BANNING NUCLEAR WEAPONS

Article36

INTRODUCTION AND EXECUTIVE SUMMARY

"The morning was still; the place was cool and pleasant. Then a tremendous flash of light cut across the sky."

Description of the Hiroshima detonation [1]

"The mind recoils from the effort to foresee the details of such a calamity, and from the careful explanation of the unavoidable uncertainties as to whether people would die from blast damage, from fallout radiation, or from starvation during the following winter."

US Office of Technology Assessment, The Effects of Nuclear War, 1979 [2]

The humanitarian impacts of nuclear weapon use are more destructive than those of any other weapon developed throughout history. The main immediate effects are intense light and heat, a massive blast wave, and ionising radiation. Matter is vaporised. People are blinded. Blast effects pull apart buildings, crush people to death and cause hurricane force winds that hurl cars and masonry. The heat burns through skin and sets the landscape ablaze. Radiation and radioactive fallout cause sickness, that breaks down the organs of those that survived the blast. The effects cover wide areas.

Humanitarian organisations such as the UN relief agencies and the ICRC have made it clear that they would not have the capacity to respond meaningfully to the impacts of a nuclear weapon explosion.

The use of a single nuclear weapon in an urban area would cause hundreds of thousands of casualties and massive social and economic destruction. The use of multiple nuclear weapons could have longer-term consequences on a global level, with recent research showing that soot from massive firestorms could cause climate disruption affecting food production worldwide and causing large-scale famine.

This paper argues for the agreement of a treaty banning nuclear weapons. It argues that the humanitarian consequences of a nuclear weapon attack make it vital to avoid their use, and this in turn makes the elimination of nuclear weapons an imperative. Existing multilateral instruments and approaches provide building blocks towards a prohibition, but currently too much special status and authority is given to the states that are armed with nuclear weapons. In order to delegitimise nuclear weapons within those countries, and so take the next necessary step towards the elimination of these weapons, committed states need to develop and agree an instrument that makes the illegality of nuclear weapons explicit. This can be done even if the nuclear-armed states will not participate.

Such an initiative would be coherent with the obligation of Article 6 of the Non-Proliferation Treaty, to pursue in good faith negotiations relating to nuclear disarmament.

Such an initiative would allow states within existing nuclear weapon free zones (NWFZs) to stand together in a common instrument that asserts more strongly their rejection of nuclear weapons. With treaty text banning the use, production and possession of nuclear weapons, with acceptance by the international community that states can adopt such a position even if their neighbours do not follow suit, and with applause from the international community for this contribution to international security, the NWFZs stand as clear building blocks for a stronger prohibition regime – one that

binds this existing body of support together, reinforcing the existing regional treaties and providing an open architecture into which any committed individual state can accede.

Finally, a ban treaty would put nuclear weapons, where they belong, on the same footing as the other weapons of mass destruction. As with treaties banning chemical and biological weapons, the prohibition of nuclear weapons would precede their elimination, with the treaty providing a framework for the subsequent stockpile destruction. Whilst the process of developing and agreeing such an instrument may seem daunting, the task in hand could be seen as little more than correcting a legal anomaly that has been allowed to persist, dangerously and for far too long.

In November 2011, the Council of Delegates of the International Red Cross and Red Crescent Movement appealed to all states "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, based on existing commitments and international obligations."[3] Even amongst the military forces in certain nuclear armed states there is increased questioning of the utility of nuclear weapons in today's world, discussions that further serve to devalue these weapons. In 2012, a growing number of governments endorsed international statements arguing that due to the catastrophic humanitarian consequences their use would cause, moves should be taken to outlaw nuclear weapons.[4] This is coupled with a renewed sense of confidence within civil society under the banner of the International Campaign to Abolish Nuclear Weapons (ICAN), which is drawing both upon the decades of work towards nuclear disarmament as well as upon more recent efforts to prohibit certain weapons and to mobilise NGOs in coalitions around the world.[5] There is an opportunity now to take this crucial next step towards nuclear disarmament.

STRUCTURE OF THE REPORT

Section 1 of this paper draws on existing research to provide a brief introduction to the humanitarian impacts of nuclear weapon use and explains why little can be done to alleviate the grave suffering of those directly affected by a nuclear explosion, or to effectively address the wide-ranging and long-term consequences it would cause.

Section 2 surveys some of the key multilateral instruments and approaches that have been put in place to address nuclear weapons. It finds potential in all of them to act as building blocks for an instrument providing a clearer rejection of nuclear weapons.

Section 3 calls for a treaty banning nuclear weapons. It develops further the justification and key elements of such a treaty.

1. J. Hersey, Hiroshima, 1946.

2. United States Office of Technology Assessment, The Effects of Nuclear War, 1979.

3. 'Working towards the elimination of nuclear weapons', resolution of the Council of Delegates of the International Red Cross and Red Crescent Movement, Geneva, Switzerland, 26 November 2011.

4. See the Joint Statement on the humanitarian dimension of nuclear disarmament, delivered by Switzerland, 2 May 2012, on behalf of 16 countries at the First Session of the Preparatory Committee for the 2015 Review Conference to the Treaty on the Non-Proliferation of Nuclear Weapons (http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/npt/prepcom12/statements/2May_IHL.pdf) and the Joint Statement on the humanitarian dimension of nuclear disarmament, delivered by Switzerland, 22 October 2012, on behalf of 35 countries at the 67th session of the United Nations General Assembly First Committee (http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com12/statements/22Oct_Switzerland.pdf).

5. See the website of the International Campaign to Abolish Nuclear Weapons: www.icanw.org.

THE HUMANITARIAN IMPACT OF NUCLEAR WEAPONS

The use of nuclear weapons would cause human suffering on a massive scale and over an extended period of time.[1] The actual effects experienced depend on a very wide variety of factors relating to the weapons used, the manner of use and the conditions in the affected area.

The following section sketches out those effects, recognising that significant variations of impact will occur depending on the yield of the warhead, the number of warheads used, whether detonation is on the ground or in the air above a target etc. The paper looks first at immediate effects in terms of human health and damage to infrastructure. It then looks at longer-term humanitarian impacts including both longer-term health effects and the wider risks of nuclear weapon use to society and the environment. Finally, it very briefly draws conclusions regarding the challenges that face any response to such impacts.

In the wider context of this paper, the purpose of this section is to highlight that despite variations of impact as a result of the factors noted above, the humanitarian consequences from the use of nuclear weapons would be dire. Seen in the context of other treaty prohibitions on certain categories of weapons (including the other weapons of mass destruction), the pattern of humanitarian consequences described here easily justify calls for a prohibition.

Throughout this section, short examples are presented. The degree of red shading adjacent to these examples roughly indicates the scale of detonation from which those effects result. So an example regarding a detonation of some kilotons (kT) will be more lightly shaded than where detonation is in the megatons (MT), or where multiple detonations are involved. In all cases the humanitarian effects are sufficient to be considered unacceptable, but it is hoped that this shading avoids confusion between the different scales of weapons being discussed

kilotons (kT)

megatons (MT)

Injured civilians, having escaped the raging inferno, gathered on a pavement west of Miyuki-bashi about 11.00 am on 6 August 1945.
6 August 1945, Hiroshima, Japan. Photo: United Nations Photo by Yoshito Matsushige

IMMEDIATE EFFECTS

Health

A nuclear explosion involves the sudden release of massive amounts of energy resulting from an instantaneous fusion or fission process. This explosion can be many orders of magnitude more powerful than the largest conventional detonations. Immediately following the explosion, the most significant effects are blast, thermal radiation (light, heat) and ionising radiation.

The relative distribution of energy released depends on a variety of factors. A low altitude detonation of a moderate sized weapon in the kT range, will release roughly 50% of its energy in the form of blast, 35% as thermal radiation, and 15% as ionising radiation (5% as initial radiation and 10% as fallout over time). The number and the relative distribution of blast, thermal and radiation casualties that a detonation produces varies significantly in relation to the height of the burst, and the population density, weather, topography and structural makeup of the area around ground zero.

Blast and fragmentation

The detonation of a nuclear weapon causes a powerful blast wave that moves outward from the centre of the explosion, initially at speeds of a hundred times the speed of sound in normal air. The overpressure ('static overpressure') near the point of detonation is extremely high, thousands of pounds per square inch (psi). The blast is immediately followed by hurricane force blast winds ('dynamic overpressure'). The winds associated with as little as 2 – 3 psi can blow people out of an office building.

> Everyone within 800m of a 1 kt nuclear explosion who is directly exposed to the blast will be killed instantly.[2]
>
> 1 kT

For the most part, blast kills and injures people by indirect means rather than direct pressure. People inside or near buildings will be crushed under the weight of collapsing structures, or suffocated by the dense dust of crushed bricks and mortar. Those standing in the open will be swept up and carried above the surface of the ground, hitting other objects and being hit by flying debris. The violent implosion of windows and walls creates a hail of deadly missiles. The medical effects include traumatic amputation of limbs, crush injuries, penetrating injuries, the rupture and haemorrhaging of internal organs, and ear drum rupture. The blast also magnifies burn injuries by tearing away severely burned skin, which creates raw open wounds that readily become infected.

Injury thresholds for window glass are considered to be around 0.6 psi. That corresponds to 6 km for 20 kT bomb, and 17 km for a 550 kT bomb.[3] Even at great distances from ground zero, people can suffer injuries from flying glass that require medical attention.

Thermal radiation

The heart of a nuclear explosion reaches a temperature of several tens of million degrees centigrade within a fraction of a second. This is hotter than the surface of the sun. At this temperature all matter is vaporised. The hot air and gaseous weapon residues form a 'fireball' that grows rapidly and rises up in the air, emitting enormous amounts of 'thermal radiation'.

> In Hiroshima, within a radius of half a mile (800m), the only remains of most of the people caught in the open were their shadows burnt into stone.
>
> 13 kT

The visible light component of the thermal radiation accounts for the blinding flash seen upon detonation as well as the subsequent brightness of the fireball. On a clear day, the flash appears to an observer over 50 km away from the explosion more brilliant than the sun at noon. People looking in the direction of the explosion can suffer flash-blindness or dazzle and even retinal burns leading to permanent blindness.

> Flash-blindness would occur up to distances of 21 km on a clear day and 85 km on a clear night.[4]
>
> 1MT airburst

The infrared component (heat) of the thermal radiation can cause 'flash burns' and kill people caught in the open. The risk of injury from thermal radiation depends strongly on weather conditions (smog or moisture in the air absorb thermal radiation, whereas reflection from cloud cover, or snow or ice on the surface can increase it), on shielding (for example, by walls, buildings or hills) and on skin pigmentation and the type and colour of clothing.

The more thermal radiation absorbed, the more serious the burns. Second degree burns involve damage to the dermal tissue, leading to blistering. Third degree burns involve tissue death all the way through the skin, including the stem cells required to regenerate the tissue. Such burns present a serious risk of infection, and can cause major fluid loss. Severe second or third degree burns (over a quarter or a third of the body respectively) will typically precipitate shock in a matter of minutes. Within 200m of a 1 kT nuclear explosion there will be 100% mortality from the heat alone. Survivors within up to 500m can have third degree burns. At the other end of the scale, a 20 MT explosion can cause potentially fatal third degree burns at a range of 40 km, where the blast can do little more than break windows.[5]

Heat from the explosion contributes to secondary fires in the affected area. How these fires spread will depend on weather, terrain, and on the distribution of combustible material in the vicinity.

> In the case of a 1 kT device, detonated on the surface in an urban area, burns due to direct radiant energy would be expected to be limited to short distances due to structural shielding, but subsequent fires could still produce a high burn trauma population.
>
> 1kT

Due to these fires people may be trapped in burning buildings and be killed or suffer flame burn injuries. They may also suffer from the inhalation of fumes and smoke, which can cause lung damage and have toxic effects, especially on people in enclosed spaces.

Under certain conditions these fires can coalesce into a 'firestorm' characterised by very strong winds and such high temperatures (many hundreds of degrees) that objects will be vaporised or melt (as happened in Hiroshima, and in Dresden, Hamburg and Tokyo after bombardment with conventional explosive weapons). In a firestorm, carbon monoxide reaches lethal levels and all the oxygen in the area is consumed. Even people in deep shelters will die from the heat or by asphyxiation.

Ionising radiation

A nuclear explosion releases radioactive fission products, mostly neutrons and gamma radiation, within the first minutes after the explosion (called 'prompt radiation' or 'initial radiation'). The intensity of these emissions depends on the type of weapon used. In addition, the expanding fireball lifts radioactive residues of the weapon, debris, soil and water, into the atmosphere. This radioactive material, is directed by weather patterns and falls back to earth gradually as radioactive fallout. Fallout is of far greater significance for ground-burst detonations than for airburst detonations.

Early fallout deposits larger particles locally within 24hrs of the explosion and in the direction of prevailing winds. Smaller particles ascend in the mushroom cloud. Where and when they will come to the ground depends, among other things, on the height to which the particles are carried, their weight and the weather conditions. Delayed fallout can eventually be deposited in places far from ground-zero, between a day or two after the explosion until decades later. Residual radionuclides from the atmospheric tests of the 1950s and 1960s persist to this day throughout the world.

Prompt radiation will directly affect everybody within a few kilometres. Significant health effects extend to roughly 2 km for a 20 kT nuclear detonation, and 3 to

4 km for a 550 kT detonation. In many cases this zone of impact will overlap with the zone of severe blast and heat effects, limiting in practice the contribution of this radiation to mortality levels.

From a ground-burst detonation, fallout can irradiate people over much larger distances through external exposure to the fallout plume passing overhead, continuing external radiation from radionuclides deposited on the ground, inhalation of radionuclides, and ingestion of contaminated food and water. Fallout from a 15 kT ground-burst could be lethal to all survivors of blast and fire within a 350 m wide zone extending to 8 km downwind. Although primarily associated with ground-burst detonations, rainfall following an air-burst can result in much higher local fallout, increasing radiation fatalities significantly.[6]

Radiation kills or damages living cells resulting in impaired functioning or even failure of organs. Acute effects of radiation include damage to the bone marrow, the gastrointestinal tract and the central nervous system. The severity of radiation effects increases with total accumulated dose, which in turn depends on the distance from the radiation and the time for which people are exposed to radiation.

Except in the case of a massive exposure where death occurs swiftly, people who have received a lethal dose will suffer horribly for days or weeks (even months) before they die. There is no cure for radiation sickness and even with medical treatment the results are very often fatal. A non-fatal radiation dose can induce acute health effects and predisposes to infections. Radiation increases mortality from burns and blast injuries and slows recovery. Any radiation dose is assumed to contribute to an increased risk of cancer over a person's lifetime.[7]

Radiation affects cell division, and children and the unborn are particularly susceptible to its effects because of their rapid rate of cell division. Pregnant women are likely to miscarry or give birth to babies with a range of abnormalities, disabilities, severe mental and growth retardation. Radiation is also associated with increased child mortality below 1 year.

Damage and destruction

The blast wave and the heat from a nuclear explosion, as well as the electromagnetic pulse and secondary fires will cause extensive damage and destruction to private property and public infrastructure that in turn have significant long-term impacts on the wellbeing and survival of the population.

Blast, heat and fires

The shock wave of a nuclear weapon is more prolonged compared to conventional explosive weapons, which increases the destructive effects. The static overpressure and the speed of the blast wave dissipate and decrease as they move out from the centre of the explosion. However, even a small amount of overpressure is associated with wind speeds that are extremely destructive to structures. City areas should be presumed to be completely destroyed (with massive loss of life) by an overpressure of 5 psi, with heavy damage extending out at least to the 3 psi contour. Windows can break (and injure people) to a distance of 17.5 km for a 20 kT explosion, or 53 km for a 550 kT explosion.[8]

Whereas blast is the most significant immediate effect of weapons below 100 kT, for weapons above 100 kT significant thermal effects can extend to far greater distances than major blast effects. Secondary fires will add significantly to the destruction caused by blast. If a firestorm develops, everything combustible within the affected area is likely to be consumed.

The infrastructure damage resulting from blast, heat and fires can disrupt transport, energy and communication networks and affect the delivery of health care. It can also have a series of knock-on effects on food production and other sectors of the economy.

Electromagnetic pulse and fireball blackout

A nuclear detonation is accompanied by an electromagnetic pulse (EMP) that produces a high voltage surge and can have damaging effects on electrical and electronic devices, even if unplugged.

The area affected by an EMP is strongly dependent on the yield of the weapon and the height of its burst.[9] The humanitarian impact of an EMP can be profound, although human health is not directly affected. Commercial electrical grids would be subjected to voltage surges far exceeding those created by lightning. As a consequence, electronic appliances, including cell phones, computers and medical equipment can be damaged, completely destroyed or malfunction, with important negative effects on emergency assistance. Hospitals within the affected area would lose their power supply (including backup power) and plugged-in equipment would likely be destroyed.

In addition to the EMP, the ionized fireball has the ability to block radio and radar signals for seconds to minutes over an area tens of kilometres across. High frequency radio can be disrupted over hundreds of kilometres for minutes to hours under certain conditions.

Survivors of the Hiroshima bomb who have received some medical care. 12 August 1945, Hiroshima, Japan. Photo: United Nations Photo by Hajime Miyatake

LONGER TERM HUMANITARIAN IMPACTS

Health

Nuclear weapon use will have severe impacts on health in the long-term, both in terms of permanent disability, such as blindness and amputation, and due to effects of radiation that manifest years, even decades, after exposure.

The late (or 'stochastic') effects of radiation on health are unpredictable and do not necessarily affect all individuals in the same way. The effects are due to damage caused to the DNA and chromosomes. Unrepaired or incorrectly repaired DNA damage results in mutations, which in turn can lead to cancers in ordinary cells, and genetic damage in germ cells. Chromosomal damage can also be passed on to subsequent generations.

Cancer, especially of the breast, lung, thyroid, pancreas, skin, brain and blood (leukaemia), is the most widely observed late effect of radiation. Other late health effects include genetic abnormalities from the effects of radiation on the ovum and sperm producing cells, impaired fertility or infertility, chronic diseases, and cataracts.[10]

Following a nuclear war, atmospheric changes could result in increased exposure to solar radiation that will cause blindness in humans unless they protect their eyes, skin burns and skin cancers. Radiation can also reduce resistance to infection and can make vaccines less effective. Certain species, especially insects, are less susceptible to radiation than mammals. Infectious diseases or illnesses controlled by antibiotics today could become serious or epidemic again. Overcrowding and poor sanitation in large cities or camps of survivors would compound these problems.

Psychological and psycho-social

"No survivor could be certain he was not among the doomed, and so added to every terror of the moment, thousands would be stricken with the fear of death and the uncertainty of the time of its arrival." [11]

Experiencing a nuclear weapon explosion is likely to be associated with intense social and psychological distress. Radiation emergencies suggest that anxiety and fear are enhanced by the invisibility of radiation. People cannot rely on their own senses to determine physical exposure. Fear of an unfamiliar and potentially terrible danger causes acute stress, even when radiation exposure is low or insignificant.

Many survivors of a nuclear weapon use will suffer from 'disaster syndrome' in which people would feel 'dazed, stunned, bewildered, and apathetic and behave mechanically'. Given the devastation and unspeakable horror survivors will witness, it is uncertain whether they would be capable or willing to take the measures needed to save their own lives in the aftermath.[12]

There is little experience on which to base estimates of mental health problems after a nuclear weapon explosion. Experience with natural disasters suggests that mental health problems would be widespread and severe, and the lack of a 'normal world' after a nuclear war would be a critical factor in amplifying the psychological effects.[13] Many survivors will have lost family and friends, and potentially large parts of the population will be displaced, some without hope of returning within their lifespan. Anxiety, apathy, despair, emotional numbing and emotional instability, would probably affect almost all survivors. Depression, illnesses and early death, including suicides, will become more common.

Environmental and socio-economic impacts

In the longer term, a nuclear weapon explosion can affect the natural and human environment in a variety of ways. Radioactive contamination can render entire cities uninhabitable and swathes of land unfit for use for decades. The population and economic assets affected by the use of even modest numbers of low-yield

nuclear weapons in a regional conflict would dwarf the impacts of the 1986 Chernobyl nuclear power plant accident. Eventually, such use could lead to famine on a global scale.

Radioactive isotopes from the fallout will exert a variety of effects upon world ecology over time, as plants and animals absorb the fission products. The isotopes will migrate into the drinking water and enter the human food chain, affecting not only human health (see above), but also the health of livestock and agricultural productivity.

Because of the smoke released in fires ignited by detonations, there is a possibility that the use of one hundred 15 kT weapons, used against city centres, would produce global climate disturbances unprecedented in recorded human history.[14]

100 x 15 kT

Under certain conditions, such as in the case of a regional nuclear war, the smoke and soot from fires transported into the upper troposphere can cause an abrupt drop in global temperatures and rainfall by blocking sunlight from reaching the Earth's surface. Soot injections could also lead to the depletion of the stratospheric ozone layer, causing increased penetration of ultraviolet (UV) and other harmful radiation from the sun and disturbing global weather patterns.

Newly generated data indicates that the decline in agricultural production following a regional nuclear war would put more than one billion people in danger of starvation.[15] Ionising and solar radiation effects on crops and livestock, possible reduced effectiveness and decline in available fertilisers and pesticides, and changes in weather patterns could result in a significant decline in food production over wide areas of the world and affect human nutrition on a global level. These effects on food production could occur at great distances from the location of nuclear weapon use, with modelling suggesting for example that parts of Africa would be severely affected by a nuclear war between India and Pakistan. Food scarcity will be exacerbated by turmoil in agricultural markets.

Given the precarious situation of the 925 million people who are presently malnourished, even a small decline in available food and rise in prices will have devastating consequences. Famine on a major scale would lead to epidemics of infectious diseases. Massive population displacements, political tensions and conflict over scarce resources, and possibly a breakdown of social order should also be expected.

Hiroshima Red Cross Hospital.
6 October 1945. Photo: Hiroshima Peace Media Center

RESPONSE EFFORTS

A nuclear weapon attack would constitute a 'complex emergency' in terms of relief efforts, presenting unique logistical, health and safety challenges due to the great destructive power of the weapons and the risk of radioactive contamination. Hundreds of thousands, even millions of people may require assistance, including urgent medical care; large parts of the population may be homeless and displaced; to keep them alive people will require protection from delayed fallout and shelter from the elements, as well as assistance in the form of water, food, medicine and other supplies; beyond this they may need help in locating missing family members, counselling, or simply information.

Health of rescue workers

Radioactive contamination will seriously hamper any rescue and assistance effort and threatens the health of rescue workers. Approximately 40,000 persons entered Hiroshima soon after the explosion to help with rescue work. Those entering within the first 3 days were exposed to radiation and subsequently showed increased incidence of leukaemia and solid cancers.[16]

A decision to attempt rescue work must be preceded by a survey of the area by specialists with appropriate protection and measuring equipment (which must be available and in many cases will not be), and a policy decision as to how much radiation rescuers should be exposed to. This will also be necessary to designate areas where populations need to be directed to seek shelter from fallout, priority evacuation areas, priority areas for rescue efforts, and safe locations for camps of displaced people and bases for rescue workers. The problem is compounded by the difficulty of predicting where delayed fallout will come to the ground.

Emergency relief

People who require medical care, who are trapped by fallen masonry or in collapsed basements or shelters

will need emergency assistance. Everyone sheltering within the affected zone will, in time, need assistance and will need to be evacuated. With much local capacity likely destroyed, relief will have to be provided from outside of the affected zone. Effective communication among emergency services, and with survivors and the wider public will be critical yet blast and EMP effects on communications infrastructure will severely impair radio, cell phone and satellite communications.[17]

Fires and structural damage will make access to the affected areas extremely difficult and unsafe. Rescue work will be hampered by impassable roads and damaged bridges and central areas of severe damage will likely remain inaccessible to emergency services. Access problems may be exacerbated due to unorganised self-evacuation of survivors leading to traffic jams. Ruptured vehicle fuel tanks, downed power lines, broken gas conduits and unstable buildings will pose a safety risk. Visibility will be poor due to dust and smoke from fires. Water pumping stations may not be functioning and water distribution lines may be broken, hampering fire fighting. Rubble heated by a firestorm may remain intolerably hot for several days after the fire has gone out. Lack of electricity will further complicate relief efforts.

"At Hiroshima, 70% of the fire-fighting equipment was crushed in the collapse of fire houses, and 80 per cent of the personnel were unable to respond." [18]

The logistical challenges due to the devastation alone may be insurmountable. Radioactive contamination would further complicate relief efforts, especially in the case of a ground-burst detonation. People, animals, food, equipment and critical infrastructure would have to be decontaminated. Water, food, fuel and other supplies will have to be brought to populations in need, whereas contaminated goods will have to be prevented from leaving the affected area. People, including self-evacuees, their vehicles and pets, will have to be screened and decontaminated. The management of debris and other waste, and the disposal of human remains will also require special handling.

Medical care

Such a crisis would pose overwhelming challenges to health services due to the presence of radioactive contamination and the large number of victims. Many victims will present complex, often combined, blast, burn and radiation injuries requiring urgent specialist treatment, including respiratory intensive care, major surgery for blast trauma, and plasma and blood transfusions for burn and radiation victims. Severe burns will require immediate treatment. Due to the combination of different types of injuries, death rates can be exacerbated far beyond those expected for any one type of injury.

Emergency services close to a nuclear explosion will themselves be severely affected and there will be an acute lack of specialist wards, surgical theatres, burn beds and qualified and support personnel to administer treatment. Given the tendency to locate major health care facilities close to city centres, an attack on a city is likely to greatly curtail local capacity. Any remaining specialist capacity will easily be overwhelmed or rendered non-functional. Hospitals further away from ground zero may be overwhelmed by self-evacuees and vast numbers of people with relatively minor injuries. Most clinicians are unfamiliar with triage in radiation mass-casualty incidents and with the treatment of victims with radiation injuries. In order to maximise the number of lives saved, especially when medical resources are scarce, it may well be necessary not to give priority treatment to the most severely injured, particularly if they are suffering from radiation sickness. They are unlikely to survive.

The explosion of a single nuclear bomb of the size used at Hiroshima over a major city in the UK is likely to produce so many cases of trauma and burns requiring hospital treatment that the remaining medical services in the UK would be completely overwhelmed.[19]

13 kT

The entire US has specialised facilities to treat roughly 1,500 burn victims, which is far less than the burn casualties produced by one single small nuclear explosion.[20]

A single 1 MT bomb on the city of Detroit is expected to overwhelm the hospitals of the whole of the United States, even if the injured could be efficiently distributed amongst them all. There would be perhaps 10,000 burn cases.... A whole year's supply of blood for transfusion would be needed in one day.[21]

1 MT

In many countries, the limited capacity of the health system, shortfalls in hospital disaster preparedness and emergency department overcrowding already severely limit the ability to respond to sudden mass-casualty events.[22] Before long, stocks of blood plasma for transfusions, antibiotics against infections, pain-killers and other drugs will be depleted, and it is not possible to increase production of these in a short period of time. Beyond those injured during the nuclear weapon use, individuals already suffering from chronic conditions, such as diabetes, before the attack would likely have no access to medicine and treatment on which they rely for survival on a daily basis.

The health infrastructure of no single country would be able to cope with a sudden influx of such a large number of emergency casualties. An international response to assist the victims would be required yet it

is unclear who would provide such assistance, how it would be delivered, and whether it would be effective, given that no humanitarian organisation has significant experience, training, the capacity or plans in place for such an eventuality. In almost any scenario, the conditions would be such that aid organisation would not be able to fulfil their mandates effectively.[23] In the case of a nuclear war, the medical needs, including in the long-term needs of survivors, will go far beyond the capacity of health care provision globally.[24] Of course, in no scenario will emergency responses be able to bring the tens or hundreds of thousands of dead back to life.

CONCLUSIONS FROM THIS SECTION

It is clear from the effects of even a single low-yield nuclear weapon that 'any nuclear explosion would be a health catastrophe'.[25] The detonation of a large yield nuclear weapon, or of more than one nuclear weapon in or near a densely populated area, like a city, would produce casualties and destruction on an unimaginably vast scale. The massive loss of life, the appalling plight of victims, and the long-term and wide-ranging consequences of such a nuclear weapon explosion, as well as the recognition that no health service anywhere in the world could alleviate the disaster in any significant way led the World Health Organisation almost three decades ago to conclude that 'nuclear weapons constitute the greatest immediate threat to the health and welfare of mankind'.[26] More recently, the Council Delegates of the International Red Cross and Red Crescent Movement concluded that in view of the humanitarian consequences and the lack of any adequate humanitarian response capacity, it is imperative to prevent nuclear weapon use, and appealed to all states to urgently conclude a legally binding international agreement 'to prohibit the use of and completely eliminate nuclear weapons'.[27]

"'...people covered in blood were running to the back gate which looks onto the Urakami River (Ohashi Bridge), seeking the water as they dragged their peeled skins of their bodies as if they were rags. A number of them fell, one after another, on the way, and others died at the water's edge. The shallow waterbed in the midsummer heat was stained red with their blood before my eyes. I saw houses burning as far as I could see, a sea of flames surrounding me from all sides. ... Every way I looked, it was hell. We can never let this happen again."

Mitsuko Yoshimura
survivor of the nuclear attack on Nagasaki[28]

1. This section focuses on the humanitarian impacts from nuclear weapon use and does not address humanitarian concerns that arise in connection with the manufacture, testing or deployment of nuclear weapons. For information on the humanitarian effects of nuclear weapons, including from testing and production, see International Campaign to Abolish Nuclear Weapons (ICAN), Catastrophic Humanitarian Harm, 2012; See also Reaching Critical Will, Unspeakable suffering: the Humanitarian Impact of Nuclear Weapons, 2013 and the Report of the United Nations Scientific Committee on the Effects of Atomic Radiation to the General Assembly, 2000.

2. Medact, Britain's New Nuclear Weapons: Illegal, Indiscriminate, and Catastrophic for Health, 2006.

3. W. C. Bell, C. E. Dallas, 'Vulnerability of populations and the urban health care systems to nuclear weapon attack - examples from four American cities', International Journal of Health Geographics, Vol. 6, No. 5, 2007.

4. Medact, The Medical Consequences of Nuclear Weapons, 1981, amended and reprinted 2007; Medact, Britain's New Nuclear Weapons: Illegal, Indiscriminate, and Catastrophic for Health, 2006.

5. 'Effects of Nuclear Explosions', in K. Bhushan and G. Katyal, Nuclear, Biological, and Chemical Warfare, 2002; Medact, Britain's New Nuclear Weapons: Illegal, Indiscriminate, and Catastrophic for Health, 2006.

6. W. C. Bell, C. E. Dallas, 'Vulnerability of populations and the urban health care systems to nuclear weapon attack - examples from four American cities', International Journal of Health Geographics, Vol. 6, No. 5, 2007; O. B. Toon et al., 'Atmospheric effects and societal consequences of regional scale nuclear conflict sand acts of individual nuclear terrorism', Atmospheric Chemistry and Physics, Vol. 7, 2007. The relative importance of local compared to delayed fallout varies, among other things, with the height of the burst relative to the surface. A small yield weapon (e.g. 1 kT) produces more fallout in proportion to its size compared to a weapon of larger yield.

7. T. A. Ruff, 'The Health Consequences of Nuclear Explosions', in Reaching Critical Will, Unspeakable suffering: the Humanitarian Impact of Nuclear Weapons, 2013; Medact, Radiation and Health, A briefing on the effects of ionising radiation on health, 2012.

8. W. C. Bell, C. E. Dallas, 'Vulnerability of populations and the urban health care systems to nuclear weapon attack - examples from four American cities', International Journal of Health Geographics, Vol. 6, No. 5, 2007; 'Effects of Nuclear Explosions', in K. Bhushan and G. Katyal, Nuclear, Biological, and Chemical Warfare, 2002.

9. 'Effects of Nuclear Explosions', in K. Bhushan and G. Katyal, Nuclear, Biological, and Chemical Warfare, 2002: The EMP can be significant for surface or low altitude bursts (below 4,000 m), and it is very significant for high altitude bursts (above 30,000 m), but is not significant for altitudes between these extremes. The EMP of a small nuclear weapon detonated close to the ground will only be felt in the immediate vicinity of the explosion, and is not an important source of destruction compared to the blast wave; See also Bell and Dallas.

10. Medact, The Medical Consequences of Nuclear Weapons, 1981, amended and reprinted 2007.

11. IPPNW and IEER, Plutonium, p. 143 (U.S. Joint Chiefs of Staff evaluation of the 1946 tests at Bikini Atoll) cited in A. Makhijani, 'A Readiness to Harm: The Health Effects of Nuclear Weapons Complexes', Arms Control Today,

12. Wallace, 1956, cited in J. Thomson, 'Psychological Consequences of Disaster: Analogies for the Nuclear Case', in n F. Solomon, R. Q. Marston, (Eds.), The Medical Implications of Nuclear War, 1986.

13. G. Darnton, The Bomb and the Law: London Nuclear Warfare Tribunal: Evidence, Commentary and Judgement, 1989, http://nuclearwarfaretribunal.org.

14. O. B. Toon et al., 'Atmospheric effects and societal consequences of regional scale nuclear conflicts and acts of individual nuclear terrorism', Atmospheric Chemistry and Physics, Vol. 7, 2007.

15. I. Helfand, Nuclear Famine: A Billion People at Risk, 2012.

16. Medact, The Medical Consequences of Nuclear Weapons, 1981, amended and reprinted 2007.

17. Due to power failures and system overload, communication infrastructure could fail far beyond the area immediately affected by blast, heat and fires.

18. S. Glasstone, The Effects of Nuclear Weapons, 1957.

19. J. Wiley, The Medical Effects of Nuclear War, Report of the British Medical Association's Board of Science and Education, 1983, cited in G. Darnton, The Bomb and the Law: London Nuclear Warfare Tribunal: Evidence, Commentary and Judgement, 1989, http://nuclearwarfaretribunal.org.

20. W. C. Bell, C. E. Dallas, 'Vulnerability of populations and the urban health care systems to nuclear weapon attack - examples from four American cities', International Journal of Health Geographics, Vol. 6, No. 5, 2007.

21. A. F. Phillips, 'The Immediate Effect: Medical Problems after Nuclear War', 3 A.M. Magazine, 2001.

22. D. A. Donahue et al., 'Medical Response Capabilities to a Catastrophic Disaster: "House" or House of Cards?', Journal of Homeland Security and Emergency Management, 2012.

23. D. Loye and R. Coupland, 'Who will assist the victims of use of nuclear, radiological, biological or chemical weapons – and how?', International Review of the Red Cross, Vol. 89, No. 866, June 2007; R. Coupland and D. Loye, 'International assistance for victims of use of nuclear, radiological, biological and chemical weapons: time for a reality check?', International Review of the Red Cross, Vol. 91, No. 874, June 2009.

24. On these concerns, see H.L. Abrams, 'Medical Supply and Demand in a Post-Nuclear-War World', in F. Solomon, R. Q. Marston, (Eds.), The Medical Implications of Nuclear War, 1986; U.S. National Security Staff Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats, Planning Guidance for Response to a Nuclear Detonation, 2010.

25. Medact, Britain's New Nuclear Weapons: Illegal, Indiscriminate, and Catastrophic for Health, 2006.

26. World Health Organisation (WHO), Effects of Nuclear War on Health and Health Services, 1984.

27. Council of Delegates of the International Red Cross and Red Crescent Movement, Resolution 1 - Working towards the elimination of nuclear weapons, 2011.

28. Mitsuko Yoshimura (female), 'Chokubaku' 1.1 km from the hypocenter, Asahi Shimbun, Messages from Nagasaki, http://www.asahi.com/hibakusha/english/nagasaki/n00-00008e.html.

PREVENTING NUCLEAR WEAPON USE

"The Non-Proliferation Treaty ... makes it absolutely clear that Britain has the right to possess nuclear weapons."

Tony Blair, *UK Prime Minister speaking in the House of Commons, February 2007*

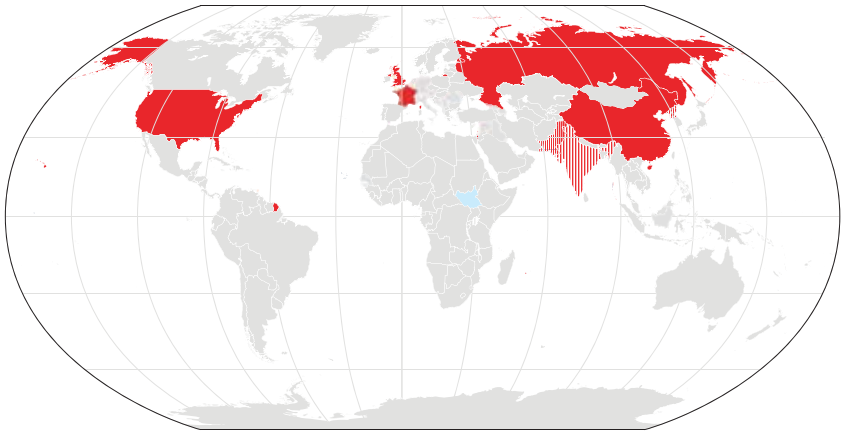
The humanitarian consequences of nuclear weapon use, as delineated in the preceding section, make prevention an imperative. Although this imperative contributes to theories of deterrence that are generally used to justify the continued possession of nuclear weapons, it also underpins a widespread formal acceptance on the part of states of the need to eliminate nuclear weapons as the most effective guarantee against use. The problem of nuclear weapons has given rise to a number of multilateral instruments and mechanisms that in different ways contribute to stigma associated with these weapons.[1] This section looks briefly at some of these efforts, including the Nuclear Non-Proliferation Treaty, Nuclear Weapon Free Zones and the Comprehensive Test Ban Treaty. The key argument being made here is that whilst these instruments and frameworks provide valuable contributions to the prevention of nuclear weapon use they all need to be built upon to strengthen the international rejection of nuclear weapons. Stronger stigmatization and delegitimisation of nuclear weapons is necessary to break up the networks of support for these weapons and so allow a more committed movement towards their elimination.

MULTILATERAL FRAMEWORKS

Non-Proliferation Treaty

The primary framework for international consideration of nuclear weapons is the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). This treaty was signed in 1968 and entered into force in 1970. Three nuclear-armed states were original signatories – the USA, the then-USSR and the UK – while China and France did not join until 1992. These five nuclear-armed states are given a special status under the NPT as 'Nuclear Weapon States'. The world's four other nuclear-armed states remain outside the NPT: India, Pakistan, North Korea and Israel (although Israel does not officially acknowledge possession of nuclear weapons.)

The main purpose of the NPT is to prevent the spread of nuclear weapons beyond those states that possessed them at the time of its agreement. The so-called 'bargain' struck in the NPT is that countries without nuclear weapons will not develop them and in return nuclear-armed states pledge to get rid of their nuclear weapons and cooperate with others in the development of civil nuclear technology – in particular nuclear energy. On this basis, the NPT is considered to have three pillars: 1) non-proliferation; 2) disarmament; 3) peaceful use of nuclear energy.



Parties to the NPT – do not posses nuclear weapons
Parties to the NPT - nuclear armed states
Not Parties to the NPT – nuclear armed states (India, Israel, North Korea and Pakistan)
Not party to NPT - does not possess nuclear weapons (South Sudan)

Map based on original by the International Law and Policy Institute (IPLI) Nuclear Weapons Project

While the NPT may have served a useful purpose on non-proliferation, and may continue to do so, it faces a range of criticisms, including that:

- it formalises a regime of nuclear weapons 'haves and have nots' that undermines its legitimacy and effectiveness in the eyes of some states;
- in granting a special status to five states on the basis of their prior possession of nuclear weapons it can be used to argue the legitimacy of this possession;
- it has been ineffective in relation to nuclear disarmament and constraining vertical proliferation (e.g. modernisation of existing stockpiles) and concerns remain at its effectiveness in constraining future proliferation of nuclear weapons to other states.

Limited pressure towards disarmament

The NPT has not been successful at achieving disarmament by the nuclear-armed states. Whilst Article 6 of the NPT points in the direction of disarmament, its legal language is weak. It requires states only to 'pursue negotiations ... relating to ... nuclear disarmament'. It sets an objective, but this is bound up in the language of 'general and complete disarmament', widely recognised as aspirational but lacking traction.

In so far as China, France, Russia, the UK, and the US are bound by this obligation, steps have mainly been piecemeal and limited to reductions in the number of warheads, in particular through bilateral agreements

"Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control."

Article 6 of the Non-Proliferation Treaty

between the US and Russia. At the same time these countries continue to spend billions of dollars modernising their nuclear weapons and delivery systems with the NPT apparently unable to address this vertical proliferation.[2]

Bolstering nuclear weapon possession by some

This limited progress towards disarmament under the NPT is more worrying given that the treaty is explicitly used to bolster the claimed legitimacy of nuclear weapon possession on the part of those states to which it grants a special status. In 2007, then UK Prime Minister Tony Blair told parliament: "I should remind my Honorable Friend of the Non-Proliferation Treaty, which makes it absolutely clear that Britain has the right to possess nuclear weapons."[3] Such an articulation illustrates what little concern even the UK has regarding the NPT's disarmament teeth.

The implications of the NPT's acceptance of nuclear weapon holding by some extend outwards. The treaty's language of 'Nuclear Weapon States', those states whose possession of nuclear weapons is accepted under the NPT, has been used more broadly – effectively importing this limited acceptance of nuclear weapons into other areas, such as instruments on nuclear weapon free zones and general language of the UN disarmament machinery.

The NPT should not be a barrier to progress

Given that the NPT can actually be used to assert the acceptability of their nuclear weapons possession, it is perhaps unsurprising that those states given a special status argue strongly that work on a treaty prohibiting nuclear weapons would be a dangerous distraction that could undermine the NPT.[4] However, there is nothing in the NPT that should be wholly incompatible with a more robust instrument delineating more clearly the unacceptability of nuclear weapons. Article 6 of the NPT requires all states to pursue negotiations on disarmament. Furthermore, nuclear weapons proliferation has not been halted by the NPT. Countering further proliferation requires an effort to increase rather than erode the stigma associated with nuclear weapons and to put in place an instrument that rejects any notion that certain states have a right to these weapons. The formal acceptance of 'haves' and 'have nots' needs to be superseded if substantive progress is to be made.

Nuclear weapon free zones

"Regional nuclear weapon free zone agreements reinforce both the commitment of nations not to pursue nuclear weapons and the nearly 65-year record of their non-use."

US White House statement, 2 May 2011[5]

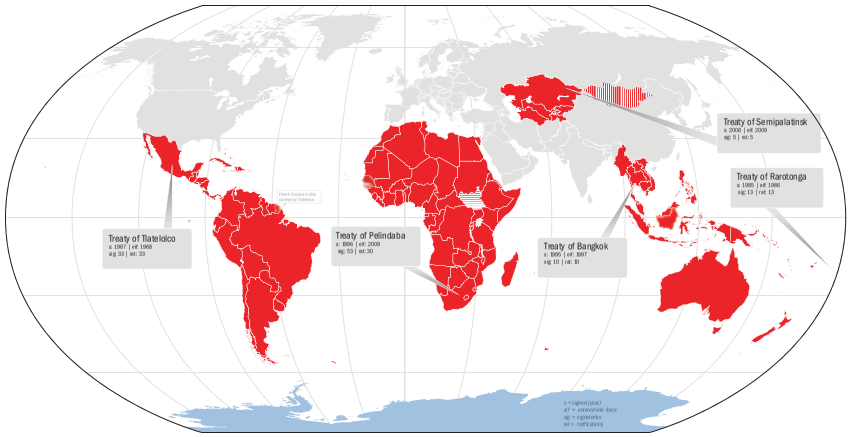
Some 115 states (some 60% of UN Member States, including all of the countries in the southern hemisphere) belong to a nuclear weapon free zone (NWFZ).[6]

The existing NWFZs are established by:

- the Treaty of Tlatelolco for Latin America and the Caribbean, which opened for signature in 1967 and entered into force in 2002;
- the Treaty of Rarotonga for the South Pacific, which opened for signature in 1985 and entered into force in 1986;
- the Treaty of Bangkok for Southeast Asia, which opened for signature in 1995 and entered into force in 1997;
- the Treaty of Pelindaba for Africa, which opened for signature in 1996 and entered into force in 2009;
- the Treaty of Semipalatinsk (Central Asian Nuclear-Weapon-Free Zone Treaty), which opened for signature in 2006 and entered into force in 2009.

In addition, following the departure of Russia troops in 1992, Mongolia declared its territory to be a nuclear weapon free zone and this was set out in a letter circulated to the UN General Assembly in 2000.

There has been significant effort towards developing a Middle East Weapons of Mass Destruction Free Zone, but this has not proven possible so far. The possibility of establishing NWFZs in South Asia, Northeast Asia, and Central Europe has also been discussed[7] as well as in the Alpine Region or in the Arctic.



States, Parties & Signatories to Nuclear Weapons Free Zones
Not Parties to any Nuclear Weapons Free Zone Treaty
Mongolian Nuclear Weapon Free Territory - Recognized by UN General Assembly
South Sudan - Yet to sign and ratify The Pelindaba Treaty
Antarctic Treaty - Demilitarized Territory, including Nuclear Weapons

Map based on original by the International Law and Policy Institute (IPLI) Nuclear Weapons Project

TREATY OF BANGKOK
The Southeast Asia Nuclear Weapon-Free Zone
Brunei Darussalam
Cambodia
Indonesia
Lao People's Democratic Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam

TREATY OF PELINDABA
African Nuclear Weapon Free Zone Treaty
Algeria
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Comoros
Congo
Côte d'Ivoire
Democratic Republic of the Congo
Djibouti
Egypt
Equatorial Guinea
Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Libya
Madagascar
Malawi
Mali
Mauritania
Mauritius
Morocco
Mozambique
Namibia
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
Somalia
South Africa
Sudan
Swaziland
Togo
Tunisia
Uganda
United Republic of Tanzania
Zambia
Zimbabwe

TREATY OF RAROTONGA
South Pacific Nuclear Free Zone Treaty
Australia
Cook Islands
Fiji
Kiribati
Nauru
New Zealand
Niue
Papua New Guinea
Samoa
Solomon Islands
Tonga
Tuvalu
Vanuatu

TREATY OF SEMIPALATINSK
Treaty on a Nuclear-Weapon-Free Zone in Central Asia
Kazakhstan
Kyrgyzstan
Tajikistan
Turkmenistan
Uzbekistan

TREATY OF TLATELOLCO
The Prohibition of Nuclear Weapons in Latin America and the Caribbean
Antigua and Barbuda
Argentina
Bahamas
Barbados
Belize
Bolivia (Plurinational State of)
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Republic
Ecuador
El Salvador
Grenada
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Suriname
Trinidad and Tobago
Uruguay
Venezuela (Bolivarian Rep. of)

Nuclear Weapon Free Territory
Mongolia

Rejecting nuclear weapons

Whilst all of the NWFZ treaties are framed slightly differently, all provide strong contributions towards the rejection and stigmatization of nuclear weapons. The treaties generally prohibit such acts as possession, testing, use, production or acquisition of nuclear weapons, as well as prohibitions on assistance or encouragement toward such acts. Such agreements have been encouraged and supported by the international community. In 2012, the US White House noted that such agreements reinforce commitment to the non-use of nuclear weapons, in addition to simply reinforcing the international effort at non-proliferation.

Mongolia's pioneering creation of a single-state NWFZ opens up the possibility for other countries to seek to fulfil similar aspirations where they find themselves in a region where a NWFZ including their neighbours may not be immediately feasible.

Where rejection of nuclear weapons can be strengthened – negative security assurances and military alliances

Whilst NWFZ provide the most important building blocks for a more demanding international opposition to nuclear weapons, there are aspects of the existing arrangements that need further consideration.

The NWFZ treaties each contain one or more protocols that should be signed by the so-called Nuclear Weapon States, established by the NPT, which cover prohibitions on nuclear testing within the zone and so-called negative security assurances. The concern here (linked to our comments above regarding the NPT) is that these protocols effectively reinforce the claim of certain states to legitimately possess nuclear weapons. Allowing such states to enter into treaties forswearing use of these weapons against one group serves to tacitly reinforce their right to hold these weapons and possibly use them against others.

In addition, while these zones prohibit nuclear weapons, they may include certain countries (such as Australia) that belong to military alliances with partners whose security doctrines contain potential for the use of nuclear weapons. This raises important considerations for the development of a treaty prohibition on nuclear weapons. On the one hand it suggests that mere membership of a military alliance that contains a nuclear-armed states does not have to be an automatic barrier to participation in a multilateral instrument rejecting nuclear weapons. On the other hand it raises questions about the wording of certain instruments and the extent that such regional instruments apply sufficient pressure on certain of their members.

The building blocks of an international prohibition

The NWFZs provide an important example for pro-active efforts by non-nuclear-armed states to establish a prohibition on nuclear weapons. With treaty text banning the use, production and stockpiling of nuclear weapons, with acceptance by the international community that states can adopt such a position even if their neighbours do not follow suit, and with applause from the international community for this contribution to international security, the NWFZ stand as clear building blocks for a stronger prohibition regime – one that binds this existing body of support together, reinforcing the existing treaties and providing an open architecture into which any committed individual state can accede.

Comprehensive Test Ban Treaty

"This was a treaty sought by ordinary people everywhere, and today the power of that universal wish could not be denied."

Madeleine Albright, *U.S. Ambassador to the United Nations, speaking after the vote in favour of the Comprehensive Test Ban Treaty in the UN General Assembly on 10 September 1996* [8]

The Comprehensive Test Ban Treaty was adopted in 1996 but has not yet entered into force. As of February 2013, 158 states are parties to the treaty and 25 more are signatories, but have not yet ratified the treaty. The provisions of the treaty require a particular group of countries with nuclear reactors to ratify before it can enter into force. Of these, China, Egypt, Iran, Israel and the US have signed but not ratified and India, North Korea and Pakistan have not signed. The Comprehensive Test Ban Treaty Organisation exists to monitor compliance with the treaty around the world. The Soviet Union last tested nuclear weapons in 1990, the UK in 1991, the US in 1992, and China and France in 1996. The most recent known nuclear tests by India and Pakistan were in 1998. A test by North Korea in February 2013 was again met with widespread international condemnation, including from the United Nations Security Council.

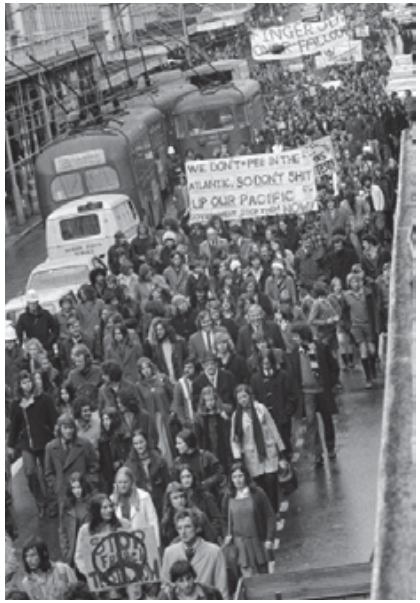
A 15-megaton thermonuclear explosion at Bikini Atoll in the Marshall Islands in 1954. Photo: US Government

A ban drawing on a humanitarian imperative

The treaty prohibits any nuclear explosion, seeking to prevent testing that contributes to the development and modernisation of nuclear weapons, as a means to advancing nuclear disarmament.

In addition to disarmament and non-proliferation, the grave health and environmental impacts caused by nuclear weapon tests were an important driver towards the prohibition of test explosions, including through the ban on atmospheric tests in the Partial Test Ban Treaty of 1963, which noted in its preamble the desire "to put an end to the contamination of man's environment by radioactive substances." The consequences of nuclear testing, in particular atmospheric nuclear testing, for communities living near the test sites have been significant. In the Marshall Islands, for example, where the US tested 67 nuclear weapons between 1946 and 1958, local people experience high rates of cancer and other conditions associated with exposure to radiation.[9] In Kazakhstan, where the Soviet Union tested 456 nuclear weapons between 1949 and 1989, local people in Semipalatinsk have suffered extensive negative health effect associated with exposure to radiation.[10]

The achievement of the CTBT should also be recognised as a significant success for civil society in helping to prevent the use of nuclear weapons and in furthering the stigma associated with their use.[11] The health and environmental harm caused by such tests were the basis of sustained public pressure for such a ban. When the UN General Assembly voted in favour of the treaty in September 1996, US Ambassador to the UN, Madeleine Albright spoke of the demand for this instrument "by ordinary people everywhere." [12]



Protest march against French nuclear testing in the Pacific, Wellington, New Zealand, 1972. Photo: Alexander Turnbull Library

Rejecting nuclear explosions

Even though it has not entered into force, the CTBT represents a clear international standard rejecting nuclear explosions. It is important in building confidence in global, technical means of verification and monitoring, which will be necessary ultimately, to nuclear weapon elimination. Furthermore, it strengthens the stigma against nuclear weapons and contributes to their delegitimisation. It is likely that any resumption of nuclear testing by nuclear-armed states will continue to be met with widespread public disquiet and international condemnation.

There is nothing in the CTBT that would stand as a barrier to the establishment of a subsequent instrument prohibiting nuclear weapons outright. The CTBT's failure to so far enter into force indicates that even in the case of this narrow prohibition the commitment of nuclear-armed states to be legally bound by a stronger international architecture remains limited. As well as illustrating the communicative power of a simple message – no nuclear testing – the CTBT also stands as a warning against formal arrangements that rely on the nuclear armed states to allow a treaty to become legally binding.

REDUCING THE RISK OF USE

The mechanisms discussed above relate to multilateral treaties that seek to shape policy and practice of states in relation to each other in order to stem nuclear proliferation and promote nuclear disarmament. While they may contribute to preventing the use of nuclear weapons, there are other, efforts of a more practical nature in place to reduce the risk of a nuclear weapon detonation. These efforts engage directly with the stockpiling, security, transport and operational status of nuclear material and nuclear weapons and some of them are noted briefly below.

Confidence-building measures

During the Cold War the NATO and Warsaw Pact countries implemented a number of confidence-building measures in order to reduce the likelihood of a nuclear war by making the behaviour of states more predictable and understandable. Similar measures are now in place between India and Pakistan.[13] Such measures generally relate to communication (such as the hotlines between decision-makers of nuclear-armed states); constraint (such as a demilitarised zone along a border); transparency (such as sharing information on military matters); and verification (such as inspections of facilities).

Nuclear security

Various efforts have been undertaken by nuclear-armed states and other states to increase the security of nuclear arsenals. Concerns in this regard have been the potential for a non-state armed group to obtain and detonate a nuclear weapon and the more likely scenario of the construction and detonation of some form of radiological weapon from nuclear material such as radioactive waste from a power plant or medical facility. The International Atomic Energy Agency plays a significant role in these efforts.[14]

De-alerting

Certain countries have put forward proposals for the US and Russia to reduce the risk of accidental launch of nuclear weapons by lengthening the amount of time required to use nuclear weapons. Thousands of nuclear weapons are on high-alert, ready-to-launch status, meaning that they could be used within minutes of an order being given. Such measures include physical barriers on missile silo lids; removing missile firing switches; removing certain elements of delivery systems such as batteries or guidance mechanisms; storing warheads separately from delivery systems.[15] Problematically though, much of the discussion around de-alerting, seems to accept the relevance and importance of deterrence rather than challenging the acceptability of nuclear weapons.[16]

CONCLUSION

Existing mechanisms to prevent the use of nuclear weapons have had significant success, with important contributions from civil society in mobilising public opinion against these weapons. The NPT, NWFZs, CTBT and other mechanisms provide useful building blocks for the eventual elimination of nuclear weapons. However, these instruments do not do enough to stigmatise the continued possession of nuclear weapons. The fact that nuclear weapons have not been explicitly and universally prohibited in an international instrument is a major legal deficit. The process of devaluing and delegitimising nuclear weapons will be crucial to the elimination of nuclear weapons and an international ban treaty is a necessary element to take that process forward. Development of the ban treaty would be consistent with existing multilateral frameworks on nuclear weapons and nuclear disarmament and section 3 sets out a possible framing for such a treaty.

1. There is a range of views regarding the extent of the stigma attached to nuclear weapons and whether it is associated with first use, any use, or includes possession. See N. Tannenwald, 'Stigmatizing the bomb - Origins of the nuclear taboo', International Security 29(4): pp. 5-49, 2005.

2. See Ray Acheson ed, Assuring destruction forever: Nuclear weapon modernisation around the world, Reaching Critical Will, 2012.

3. Hansard, House of Commons, Column 260, 21 February 2007 http://www.publications.parliament.uk/pa/cm200607/cmhansrd/cm070221/debtext/70221-0003.html.

4. For example, letter from Oliver Barton, Security Policy Department, Foreign and Commonwealth Office, 15 January 2013. "We believe that our collective focus at present should be on making progress against the tangible issues set out in the 2010 NPT Action Plan, which was agreed by consensus by all NPT signatories. To this end the UK continues to work closely with our P5 and non-nuclear weapon state partners to deliver against our NPT Action Plan commitments. We would be cautious about parallel processes that could distract attention away from this."

5. Available online at http://www.whitehouse.gov/the-press-office/2011/05/02/statement-nuclear-free-zones-asia-and-africa.

6. This includes Morocco who subsequently left the Organisation of African Unity, which is the depository for the Treaty of Pelindaba, and also Mongolia that is part of a single-state NWFZ.

7. See Reaching Critical Will factsheet on Nuclear Weapon Free Zones: http://www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/5447-nuclear-weapon-free-zones.

8. Lawrence S. Wittner, Confronting the Bomb: A Short History of the World Nuclear Disarmament Movement, Stanford University Press, 2009.

9. See Reaching Critical Will, Unspeakable suffering: the humanitarian impact of nuclear weapons, 2013.

10. Togzhan Kassenova, The lasting toll of Semipalatinsk's nuclear testing, Bulletin of the Atomic Scientists, 28 September 2009.

11. For a discussion of the impact of civil society on decision-makers within nuclear-armed states see Lawrence S. Wittner, Confronting the Bomb: A Short History of the World Nuclear Disarmament Movement.

12. Lawrence S. Wittner, Confronting the Bomb: A Short History of the World Nuclear Disarmament Movement, 2009.

13. For a timeline of confidence building measures in South Asia, see: South Asia Confidence-Building Measures (CBM) Timeline, Stimson Centre, Sept. 20, 2012.

14. For a summary of these efforts see Pavel Podvig, Global Nuclear Security: Building Greater Accountability and Cooperation, UNIDIR, 2011.

15. See Physicians for Social Responsibility's de-alerting page: http://www.psr.org/nuclear-weapons/de-alerting.html.

16. See for example: Hans M. Kristensen and Matthew McKinzie, Reducing Alert Rates of Nuclear Weapons, UNIDIR, 2012.

BANNING NUCLEAR WEAPONS

The first section of this report illustrated the humanitarian harm that would result from nuclear weapon use and concluded that such a scale of harm requires that these weapons are formally considered unacceptable. The second section noted some of the key multilateral instruments and approaches that have been put in place to date. It found potential in all of them to act as building blocks for an instrument providing a clearer rejection of nuclear weapons. This section develops further the justification and key elements of a treaty banning nuclear weapons.

Taking responsibility for nuclear disarmament
The development and agreement of a treaty banning nuclear weapons should be undertaken by committed states even without the participation of those armed with nuclear weapons. The alternative is to continue to give power to the nuclear-armed states, resulting in two-tier regimes or treaties that anyway cannot enter into force. It is only by committed governments taking responsibility to agree a treaty banning nuclear weapons even without the participation of the nuclear-armed states that a clear legal rejection of nuclear weapons will be put in place.

Such a process should be seen as a responsible initiative by states seeking to implement their international obligations for disarmament in good faith, including in accordance with Article 6 of the NPT. It should be seen as an extension of the nuclear weapon free zones. These zones have already adopted language parallel to that required for a ban treaty, and through the approach outlined here, the participants in those zones could be brought together in a collective commitment open also to individual states even if their neighbours are not yet ready to make a regional commitment to ban nuclear weapons. Such zones have been widely praised, including by nuclear-armed states. In terms of international humanitarian law, such an agreement would simply address the anomaly of nuclear weapons remaining as the only weapons of mass destruction not subject to an explicit treaty prohibition. As with the treaties banning other weapons of mass destruction, states would not be required to eliminate nuclear weapons before joining – rather elimination would be a requirement of the treaty.

A STEP IN A PROCESS

Underpinning this call for a treaty banning nuclear weapons is a belief that changing the legal framework governing nuclear weapons will have an impact beyond those states that may formally adopt such an instrument in the first instance. The process of establishing a new treaty, and the treaty itself, will extend and renew the stigma that already attaches to nuclear weapons and will contribute to their progressive delegitimisation.[1]

In this conception, a treaty banning nuclear weapons would only be one aspect of the broader effort towards their elimination. It should be seen as the next vital step, rather than the last step in such a process - just as the prohibition of chemical and biological weapons was a necessary step for their elimination, which is ongoing.

John Borrie has noted that "greater humanitarian focus now on nuclear weapons is significant because broader renewed awareness of their consequences could alter the discourse concerning the utility and acceptability of such arms, from a normative context in which the threat to use them and planning for doing so are considered legitimate actions by nuclear-weapon-possessing states, to one in which they are not. This devaluation of nuclear weapons is probably essential to their elimination."[2] Putting to the fore the humanitarian harm that any use of these weapons would cause also emphasises the imperative of avoiding such use.

British academic Nick Ritchie has noted that concepts of national identity and prestige associated with being a 'great power' are key motivating factors driving the continued possession of nuclear weapons.[3] A treaty banning nuclear weapons would challenge this construction of national identity by forcing nuclear-armed states to assess their commitment to nuclear weapons against the background of international law and the imperatives of protection of civilians and the environment. For many states, these latter humanitarian, human rights and environmental imperatives are also bound up with concepts of national identity, including in relation to the types of weapons states consider acceptable.[4]

Putting nuclear weapons outside the law would help to shift them from being held as a badge of honour to being a clear badge of shame. Even for nuclear-armed states standing outside such an instrument, it would change the context for national decisions on nuclear weapons, including modernisation programmes such as the UK's decision on whether or not to renew its Trident nuclear weapons capability. Whilst the deadlocked arguments for deterrence would continue to be heard, an international agreement on the illegality of these weapons would provide a more appropriate backdrop – a context that is demanding that the deadlock is broken, rather than facilitating deadlock by affording nuclear-armed states some special status.

FRAMING A BAN

This section suggests three complementary framings for a ban on nuclear weapons:

Fulfilling disarmament commitments
The process of developing a treaty banning nuclear weapons would not be in competition with other instruments. Rather it would be a movement towards fulfilment of existing commitments to work towards disarmament, including Article 6 of the NPT. Article 6 bears upon all States Parties to the NPT, not just those armed with nuclear weapons, and so those States Parties, in partnership with others should be encouraged to pursue negotiations relating to nuclear disarmament in any forum. The appeals of certain nuclear-armed states that any other initiative would distract attention away from the NPT derive primarily from their sense of comfort under an instrument that they claim endorses their possession of nuclear weapons.[5] Not content with twisting the NPT to serve the maintenance of nuclear weapons rather than nuclear disarmament, such an argument seeks to exploit the NPT again - this time as a barrier to a more progressive agenda. States participating in the negotiation of a treaty banning nuclear weapons should simply continue to be active also in the NPT, and make it clear that they see their work towards a ban treaty as a step in fulfilment of Article 6.

Building on the nuclear weapon free zones (NWFZ)
A treaty prohibition on nuclear weapons should build on, extend and strengthen the existing NWFZs, which currently cover some 115 countries. The treaties establishing the nuclear weapon free zones contain variations in language, but they generally prohibit such acts as possession, testing, use, production and acquisition of nuclear weapons, as well as prohibitions on assistance or encouragement with such acts. Such language is very similar in formulation to that found in international treaty prohibitions on other weapons and would no doubt be central to a treaty banning nuclear weapons.

A strong foundation for a treaty banning nuclear weapons would be its development as a platform across these established nuclear weapon free zones. It would not need to be formally dependent upon those zones, or upon the participation of all members of those zones (or indeed the NPT 'Nuclear Weapons States'), but it should be recognised as a wider articulation of the goals and aspirations that the established NWFZs are working towards.

By extending those zones into an international framework, the architecture would be put in place to allow any individual state to participate in this legal rejection of nuclear weapons, even if its neighbours are not yet ready to do the same. The recognition of Mongolia as a single-state NWFZ also points to the potential for this. Given that NWFZs have been widely applauded as a contribution to international security it would be hard for an international instrument built on this foundation to be subject to coherent criticism.

Banning weapons of mass destruction
Finally, an international treaty prohibiting nuclear weapons is the missing piece for a broad legal rejection of weapons of mass destruction. Weapons of mass destruction are widely recognised as unacceptable, including by much of the world's public. The 1972 Biological and Toxin Weapons Convention and the 1993 Chemical Weapons Convention provide clear legal prohibitions on these weapons and have provided frameworks for their progressive elimination. These treaties make it clear in their preambles that the unacceptable humanitarian consequences of biological and chemical weapons require their prohibition by the international community. Whilst any use of nuclear weapons would likely be incompatible with existing international humanitarian law, treaty prohibition is generally accepted as a mechanism for making the illegality of the weapons explicit. A treaty prohibiting nuclear weapons would end the anomaly of these weapons not being explicitly prohibited and would put them, where they belong, on the same footing as the other weapons of mass destruction.

PRINCIPLES FOR A TREATY BANNING NUCLEAR WEAPONS

Having suggested some ways of framing a treaty prohibition on nuclear weapons, this final section sets out some basic principles for such a treaty.

Prohibition on use, possession, development, production and transfer
The core of the treaty would be comprehensive prohibitions on the use, possession, development, production and transfer of nuclear weapons under any circumstances, and on assistance or encouragement with prohibited acts. This would put nuclear weapons clearly alongside those other weapons that have been internationally banned, including the other weapons of mass destruction.

Prohibition on assistance with prohibited acts
Whilst participation in military alliances that include states with nuclear weapons would not be prohibited, the treaty should require that states parties do not assist with acts prohibited under the treaty. Investment in the development and production of nuclear weapons should be explicitly prohibited.

This area will raise some important questions, in particular in relation to those states participating in military alliances based on a doctrine of extended nuclear deterrence. States that rely on extended nuclear deterrence should face particular pressure within the process of developing such a treaty. These states should be in a position to join a treaty banning nuclear weapons – Australia, for example, is part of a nuclear weapon free zone that prohibits nuclear weapons. Yet they may consider that a treaty prohibiting nuclear weapons is incompatible with their reliance on the possibility of nuclear-armed states deploying and using nuclear weapons in order to protect them.

In developing the ban treaty, participating states and other actors will need to consider carefully these challenges. While joining the ban treaty should not be made contingent on states' exiting their alliances with nuclear armed states entirely, for it to be effective as a step towards elimination, the treaty will need to be clear that nuclear weapons are illegal and states parties cannot plan to benefit from or support their use.

An obligation to eliminate stocks as soon as possible
Each state possessing nuclear weapons should be required by the treaty to submit a time-bound plan for the elimination of their nuclear weapons and other relevant materials, with stocks taken out of service and stored securely pending their elimination. Progress in implementing these plans should be considered annually by states parties. In this approach, the treaty that establishes a prohibition on nuclear weapons does not need to envisage all of the various, potentially complex steps towards the elimination of nuclear weapons by all countries, but rather it provides a framework for those processes to be carried out.

Verification
Verification, which is likely to be seen as crucial for many nuclear weapon-free states, could be based on existing IAEA safeguard mechanisms or a similar set of mechanisms established as required. Important work has been undertaken by organisations such as Vertic to consider how verification of nuclear disarmament might work in the future. An example of such work is the joint initiative by Norway and the UK, in cooperation with Vertic, to understand the practical implications of a non-nuclear armed state's involvement in verification of disarmament measures by a nuclear-armed state. The considerable work in this area could certainly be drawn upon during the implementation of a ban treaty.[6]

CONCLUSION

In November 2011, the Council of Delegates of the International Red Cross and Red Crescent Movement appealed to all states "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, based on existing commitments and international obligations."[7] In 2012, a growing number of governments endorsed international statements arguing that due to the catastrophic humanitarian consequences their use would cause, moves should be taken to outlaw nuclear weapons.[8] This is coupled with a renewed sense of confidence within civil society under the banner of the International Campaign to Abolish Nuclear Weapons (ICAN), which is drawing both upon the decades of work towards nuclear disarmament as well as upon more recent efforts to prohibit certain weapons and to mobilise NGOs in coalition around the world.[9]

Direct consideration of the humanitarian consequences of nuclear weapon use makes it clear that these weapons are unacceptable and that their elimination is an imperative. Making it explicit that these weapons are considered illegal is the next, necessary step to further delegitimise the weapons and strengthen the stigma against them. These changes are vital to securing their elimination. Such a legal treaty would build upon established instruments and approaches and can be pursued with confidence by states that have already rejected nuclear weapons. Civil society organisations would work as committed partners in such a process.

1. For further recent discussion on devaluing and delegitimizing nuclear weapons, see Rebecca Johnson, Tim Caughley and John Borrie, Decline or Transform: nuclear disarmament and security beyond the NPT review process, Acronym Institute for Disarmament Diplomacy, 2012.

2. John Borrie, Viewing Nuclear Weapons through a Humanitarian Lens: Context and Implications, Humanitarian Impact of Nuclear Weapons project paper no. 2, UNIDIR, 2013.

3. Nick Ritchie, 'Relinquishing nuclear weapons: identities, networks and the British bomb', International Affairs 86: 2, 2010, pp. 465-487.

4. Brian Rappert, A convention beyond the Convention: stigma, humanitarian standards and the Oslo Process, Landmine Action, 2008.

5. See for example Foreign and Commonwealth Office, Lifting the Nuclear Shadow, 2009, p. 34; Letter to Jeremy Corbyn MP from the Prime Minister, 15 August 2011; Letter from Oliver Barton, Security Policy Department, Foreign and Commonwealth Office, 15 January 2013.

6. David Cliff, Hassan Elbahtimy and Andreas Persbo, Verifying Warhead Dismantlement: Past, present, future, Vertic, 2010.

7. 'Working towards the elimination of nuclear weapons', resolution of the Council of Delegates of the International Red Cross and Red Crescent Movement, Geneva, Switzerland, 26 November 2011.

8. See the Joint Statement on the humanitarian dimension of nuclear disarmament, delivered by Switzerland, 2 May 2012, on behalf of 16 countries at the First Session of the Preparatory Committee for the 2015 Review Conference to the Treaty on the Non-Proliferation of Nuclear Weapons (http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/npt/prepcom12/statements/2May_IHL.pdf) and the Joint Statement on the humanitarian dimension of nuclear disarmament, delivered by Switzerland, 22 October 2012, on behalf of 34 countries at the 67th session of the United Nations General Assembly First Committee (http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com12/statements/22Oct_Switzerland.pdf).

9. See the website of the International Campaign to Abolish Nuclear Weapons at: www.icanw.org.

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