children's Rights

While the international conventions to which Japan is party also make clear that children have the right to access accurate information to make informed choices, the Japanese government instead opted to specifically target children with a misinformation campaign regarding the risks of radiation in the environment. Specifically, materials that have been provided – and even mandated school reading[1] – downplay the risks of radiation exposure such that it may provide a false sense of security, leading to greater radiation exposures. Further, activities are being organized for children that would make it appear that radiation is not something of much concern. This has resulted in avoidable exposures of this vulnerable population to Fukushima radiological contamination.

For example, National Road 6 – which runs along the coast past the Fukushima Daiichi nuclear plant – was identified for clean-up by the "Happy Road Network." Middle and high school children who were members of beautification clubs were then mobilized to participate in cleaning up sections of the road in Fukushima prefecture.[2] Although children were not allowed in the most heavily contaminated sections of road, basic radiation protection measures were not taken. Few used gloves, and fewer still wore masks.

In an even more shocking example, in November 2016, 13 Fukushima High School students were sent on a school field trip to the crippled reactor site. [3]They spent an hour touring the site, including near the number 1 reactor which had its cover removed at the time of the visit. Prior to this visit, TEPCO had not permitted anyone under the age of 18 to visit the reactor site, due to the prohibition under the Labor Standards Act on employing people under this age in areas with harmful radiation.

The students visiting the plant were guided by their teachers and a Tokyo University physics professor. This is a clear case where children, including young girls who are far more vulnerable to the effects of radiation, were encouraged and guided by adults in whom they trusted to take an unnecessary risk. They were thus unjustifiably exposed to excess human-made radiation, which is in breach of the justification and ALARA (As Low As Reasonably Achievable) principles, the internationally agreed basic radiation protection concepts. This is a definitive case wherein children's right to participation – based upon their ability to access accurate information – was deliberately violated by adults who were perceived as authority figures.

In addition, the government has relied on Whole Body Counters (WBC) to determine population doses. This is problematic for several reasons: it only measures gamma radiation (hence the effect of beta and alpha emitting particles is not assessed), the detection limit for ^{134}Cs and ^{137}Cs is usually only about 300 Bq/kg (meaning lower doses that may still impact human health are disregarded), and there are large uncertainties in evaluating the equivalent radiation dose based on the WBC measurements.[4] As children are more vulnerable than adults, this may have greater implications for them.

This also means that the doses recorded are based upon lifestyle changes that violate children's human rights – namely the right to play – as children are often kept indoors by their caretakers to avoid radiation exposure. The government has been using the measurements taken by the WBC as justification for people living in or returning to contaminated areas. However, this then embeds this obstructed childhood into formal policy, wherein children cannot safely play outside and must avoid doing so in order to meet the levels measured by the WBC that form the basis for their being permitted to live there to begin with. Thus, Japan is ignoring its obligation to form policies based upon what is in the best interest of the child, and instead has chosen to create policies that are in direct violation of children's internationally recognized human rights – the right to health, survival, and development – which include the right to play.

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Annex C: Mental Health

Trauma research has clearly shown that exposure to disasters increases the likelihood for Post-Traumatic Stress Disorder (PTSD) and other mental illnesses, including anxiety, depression, and other negative outcomes. Further, a review of studies of the psychological impacts of disasters, encompassing human-made (mass shootings, acts of war, etc.), technological (radiological and chemical accidents, plane crashes, etc.) and natural disasters, found that PTSD rates for natural disasters were significantly lower among survivors than they were for human-made and technological disasters.[1]

Another study that focused specifically on the mental health impacts of nuclear disasters on survivors – Three Mile Island, Chernobyl, and Fukushima – not only found increased rates of mental illness among survivors, but that mothers with young children were one of the two highest risk groups – the other being first responders.[2]

This would be consistent with another study of mothers, with infants in the Fukushima-impacted region, which found that depression rates were highest in the areas closest to the Fukushima Daiichi site and lowest in areas least affected by the nuclear disaster.[3] In addition, the authors note that the percentage of Fukushima-impacted women with depressive symptoms six months after giving birth was remarkably high at 27.6%. Predictive models would indicate only 14% of mothers in this study should screen positive for depressive post-partum symptoms after that length of time following giving birth.

Thus, women are not only at greater risk due to the physical impacts of radiation, but are at greater risk of suffering mental health consequences as well. And while human-made, technological disasters increase the likelihood of mental illnesses in both genders, this greater mental health vulnerability for women may be due to a number of compounding factors that are directly related to the nuclear disaster and the emergency response policy failures[4], though not related to physical effects of radiation itself, including: increased domestic tensions, violence and/or sexual assault; loss of support networks and lack of legal protections; loss of income and employment; inability to access compensation payments due to distribution to male heads of household; challenges in taking action to evacuate and/or take actions to protect oneself and children against radiation due to domestic disagreements and lack of financial resources; and, of course, concern about radiation exposure of themselves and their children.

Further, it should be noted that foreign-born women, who lacked strong community ties, were particularly isolated in the aftermath of the disaster. Though the vast majority of victims were Japanese, the lack of both formal and social support networks for foreign-born Fukushima survivors meant these women had even fewer resources for coping with psychological stresses wrought by the disaster and evacuation.[5]

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