IPPNW Campaign Kit

The Humanitarian Impact of Nuclear Weapons

November 2014
A n evidence-based understanding of the humanitarian impact of nuclear weapons has become the driving force behind a renewed State and civil society demand for effective action to prohibit and eliminate nuclear weapons. The facts about nuclear weapons and the consequences of their use have been the subject of three international conferences starting in 2013—in Oslo, Nayarit, and Vienna. The most recent joint statement on the humanitarian impact of nuclear weapons, submitted to the UN General Assembly in October 2014, was signed by 155 States who said that “the only way to guarantee that nuclear weapons will never be used again is through their total elimination.”

The facts about nuclear weapons—their unprecedented destructive power, their massive and indiscriminate medical and environmental effects, their capacity to wipe out everything that sustains life on Earth—have been extensively documented in hundreds of books, journal articles, and scientific papers. Campaigners for nuclear abolition are faced with the challenge of presenting the facts correctly and persuasively, and they must often do so in the few moments they have the attention of a government minister, a parliamentarian, a politician, a journalist, or a person on the street.

ICAN—the International Campaign to Abolish Nuclear Weapons—has argued that the humanitarian threat posed by nuclear weapons requires a treaty banning them as a prelude to their elimination. The purpose of this kit is to provide ICAN campaigners—and all others working to prohibit and eliminate nuclear weapons—with the essential facts about the blast, burn, and radiation effects of nuclear weapons; the devastation they wreak upon the environment; and the inability of physicians to reach and treat the surviving victims of nuclear war; in language that is accessible, understandable, and repeatable.

Each section includes a longer, more detailed description of the evidence, with references and links to a number of important research studies and reports. Campaigners do not need to become experts in nuclear physics, medicine, or environmental science, but they do need to know that such expertise is available to back up their assertions and that they can put their hands on it quickly.

The sections on nuclear weapons effects are followed by excerpts from some of the most important and influential statements about nuclear weapons made by international medical and humanitarian relief organizations.

The campaign kit concludes with an “elevator speech”—a one-minute version of the facts about nuclear weapons and why a ban treaty is the only political, practical, moral, and humanitarian response to those facts.

Let us know if you find this kit useful in your campaigning; tell us how you’re using it; and send us your suggestions for how to make it even more useful.

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Introduction

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Cover: Dazed survivors of Nagasaki one day after the atomic bombing. Credit: UN Photo/Yosuke Yamahata

This page: A mushroom cloud rises above Moruroa Atoll after a French nuclear test in 1970.
DIRECT CASUALTIES OF NUCLEAR WAR

- **Hiroshima** — 70,000 dead; ~70,000 injured — 140,000 dead by the end of 1945; one 15-kiloton “tactical size” nuclear bomb
- **Nagasaki** — 74,000 dead; 75,000 injured — 100,000 dead by the end of 1945; one 21-kiloton “tactical size” nuclear bomb
- **India-Pakistan** (Pentagon estimate) — 12 million dead; 150-200 million injured (100 bombs)
- **US-Russia** (PSR estimate) — 300 Russian nuclear arsenals could kill more than 150-200 million people in one day than were killed during the entire Second World War. A study by Physicians for Social Responsibility concluded that 300 Russian nuclear weapons detonated over US cities would kill 75-100 million people within the first half hour, with comparable numbers of Russians killed by US weapons. The Pentagon has estimated that 12 million people would be killed immediately and another 7 million would be injured in the event of a nuclear war between India and Pakistan, with their much smaller arsenals. No other weapon ever created has the capacity to kill on such a massive scale, in such a short time.

THE EVIDENCE

1. The United States dropped the first atomic bomb over Hiroshima on August 6, 1945. At least 70,000 people were killed instantly, and another 70,000 were severely injured. Temperatures at ground zero of the 12.5-kiloton Hiroshima blast were between 3,000 and 4,000 degrees Celsius (5,400 to 7,200 degrees Fahrenheit), incinerating everything within a square mile. Intense heat and winds started firestorms that covered more than four square miles. A blast wave traveling at supersonic speed created overpressures that killed people, leveled reinforced concrete structures, destroyed transportation systems, factories, and commercial buildings, and reduced houses to debris. An electromagnetic pulse destroyed communications and power systems.

2. A nuclear war with weapons in existing arsenals could kill more people in a single day than were killed during the entire Second World War. A study by Physicians for Social Responsibility concluded that 300 Russian nuclear weapons detonated over US cities would kill 75-100 million people within the first half hour, with comparable numbers of Russians killed by US weapons. The Pentagon has estimated that 12 million people would be killed immediately and another 7 million would be injured in the event of a nuclear war between India and Pakistan, with their much smaller arsenals. No other weapon ever created has the capacity to kill on such a massive scale, in such a short time.

3. Nuclear weapons are indiscriminate in their effects. They cannot distinguish between military and civilian targets, or between combatants and non-combatants. Addi­tional Protocol I to the Geneva Conventions, adopted in 1977,

Incompatible with humanity

THE FACTS

- Nuclear weapons unleash the binding forces that power the stars to produce incinerating heat, powerful shock waves and overpressures, and ionizing radiation. Unlike conventional weapons or other weapons of mass destruction, nuclear weapons instantaneously wipe out entire populations, level cities, and devastate the environment. Moreover, they produce radioactive contamination that causes cancers and other illnesses that can persist across generations for millennia.

- No weapon ever invented can cause so much death and destruction so quickly, on such a catastrophic scale, or such widespread and persisting toxicity in the environment.

- A single nuclear weapon can destroy a city and kill most of its people. A small number of nuclear explosions over modern cities would kill tens of millions of people. Casualties from a major nuclear war between the US and Russia would reach hundreds of millions in a matter of hours.

- Less than one percent of the nuclear weapons in the world today could disrupt the global climate and cause nuclear famine. The thousands of nuclear weapons possessed by the US and Russia could bring about a nuclear winter, destroying the essential ecosystems on which life depends.

- Physicians and first responders not themselves victims would be unable to work in the totally devastated, radioactively contaminated wastelands that would extend for kilometers beyond ground zero, making it impossible to reach and treat survivors.

- Whether or not they are detonated, nuclear weapons cause widespread harm to health and to the environment. The mining and processing of uranium that provides the fuel for nuclear weapons, for example, has serious and long-lasting health consequences for workers, local communities and their environment.

Nuclear weapons are indiscriminate in their effects. They cannot distinguish between military and civilian targets, or between combatants and non-combatants. Additional Protocol I to the Geneva Conventions, adopted in 1977,
prohibits indiscriminate attacks and treats them as a violation of International Humanitarian Law (IHL). The International Court of Justice (ICJ) reaffirmed this conclusion in its 1996 advisory opinion on the illegality of nuclear weapons.

Nuclear weapons release ionizing radiation as a result of the uncontrolled chain reaction of fissile materials. This is both immediate and localized, and also long term and widespread from dispersal of bomb contents and radioactive material created by the explosion, spread by wind, rain and water. Exposure to radiation—including fallout from nuclear tests—causes acute and long-term illnesses that are often deadly, as well as genetic and inter-generational health effects.

Nuclear weapons detonations have extreme and long-lasting environmental consequences, including disruption of the Earth’s climate and agricultural productivity.

Nuclear weapons eradicate the physical and social infrastructure required for recovery from conflict. Roads and transportation systems, hospitals and pharmacies, fire fighting equipment, and communications all lie in impassable rubble throughout a zone of complete destruction extending for kilometers. In Hiroshima 90% of physicians and nurses were killed or injured, and 42 out of 45 hospitals became non-functional. The few physicians who arrived in Hiroshima and Nagasaki had to work without equipment, blood supplies, medicines, and other resources needed for effective treatment. There was no electric power, no water, no transportation system, no communication, and unrecognizable surroundings.

Uranium mining is a dangerous and health-destroying occupation. The workforce is often drawn from marginalized and vulnerable communities who are uninformed (or misinformed) about the dangers of exposure to radiation and toxic substances. Miners are all too frequently sent to work without protective equipment, and are abandoned when they develop exposure-related illnesses. Workers at nuclear weapons production facilities have suffered disproportionately from cancers and other illnesses, including leukemia, lymphoma, and cancers of the prostate, kidney, salivary glands, and lungs.

WHAT’S NEW?

The medical, environmental, and humanitarian impacts of nuclear weapons have been summarized in a recent publication by Reaching Critical Will. Particularly useful in this context is the chapter by Dr. Tilman Ruff on “The health consequences of nuclear explosions.”

THE FACTS DEMAND A BAN

Chemical weapons (e.g., mustard gas) and biological weapons (e.g., anthrax and sarin) are also referred to as weapons of mass destruction. These weapons, while inhumane and indiscriminate, cannot kill on the scale and with the intensity of nuclear weapons, nor do they produce the physical and environmental destruction and persistent toxicity across future generations for all living things that put nuclear weapons in a class of their own. Chemical and biological weapons, antipersonnel landmines, and cluster munitions have all been banned by treaties. While international law provides a clear basis and obligation for the elimination of nuclear weapons, they are not yet formally prohibited. A treaty banning nuclear weapons will fill that gap, and is an important step toward their elimination.

SOURCES

3. Additional Protocol I, Article 51(4); online at www.icrc.org/ihl/INTRO/470
5. IPPNW has produced a poster exhibition on the global health and environmental impacts of the entire nuclear chain, from mining to detonation. The exhibition, called Hibakusha Worldwide, is online at www.hibakusha-worldwide.org.
Section 2

The Facts

- Nuclear weapons have extreme blast and burn effects that kill people and destroy infrastructure on a scale and with an intensity that puts them in a class of their own compared with any other weapons.
- The heat wave from a nuclear detonation incinerates everything combustible in its path, including human flesh. Firestorms consume all remaining oxygen, suffocating everyone who might have managed to take refuge from the flames themselves.
- The blast wave and associated overpressures and hurricane-force winds collapse all but the strongest buildings, destroy roads and transportation systems, and turn objects (including human victims) into missiles that amplify the damage, until nothing remains but rubble.
- An electromagnetic pulse disrupts the electricity supply grid and electronic equipment and systems, including computers, medical equipment and satellite communications.
- These levels of destruction, which are more extreme than produced by any other weapon, cannot be limited to military targets or to combatants.

The Evidence

1. At the instant of detonation, a nuclear weapon produces temperatures of tens of million degrees Celsius—comparable to temperatures in the core of the Sun. Depending on the size and yield of the weapon, the heat generated by the fireball incinerates everything it touches. Ground temperatures at the hypocenter (ground zero) of the 15-kiloton atomic detonation over Hiroshima were between 3,000 and 4,000 degrees Celsius (5,400 to 7,200 degrees Fahrenheit). The heat from the 21-kiloton Nagasaki blast reached 3,900 degrees Celsius (7,000 degrees F). These temperatures—comparable to those found on the surface of the Sun—are produced by no other weapon ever created.1,2

2. The impacts of this heat are extreme and far reaching. A Hiroshima-size bomb burns naked skin up to 3.5 km (2.2 mi) away, and chars wood up to 3 km (1.9 mi) away.3

3. Nearly half the energy from a nuclear weapon is released in the form of a blast wave, which travels at supersonic speed, creating overpressures that kill people, level reinforced concrete structures, destroy transportation systems, factories, and commercial buildings, and reduce houses to debris. Depending on the height of burst, a 10-20 kiloton nuclear detonation can produce overpressures at the center of the blast greater than 140 kilopascals (kPa) (20 pounds per square inch, psi). This is enough to destroy all but the skeletons of reinforced concrete structures. At 1 km (0.6 miles) from ground zero, overpressures of about 70 kPa (10 psi)

8 Nagasaki bomb victim Sumiteru Taniguchi looks at a photo of himself taken in 1945. His horrific burns have required 17 operations. Credit: Yuriko Nakao

9 Physical trauma and burns

- Modern nuclear weapons are typically 50,000 to 300,000, but up to 5,000,000 tons (5 megatons, Mt) of TNT equivalent.
- Ground temperatures from the 15-kt Hiroshima bomb reached about 7,000ºF = Sun’s surface.
- Of the 76,000 buildings in the city, 92% were destroyed or damaged from the shock wave and blast.
- The 21-kt bomb detonated over Nagasaki three days later leveled 6.7 square kilometers (2.6 square miles).
- Nuclear detonations at high altitudes cause an electromagnetic pulse (EMP), which disables electrical and electronic equipment and the electrical power grid.
In Hiroshima, more than 70% of those injured had combined injuries. In the absence of effective and timely medical care following a nuclear war, many would die of injuries, including radiation exposure, from which they would recover if they had access to care. In Hiroshima, many died of radiation doses which were only about half of those which would be fatal under normal circumstances. (See section 3.)

**WHAT’S NEW?**

The physical and medical effects of nuclear weapons have been thoroughly researched and documented for more than 50 years. Nevertheless, governments have generally denied and avoided the evidence of just how catastrophic the impacts of nuclear war would be. They have also willfully neglected updating the evidence about those impacts—evidence that should drive policy on nuclear weapons. This has hindered appreciation of the gravity and universality of the threat, including the impossibility of any effective humanitarian response in the aftermath of a nuclear war, and has obscured the urgency of eradicating nuclear weapons. It is remarkable that the first intergovernmental conference dedicated to the humanitarian impacts of nuclear weapons was only held in 2013, in Oslo, 68 years after the nuclear bombing of Hiroshima and Nagasaki. The papers presented at that conference and at the second and third HINW conferences in Nayarit, Mexico, and Vienna, Austria, are available online.4,5

**THE FACTS DEMAND A BAN**

Nuclear weapons are inherently indiscriminate and disproportionate in their effects, including beyond the zone of conflict, and, as such, violate international humanitarian law. They must be banned and eliminated.

**SOURCES**

[***Available from IPPNW at www.ippnw.org/resources-abolition-nuclear-weapons.html.]


Some additional developments in our understanding of the effects of nuclear weapons have been outlined in a number of publications in recent years.


Although with improved missile accuracy, most nuclear weapons now deployed are in the tens or hundreds of Kt range, rather than the megaton range as was typical in the 1950s-1980s, this has not reduced their destructive effects proportionately. In fact, weapons that are “low yield” in nuclear terms—in the tens of Kt range—cause around 100 times more deaths and produce 100 times as much smoke from burning cities per Kt of explosive power as do “high yield” weapons in the hundreds of kilotons to megatons range.


This US National Academy of Sciences report concluded that “Current experience and empirical predictions indicate that earth-penetrator weapons cannot penetrate to depths required for total containment of the effects of a nuclear explosion.” That is, nuclear weapons cannot plausibly be used in ways that avoid release of radioactive fallout.


The global growth of megacities, with extreme densities of people and combustible materials, only increases the casualties that would result from a nuclear war. A Hiroshima-size bomb exploding over Mumbai, for example, could promptly kill 860,000 people and injure 2.1 million.

Nuclear weapons produce ionizing radiation, which kills or sickens those exposed, contaminates the environment, and has long-term health consequences for those who do not die right away.

- **Acute radiation sickness** can cause death within hours, days, or weeks; those who recover may remain ill for months or even years.

- Lower doses of ionizing radiation can cause leukemia, thyroid cancer, and many other cancers, even many years after exposure. Increased risk of cancer persists for the lifetime of those exposed.

- Radiation exposure also causes birth defects and genetic damage. Subsequent generations can suffer both because of genetic damage they inherited, as well as exposure to radioactivity from lingering radioactive contamination and fallout.

- A dose of radiation lethal for a human being can contain no more energy than the heat in a single sip of hot tea or coffee.

- There is no antidote to radiation exposure and no way to hasten the pace of physical decay which is innate to each different radionuclide.

- Exposure to dangerous ionizing radiation has become a persistent global problem because of continuing fallout from atmospheric tests and contamination of land and water around the former test sites, nuclear weapons production facilities, and radioactive waste storage sites.

- Radiation poses a particular problem for physicians and other first responders, who jeopardize their own health and safety by entering contaminated areas in the attempt to find and treat survivors.

- Accumulating evidence is demonstrating greater health harm for a given dose of radiation than previously understood.

**THE EVIDENCE**

1. Radioactive materials are dispersed by wind, and spread through surface and groundwater and ocean currents. Some are preferentially taken up by living things and concentrated up the food chain. Strontium-90, for example, is handled by the body like calcium (concentrated in bones and teeth), while cesium-137 and -134 are handled by organisms like potassium (concentrated inside most cells). These can be recycled in living things until they physically decay away, depending on their half-life.

2. Exposure to the initial burst of neutrons and gamma rays, to the radioactivity these induce in materials that are not normally radioactive, and to radioisotopes from the fallout produced by the detonation, all can cause acute radiation syndrome—also known as radiation sickness. The source of exposure can also be radiation releases from nuclear power plant disasters such as Chernobyl or Fukushima, or any other external exposure to high energy X-rays, gamma rays, and neutrons capable of penetrating to internal organs. Nuclear facilities such as power reactors and especially spent reactor fuel pools, if attacked by nuclear or other weapons, could release large amounts of long-lived radioactive isotopes. As demonstrated by the 2011 Fukushima nuclear disaster, disruption of water and power supplies, crucial to continuous cooling of spent fuel pools and reactors, can also cause severe and extensive radioactive contamination.
3 Symptoms of acute radiation sickness include destruction of bone marrow; irreversible gastrointestinal damage and dehydration; uncontrollable internal bleeding; extreme susceptibility to infection; hair loss; and central nervous system dysfunction.1

4 Ionizing radiation is uniquely biologically damaging not because it contains especially large amounts of energy, but because that energy is delivered in large packets, to which the large complex molecules like DNA that define our make-up, are especially vulnerable. Up to half of those exposed to whole body doses greater than 1-2 Gy develop nausea, vomiting, and fatigue. Doses greater than 5-6 Gy will cause hemorrhaging and infectious diseases, including pneumonia, enterocolitis, and sepsis, due to lowered white blood cell levels. Without complex medical care, 95-100% of those receiving acute doses of more than 6 Gy will die within 2-4 weeks. Even with care, 50-100% will die. Still higher doses kill everyone exposed in a matter of days. [A Gray (Gy) is a standard measure of the absorbed dose of radiation.]2

5 Doses over 100 millisievert (mSv) produce acute dose-related damage especially to the rapidly dividing cells of the body including:
- the bone marrow which produces red cells (causing anemia), white cells (causing increased vulnerability to infections) and platelets (causing internal and external bleeding)
- germ cells (causing sterility)
- the lining of the gut (causing vomiting, diarrhea and hemorrhaging)3

- hair loss

At high doses, central nervous system dysfunction causes seizures and coma. Such doses can also produce longer term damage to specific organs, including cataracts of the eyes, radiation burns and scarring of the skin, and permanent sterility. They can also cause birth defects and mental retardation for fetuses exposed in their mother’s womb. These doses also increase the risk of chronic diseases, particularly cardiovascular disease (including heart attacks and strokes), but also others, including respiratory and gastrointestinal diseases.4

6 All radiation doses increase the risk of many different types of cancer (leukemia and thyroid cancer being among the earliest to appear). Cancers begin to increase several years after exposure, and the heightened risk persists throughout the lifetime of those exposed. The increased risk is proportional to the dose, but there is no dose below which there is no increased risk. Accumulating evidence suggest that increase in non-cancer chronic diseases such as cardiovascular disease (including heart attacks and strokes), but also others, including respiratory and gastrointestinal diseases.5

- radiation from nuclear weapons

- hair loss

- a large number of individuals exposed to high doses of radiation

- reduction of white blood cells and platelets

- anemia

- skin burns and scarring of the skin

- gastrointestinal damage and dehydration

- central nervous system dysfunction

- loss of body weight and appetite

- memory loss

- temporary reproductive failure

- mental retardation and lowered IQ

- increased cancer risk

- increased risk of heart disease

- increased risk of stroke

- increased risk of diabetes

- increased risk of other chronic diseases

7 Infants and young children are 3-4 times more sensitive to these effects than adults, and women overall have a 40% higher risk of radiation-associated cancer than men.4 While no increase in genetic diseases in children of those exposed to radiation has yet been confirmed in humans, such effects have been proven in a wide variety of other animals and can be expected in humans. Radiation does cause transmissible genetic damage in all types of living things.6

8 Exposures to lower doses of ionizing radiation, while they do not normally have acute effects, can cause leukemia, thyroid cancer, and cancers of the stomach, lung, liver, colon, bladder, breast, ovary, and skin. Other long-term effects include birth defects, chromosomal damage, miscarriages, and increased infant mortality among those exposed in utero.7

9 Exposure to dangerous ionizing radiation has become a persistent global problem because of continuing fallout from atmospheric nuclear tests and contamination of land and water around the former test sites. Researchers have estimated that more than two million excess cancer deaths will have been caused by the end of this century by exposure to global radioactive fallout from atmospheric nuclear test explosions.

WHAT’S NEW?

In 2013, a peer-reviewed, large-scale study of increased cancer risk among children and adolescents undergoing CT scans in Australia confirmed evidence from other studies that even very small exposures to ionizing radiation increase cancer risk.8 This study is the largest population study of low-dose radiation exposure ever conducted. The health risk for a given dose of radiation was also higher than current estimates. This evidence reinforces the conclusion that any exposure to persistent radiation from nuclear weapons causes illness and death long after they are detonated, whether associated with their production, in tests or in acts of war.9

The largest study of nuclear industry workers ever conducted, incorporating over 400,000 workers in 15 countries, almost all of whose exposures were well within the currently recommended occupational radiation limits, showed a significant excess of cancers related to radiation dose.10 Extensive recent studies of a wide variety of plants and animals—including birds, mammals, beetles, spiders and trees—near the damaged Chernobyl and Fukushima nuclear reactors show a wide range of dose-related radiation effects. These include physical abnormalities and malformations, tumors, impaired neurological development resulting in smaller brains with reduced cognitive ability and survival, depressed fertility and deformed sperm, shortened lifespans, reduced numbers of individuals, loss of species, and genetic damage. Tree growth and even microbial decomposition are depressed in areas of high radiation. In some species, mutations have been shown to accumulate over multiple generations. Adverse effects have been observed in every single type of organism studied. All living things are vulnerable to radiation harm; and humans are in fact more sensitive to adverse radiation effects than many other species, including many of those studied.11

THE FACTS DEMAND A BAN

Nuclear weapons produce unique, lethal ionizing radiation and many different radioactive isotopes at the moment of detonation. Radioactive materials contaminate the soil, water, and the atmosphere, causing cancers, genetic damage, and other illnesses. They pose a hazard to all living things for periods ranging from fractions of a second to hundreds of thousands of years. Ongoing exposure to radiation from past nuclear testing alone has caused unacceptable damage to global health. Unlike any other weapons, nuclear weapons have the unique ability to cause sickness and death long after they are used, in invisible, completely indiscriminate and frightening ways. This, by itself, is more than enough reason to ban and eliminate them.

SOURCES

8. Prof. Tim Mousseau at the University of South Carolina leads this body of extraordinary work. Detailed information including scientific papers are on his website (http://crickett.biol.sc.edu/chemboby/Chernobyl_Research_Initiative/Introduction.html).
SECTION 4

Nuclear famine and nuclear winter

THE FACTS

- A limited, regional nuclear conflict involving only 100 Hiroshima-size nuclear weapons would severely disrupt the global climate and agriculture for two decades or more.
- The resulting food shortages would place at least two billion people at risk of starvation. The effects would hit hardest the people who are currently most affected by food insecurity, even if they are distant from the region of conflict; but no region would be spared.
- The massive arsenals held by the US and Russia could destroy Earth’s fundamental ecosystems, on which all life depends.
- These findings have profound implications. Use of nuclear weapons by any nation, with uncontrollable risks of escalation, would be suicidal. And not only the bloated arsenals of Russia and the US, but also the arsenals of UK, France, China, Israel, India and Pakistan pose an unparalleled global threat.

THE EVIDENCE

1. Starting in 2007, scientists began to study the climate effects of a limited, regional nuclear war using only 100 Hiroshima-size warheads against large cities. The firestorms resulting from a nuclear war between India and Pakistan using 100 Hiroshima-size weapons—the example used in the computer models—would inject five teragrams (5 Tg, 5 million tons) of smoke into the stratosphere, where it spreads globally. The most recent studies using the most sophisticated Earth system model show average global temperatures dropping 1.6°C in the 5th year, still 1.1°C cooler after 10 years, and not yet returned to baseline after 26 years. Global rainfall would decrease by around 10%, with local and regional decreases of 30-40% or more in temperate, grain-growing regions of North America and Eurasia.2 In particular, annual rainfall would be reduced by 20-80% over the Asian monsoon region, including the Middle East, South Asia and SE Asia2, on which food supplies for over 1.5 billion people crucially depend. Similar large reductions would occur in the Amazon region and southern Africa.

- Drastic food shortages threaten at least two billion people with starvation.
- Nuclear winter caused by a US-Russia nuclear war threatens human extinction.

- Firestorms from 100 Hiroshima-size bombs used against modern cities would inject 5 teragrams of smoke and soot into the atmosphere, blocking sunlight from reaching the Earth.
- Average global surface temperatures drop by approximately -1 to -1.6°C for a decade.
- Rainfall decreases by 10% or more.
- Growing seasons are shorter by up to 40 days throughout the world’s agricultural zones over years 2-6 after such a war.
- Drastic food shortages threaten at least two billion people with starvation.
- Nuclear winter caused by a US-Russia nuclear war threatens human extinction.

3. 825 million people in the world are chronically malnourished today; several hundred million more are highly dependent on food imports. This means more than one billion people, primarily in the global South, would face starvation from a nuclear-war-induced famine. More than a billion people in China would also face severe food insecurity, meaning the endangered population could exceed two billion globally—more than one quarter of the people in the world.4 Pending data from other regions likely to be similarly affected, it can be expected that the number of people around the world who would starve to death following a regional nuclear war would be substantially greater.

4. Famines, however, are not simply related to decline in food produced. Historically, famines have occurred even with very modest declines in food production, because of panic, food hoarding and
Hemisphere. Agriculture would produce 50-150 million tons of smoke and soot. Global warming would collapse, and many species, especially as the effects would be both widespread and prolonged over many years.

3. What’s the smallest number of nuclear weapons that could be used without damaging the global climate? The authors of these studies have not set out to precisely answer that question. One nuclear weapon can destroy an entire city. The massive arsenals of the US and Russia can destroy the Earth’s biosphere. What these climate studies have shown is that a miniscule fraction (0.6% of the weapons and an even smaller proportion of the explosive yield) of the 16,400 nuclear weapons in the world today can cause irreparable damage to the natural systems that sustain life on Earth.

In addition to the direct agricultural impacts, stratospheric ozone depletion would result in large increases in ultraviolet (UV) radiation—30 to 100% increases in summer outside the tropics, endangering human and animal health, and further damaging crops and marine ecosystems.5

A war involving the massive American and Russian arsenals would produce 50-150 million tons of smoke and soot. Global average temperature would decrease by -10°C—temperatures not seen on Earth since the coldest point in the last ice age some 18,000 years ago. For almost 70 years, we have known that a single nuclear weapon can destroy a city. During the Cold War between the US and the former Soviet Union, we learned that a nuclear war involving the massive arsenals possessed by those countries could destroy virtually all life on Earth in a nuclear winter. Now we find that far fewer than 1% of all the nuclear weapons currently deployed in the world, targeted on cities, can damage the global climate and disrupt agricultural production so severely that billions of lives could be lost. The arsenals of the US, Russia, the UK, France, China, India, Pakistan, and Israel could all produce a nuclear famine. Weapons that powerful and destructive belong in no one’s hands. The only way to prevent their use—and their Earth-shattering consequences—is to ban and eliminate them.

The scenario is also plausible—India and Pakistan have been to war three times since their independence, and have mobilized up to a million troops along their border during two additional periods of high tension. Armed skirmishes across their shared and contested border are frequent. Similar effects, however, would be produced by nuclear explosions on cities anywhere in the world.

Sources

[Sources cited here, along with other resources, can be found on websites maintained by Professors Alan Robock of Rutgers University (http://climate.envsci.rutgers.edu/robock/robock_res.html) and the International Physicians for the Prevention of Nuclear War (IPPNW) (www.ippnw.org).]

4. Helfand I. Nuclear famine: two billion people at risk—global impacts of limited nuclear war on agriculture, food supplies, and human nutrition. 2013: IPPNW/PSRI.
7. IPPNW. Global climate effects of regional nuclear war (Powerpoint presentation) may be included web ref.
Doctors can’t help

THE FACTS

In the aftermath of a nuclear detonation:
- Doctors and health care workers would be killed or severely injured along with the general population;
- Hospitals, clinics, and other medical facilities would be destroyed or rendered unusable;
- Medicines, blood for transfusions, diagnostic equipment, and all other essential supplies would be unavailable;
- There would be no water, no electricity, no transportation, no communication systems;
- Roads would be impassable and the terrain would be unrecognizable;
- Corpses would be everywhere, strewn among the injured and the dying;
- Surviving doctors and nurses would be unable to find, let alone treat, other survivors;
- Dangerous levels of radiation would prevent doctors and other emergency responders from entering affected areas in search of survivors.

The fact is, a meaningful medical and humanitarian response to aid the immediate survivors of the use of nuclear weapons is impossible. Facing multiple injuries, an unrecognizable world, and most of the normal supports and essentials of life gone, few of those with more than minor injuries are likely to survive even the immediate aftermath. And no humanitarian response could undo even a small part of the terrible destruction and cataclysmic scale of death and injury inflicted.

THE EVIDENCE

1 The atomic bombings of Hiroshima and Nagasaki killed most of the physicians and health workers in both cities, destroyed hospitals and clinics, and decimated medical resources. The heavily damaged Red Cross hospital in Hiroshima had no functioning laboratory equipment and was unable to provide blood transfusions; 600 of the 1,000 victims brought there on the first day died immediately.1

2 Because there were so few doctors and nurses left alive in either city and most of the medical infrastructure had been destroyed, treatment of survivors had to be organized internationally, and with great difficulty. During the critical hours and days following the bombings, physicians who arrived in Hiroshima and Nagasaki to work without equipment, blood supplies, medicines, and other resources needed for effective treatment. There was no electric power, no water, no transportation or communication systems; the surroundings were unrecognizable. Dr. Marcel Junod of the International Committee of the Red Cross (ICRC) arrived in Hiroshima just one month after the attack and chronicled the enormity of the destruction and the inability of the relatively few surviving health professionals to care for the enormous number of severely injured patients.1

3 One of the foremost experts on the medical effects of nuclear war, Dr. Jack Geiger, has explained the insuperable obstacles to mounting a medical response:

"Estimates of the ratios of surviving physicians to seriously injured victims vary from 1:350 to 1:1,700. If we assume a ratio of 1:1,000, and imagine that every surviving physician would find all the wounded with no loss of time, spend only 15 minutes per patient on every aspect of diagnosis and treatment, and work
18 hours a day, it would still be 8 to 16 days before every surviving patient would be seen for the first time. Most of the victims, obviously, would die…

“Many physicians and patients would never find each other because of their fear of radiation exposure, because streets filled with rubble would make travel impossible, because victims would be trapped deep within wrecked buildings… There will be no communications system, no transportation network, no electricity, no water supply. Ambulances and other emergency vehicles would be non-existent. Medical care would be overwhelmed by the consequences of an explosion, because streets would be disrupted…. It is obvious that the health services in the world could not alleviate the situation in any significant way.”

WHAT’S NEW?

In 2013, the International Committee of the Red Cross (ICRC) restudied the international capacity to organize a humanitarian response to the use of nuclear weapons, and reaffirmed its conclusion that “there is presently no effective capacity at the international level to deliver appropriate humanitarian assistance to survivors if nuclear weapons were ever to be used.” In 2014, ICRC vice president Christine Beerli told the Second Conference on the Humanitarian Impact of Nuclear Weapons that “when nuclear weapons are used, the normal systems and services for helping the victims are, in an instant, wiped out or severely damaged, making the provision of adequate assistance nearly impossible in the aftermath.”

A new 2014 United Nations Institute for Disarmament Research (UNIDIR) study concludes that any emergency medical response to even a single nuclear detonation would be palliative (i.e., easing the suffering of the dying) at best, and the only effective humanitarian or public health approach to nuclear weapons use is primary prevention.

“While nuclear weapons exist the risk of their detonation does too, whether deliberately or inadvertently. It is clear that the humanitarian system cannot be expected to put matters right in view of the magnitude of the harm and suffering nuclear weapon use would inflict, even if it is a prospect for which it should prepare.”

THE FACTS DEMAND A BAN

Since the destruction of Hiroshima and Nagasaki in August 1945, the medical and international relief communities have understood that there can be no meaningful response to the terrible devastation caused by nuclear weapons. All existing resources would be overwhelmed by the magnitude of the devastation, and no amount of planning or spending on improved capacity can change this reality. Based on this understanding, we have a responsibility to prevent what cannot be cured. Banning and eliminating nuclear weapons is the best and only way to prevent their use.

SOURCES

1. ICRC. The Hiroshima disaster – a doctor’s account. Online: www.icrc.org/eng/resources/documents/misc/hiroshima-junod-120005.htm
The abolition of nuclear weapons is the core mission of International Physicians for the Prevention of Nuclear War (IPPNW). Citing the first principal of the medical profession—that doctors have an obligation to prevent what they cannot treat—IPPNW uses the medical and scientific facts about nuclear war to advocate for the elimination of nuclear weapons. For this it was awarded the Nobel Peace Prize in 1985. IPPNW launched ICAN—the International Campaign to Abolish Nuclear Weapons—in 2007 and, with hundreds of civil society partner organizations, campaigns for a treaty to ban nuclear weapons, leading to their elimination.

The International Committee of the Red Cross—the world’s premier medical-humanitarian organization—first called for nuclear weapons to be banned in September 1945, mere weeks after the atomic bombings of Hiroshima and Nagasaki. Red Cross doctors, including Marcel Junod, were among the first to witness the suffering and devastation in those two cities, and advised the states parties to the Geneva Conventions in 1950 that the “inevitable consequence [of nuclear weapons] is extermination, pure and simple.”

In November 2011, the Council of Delegates of the International Red Cross and Red Crescent Movement once again condemned nuclear weapons as incompatible with international humanitarian law. The resolution cited the 1996 advisory opinion of the International Court of Justice, which concluded that “nuclear weapons...have the potential to destroy all civilization and the entire ecosystem of the planet.”

In 1984, at the height of the Cold War between the US and the former Soviet Union, the World Health Organization concluded that doctors and scientists “have both the right and the duty to draw attention in the strongest possible terms to the catastrophic results that would follow from any use of nuclear weapons.”

In 1998 and again in 2008, the World Medical Association condemned nuclear weapons and called on the governments of the world to work for their elimination.

Over the years, the American Medical Association, the British Medical Association, the US Institute of Medicine, the Royal Swedish Academy of Sciences, and others have added to the medical knowledge about the unique dangers of nuclear weapons and nuclear war.

“It is not [our] intent to provide a comprehensive plan for survival in the face of a thermonuclear Armageddon;...there is no rational basis for such plans. It is [our] intent, rather, to demonstrate the magnitude of the threat that thermonuclear war presents, and to call attention to a conclusion familiar to physicians in other contexts: that there are some situations in which prevention is the only effective therapy.”


“For more than 50 years, physicians concerned with the medical, environmental and humanitarian impact of nuclear weapons have documented the extreme and unacceptable consequences of their use. ...The renewed awakening to the humanitarian impact of nuclear weapons that is now driving a political initiative for their abolition is the most hopeful development in more than 20 years since the end of the Cold War. ... With sufficient courage and determination, the ban treaty, championed by ICAN and IPPNW, can be completed in a very short time, and can hasten the arrival of a nuclear-weapons-free world.”

—Astana Declaration, 21st World Congress, 30 August 2014
“The suffering caused by the use of nuclear weapons is increased exponentially by devastation of the emergency and medical assistance infrastructure.... Although nuclear weapons’ potential for destructive force increased by a factor of many thousands during the Cold War, the ability of States and international agencies to assist potential victims did not. The ICRC has recently completed a thorough analysis of its capacity, and that of other international agencies, to bring aid to the victims of the use of nuclear, radiological, chemical or biological weapons. Despite the existence of some response capacity in certain countries, at the international level there is little such capacity and no realistic, coordinated plan. Almost certainly, the images seen in Hiroshima and Nagasaki will be those resulting from any future use of nuclear weapons....

“Nuclear weapons are unique in their destructive power, in the unspeakable human suffering they cause, in the impossibility of controlling their effects in space and time, in the risks of escalation they create, and in the threat they pose to the environment, to future generations, and indeed to the survival of humanity.”

—Jakob Kellenberger, President of the ICRC, to the Geneva Diplomatic Corps, Geneva, 20 April 2010

The International Red Cross and Red Crescent Movement

The International Red Cross and Red Crescent Movement “emphasizes the incalculable human suffering that can be expected to result from any use of nuclear weapons, the lack of any adequate humanitarian response capacity and the absolute imperative to prevent such use, finds it difficult to envisage how any use of nuclear weapons could be compatible with the rules of international humanitarian law, in particular the rules of distinction, precautions and proportionality, [and] appeals to all States to ensure that nuclear weapons are never again used, regardless of their views on the legality of such weapons; [and] to pursue in good faith and conclude with urgency and determination negotiations to prohibit the use of and completely eliminate nuclear weapons through a legally binding international agreement....”

—from “Working towards the elimination of nuclear weapons,” resolution adopted by the Council of Delegates; 26 November 2011

World Health Assembly

“The Thirty-Sixth World Health Assembly... endorses the conclusion that it is impossible to prepare health services to deal in any systematic way with a catastrophe resulting from nuclear warfare, and that nuclear weapons constitute the greatest immediate threat to the health and welfare of mankind.”

—WHA Resolution WHA36.28, 16 May 1983

World Health Organization

“(C)atastrophic results...would follow from any use of nuclear weapons. The immediate and delayed loss of human and animal life would be enormous, and the effect on the fabric of civilization would be either to impede its recovery or make recovery impossible. The plight of survivors would be physically and psychologically appalling. The partial or complete disruption of the health services would deprive survivors of effective help.”

“It is obvious that no health service in any area of the world would be capable of dealing adequately with the hundreds of thousands of people seriously injured by blast, heat or radiation from even a single 1-megaton bomb....the only approach to the treatment of the health effects of nuclear explosions is primary prevention of such explosions, that is, the primary prevention of atomic war.”

—Effects of Nuclear War on Health and Health Services, 1984

“A after a major nuclear war famine and diseases would be widespread and social, communication and economic systems around the world would be disrupted....It is obvious that the health services in the world could not alleviate the situation in any significant way....Therefore the only approach to the treatment of health effects of nuclear warfare is primary prevention, that is, the prevention of nuclear war.”

—Effects of Nuclear War on Health and Health Services, 2nd ed. 1987

World Medical Association

“The World Medical Association considers that it has a duty to work for the elimination of nuclear weapons. Therefore the WMA:

- condemns the development, testing, production, stockpiling, transfer, deployment, threat and use of nuclear weapons;
- requests all governments to refrain from the development, testing, production, stockpiling, transfer, deployment, threat and use of nuclear weapons and to work in good faith towards the elimination of nuclear weapons; and
- requests all National Medical Associations to join the WMA in supporting this Declaration and to urge their respective governments to work towards the elimination of nuclear weapons.”

—Statement adopted by the 50th World Medical Assembly, Ottawa, Canada, October 1998 and amended by the 59th WMA General Assembly, Seoul, Korea, October 2008

Medical School Deans

“Health professionals must again take up our responsibility to protect public health by educating the public about the danger of nuclear war, and by convincing our leaders to make good on their promises to eliminate these weapons. As health professionals we are daily witness to failures of technical systems and mistakes in judgment by even the best clinicians. We, and the technology we have created, are simply not infallible. When mistakes occur in the medical setting patients suffer and sometimes die. If the wrong mishap occurs in the management of our nuclear arsenals it may be civilization itself that perishes.... We believe, as a matter of public health policy, that nuclear weapons must be eliminated in the near future.”

—“A Prescription for Survival,” signed by the deans of 30 US medical schools, May 2012
This is known as “the elevator speech”—what you can say to someone when you’re on the elevator together (or walking down a corridor between meetings; or waiting on line to pay for lunch) and you only have his or her attention for a minute.

Nuclear weapons are the worst instruments of mass murder ever created. Because they are indiscriminate and disproportionate in their effects, they violate international law. The ionizing radiation produced at detonation kills people from radiation sickness, while radioactive contamination of the environment causes cancers, chronic diseases, birth defects, and genetic damage. A single nuclear weapon can destroy a city. A nuclear war involving the massive arsenals possessed by the US and Russia could destroy virtually all life on Earth in a nuclear winter. Even a small fraction of the nuclear weapons that exist today can damage the global climate and agricultural production so severely that billions would starve.

The medical and international relief communities say they cannot respond to the terrible devastation caused by nuclear weapons, and that no amount of planning or spending on improved capacity can change this reality.

Weapons this powerful and destructive belong in no one’s hands. UN Secretary General Ban Ki-moon is right when he says there are no right hands for the wrong weapons. There have been many accidents, near misses and close calls. Our luck could run out any day. The only way to prevent their use is to ban and eliminate them. Ignoring the problem is not going to get the job done. While international law provides a clear basis for the elimination of nuclear weapons, they are not yet formally prohibited. Chemical and biological weapons, antipersonnel landmines, and cluster munitions have all been recognized as causing unacceptable harm, and therefore have been banned by treaties. A treaty banning nuclear weapons will fill that gap for by far the worst weapons of all, and is the best next step that can be taken now toward their elimination.

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