

# Radiation More Harmful to Girls and Women than to Boys and Men

By Mary Olson

*Editor's note: The author, the founder of the Gender and Radiation Impact Project,\* spoke to the Vienna Conference on the Impact of Nuclear Weapons. Because of the significance of her findings on harms of radiation exposure, we share an edited version of her remarks.*

On July 16, 1945, the first nuclear weapon [uranium fission] detonation was conducted in south central New Mexico and was code-named "Trinity." There were roughly 15,000 children, women, and men living within fifty miles of the test site.

My focus is on the prompt gamma and neutron pulse from fission — it is 5% of the total release. More than 2,000 nuclear explosions have already occurred. Our planet is already deeply contaminated, even without waging a full-scale nuclear war.

My government chose to use the first nuclear weapons on cities full of people. More than 200,000 people perished in the blasts or soon after.

Five years later, the United States initiated a long-term study of some of the Japanese atomic bomb survivors. Researchers assumed that humanitarian aid might "skew the results" of their study. They did not provide medical treatment to the victims they studied.

This data resulting from the atomic attacks on Hiroshima and Nagasaki is used widely, including by me, here. I need to say I am sorry. I deeply regret this history. I continue to use these numbers because what they say is vital to our survival.

Radiation is invisible but we can see the damage it has done to chromosomes. Dicentric [or double centered] and other chromosomal aberrations are common in people who have suffered acute radiation exposure.

When reproductive cells are harmed, deformations are one outcome. This happens to all babies: plants, animals, and humans. [Adults] can also suffer loss

of fertility, spontaneous abortion, and miscarriage, possible heritable mutations, and avoidance of reproduction due to uncertainty. Nuclear colonialism is responsible for disproportionate harm to Indigenous Peoples from nuclear weapons testing.

A clear spike in the death of infants [under 1 year old] followed the 1945 Trinity nuclear detonation. This finding was only recently reported by Tucker and Alvarez in 2019. The consequences of nuclear tests are tragic and often irreparable.

When genetic material inside a living cell is damaged, sometimes our bodies can repair that damage. Otherwise the abnormal cell may sit quietly in the body for years or even decades before it makes us sick.

There is no way to predict which exposure will result in cancer. ...even an exposure too-small-to-measure could, sometimes, result in cancer death.

The 2006 report, The Biological Effects of Ionizing Radiation, #7, or "BEIR VII" assumes that the victim's radiation exposure was an acute external exposure (the moment of the bomb explosion). Internalized radioactivity from fallout or other environmental contamination was not considered.

Children's bodies are small, so the same amount of radiation delivers a larger dose [to children than to adults]. Since children are growing, the cells in their bodies are dividing more rapidly. The DNA in cells is more likely to be damaged when [undergoing] cell division.

The atomic-bomb survivors in Japan were grouped by the age they were at the time of the bombing. These groups were tracked over their lifetimes. Cancers and cancer deaths were counted. The focus of the data is on the outcome of the prompt radiation exposure from the bombs.

There are problems with this data, but we can broadly say that those who were five years or younger when exposed had the most cancer at some point in their lives.

Here is the news: Girls in this youngest age group were twice as likely to get cancer at some point in the next 60 years, than were boys. For every male in the birth-to-5-year group that suffered cancer, two females got cancer. This is not childhood cancer — it is total incidence.

The BEIR VII report is where these numbers are found; the report itself does not discuss gender as a risk factor. I first published my findings in 2011, and they are independent confirmation of work published in 2006 by Dr. Arjun Makhijani and his team.

It is extremely important to understand that little girls are not a "sub-population." Girls are an inextricable link of the human life cycle.

Biological sex was also a factor for those who were adults at the time of the bombings.

Over their lifetime women exposed as adults suffered 50% more cancer death than did men in the same age group. For every 2 men in these cohorts who died of cancer, three women died of cancer.

... females suffered more cancers than males in every age group, and the difference is greatest when the exposure was in childhood.

Why is biological sex a factor in harm from exposure to ionizing radiation? We don't know. One hypothesis, from my mentor, the late Dr. Rosalie Bertell, is the greater amount of radio-sensitive reproductive tissue in female bodies. This, and other research questions, need to be tested by qualified institutions of excellence. The answers will impact all of us.

Three points to take away:

1. Ionizing radiation is harmful to living cells—harm is greater when children are exposed, compared to adults.
2. At any age, radiation is more harmful to females than to males. Young girls are most harmed by radiation (measured as cancer across their lifetime). Radiation protection rules do not yet reflect this finding. Prior to the work reported here, it was presumed that radiation, like the weapons that make it, was indiscriminate. Not so.
3. These points provide strong evidence for the jurisdiction of Humanitarian Law over fission — most especially, nuclear weapons.

The future is in our hands.

— Key sources: Olson, 2011, NIRS Briefing Paper: "Atomic Radiation is more harmful to women," <https://www.nirs.org/wp-content/uploads/radiation/radiationharm2pg.pdf>; Olson 2019, "Disproportionate impact of ionizing radiation and radiation regulation," *Interdisciplinary Science Reviews*, May 2019. <https://doi.org/10.1080/03080188.2019.1603864>; Makhijani, et al, October 2006, Science for the Vulnerable, Institute for Energy & Environmental Research; <https://ieer.org/projects/healthy-from-the-start/>.

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If exposed to the same amount of radiation, girls under five are twice as likely to develop cancer as boys in the same age group. Graphic by Saro Lynch-Thomason, Fullsteam Labs.

## International Meetings Shame Nuclear Weapons, Promote Reactors

There were several major gatherings focused on nuclear weapons this summer. In Vienna in June there was the International Campaign to Abolish Nuclear Weapons (ICAN) Forum, the Vienna Conference on the effects of nuclear weapons, and the First Meeting of Parties to the Treaty on the Prohibition of Nuclear Weapons (TPNW); and in August was the Review Conference of the Nonproliferation Treaty at the UN in New York City. I was lucky and fascinated to observe all of them.

The formal UN sessions in Vienna and New York reminded the world that the nine nuclear-armed governments are out of step with the overwhelming majority of governments that want nuclear weapons abolished, and that the nine don't intend to give up their arsenals. The five nuclear powers that have ratified the Nonproliferation Treaty (NPT) have, for 50 years, ignored the treaty's binding obligations, principally its Article VI promise to denuclearize. All of the nuclear powers boycotted the Vienna meetings and urged their allies to stay away, betraying their fear of the TPNW's power to stigmatize and delegitimize the Bomb.

Diplomatic sparks flew just once in New York, when China pointed out August 2 that stationing US nuclear weapons at NATO air bases in Europe violated the NPT's articles I and II against transferring nuclear weapons to other countries. Germany hastily replied in writing that its "nuclear sharing" was legal because

it was instituted long before the NPT became law. I thought of the 19th Century slaver who may have said he could keep his people in chains because he had enslaved them before the Emancipation Proclamation.

At the NPT RevCon in New York, I was alarmed to hear nearly every member state speaker promote nuclear reactor production like they were hucksters at an industry expo. In contrast, Linda Gunter of Beyond Nuclear International, speaking in Vienna, explicitly pointed out that nuclear reactors in war zones like Ukraine are stationary time bombs constantly posing a risk of catastrophic radiation releases. Sadly, the spectacular success of the TPNW is tainted by the treaty's embrace of "peaceful" reactor development.

The dilemma of opposing nuclear weapons while promoting nuclear reactors was accidentally revealed in New York by the representative of the Philippines. He said power reactor sales are an "equity" issue in which the Global South shouldn't be denied the "benefits" of nuclear-powered electricity that the North enjoys. The speaker then immediately noted that the world can't tell whether or not Iran's reactor fuel program is weapons related.

Because power reactors are simultaneously dirty targets in wartime, and H-bomb proliferation machines all the time, nuclear power and weapons proliferation are two lethal sides of the same poison coin. — *JL*

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