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The impact of nuclear war

Following the Russian invasion of Ukraine, the people of that country are suffering heavily as they are attacked from the air and on the ground. But the conflict poses an even wider threat – the existential threat of a nuclear war between Russia and NATO. Between them they have around 12,000 nuclear weapons – some over 100 times the power of the bomb dropped on the Japanese city of Hiroshima in 1945.

Nuclear weapons have been used twice, on Hiroshima, and another Japanese city, Nagasaki. Evidence from these occasions, as well as atmospheric nuclear testing and nuclear power accidents, have formed the basis of our knowledge of the effects of nuclear weapons. Modern nuclear weapons generally have much greater explosive power than those first two bombs, and would greatly increase the scale of the devastation. In short, a nuclear exchange between NATO and Russia would be catastrophic for the whole planet.

Instantaneous effect

If a nuclear bomb was detonated, the heat of the nuclear explosion would reach a temperature of several million degrees centigrade. The resulting heat flash would literally vaporise all human tissue over a wide area. At Hiroshima, within a radius of half a mile, the only remains of most of the people caught in the open were their shadows burnt into stone.

Near-immediate effects

People inside buildings or otherwise shielded would be killed by the blast and heat effects as buildings collapse and all inflammable material bursts into flame. The immediate death rate would be over 90%. Individual fires will combine to produce a fire storm as all the oxygen is consumed. As the heat rises, air is drawn in from the periphery at or near ground level. This would result in lethal, hurricane-force winds, and the fire would be perpetuated as the fresh oxygen is burnt.

People in underground shelters who survive the initial heat flash would die as all the oxygen is sucked out of the atmosphere.

Outside the area of total destruction there would be a gradually increasing percentage of immediate survivors. Most of these would suffer fatal burns, would be blinded, would be bleeding from glass splinters, and would have suffered massive internal injuries. Many would be trapped in collapsed and burning buildings.

The death rate would be higher than in a normal disaster since most emergency services would be incapable of responding due to their equipment being destroyed and staff killed. The sheer scale of the casualties would overwhelm any country's medical resources. The International Red Cross has concluded that the use of a single nuclear weapon in or near a populated area is likely to result in a humanitarian disaster that will be 'difficult to address'.

There is currently no international plan in place to deliver humanitarian assistance to survivors in the case of a nuclear attack. Most casualties would receive at best minimal, palliative treatment. The best they could hope for would be to die in as little pain as possible.

Short-term effects

Survivors would be affected within a matter of days by radioactive fall-out. The extent of the fall-out would vary according to whether the nuclear bomb detonates in the air (as at Hiroshima) or upon impact on the ground. While the former would entail more blast impact, the latter would throw up much larger quantities of radioactive debris into the atmosphere. The area covered by the fall-out would be determined by wind speed and direction. The heavier particles of radioactive material would fall in the immediate or close vicinity. Finer particles would be blown over longer distances before they descend. Very fine particles may be blown even further before they combine with water vapour and fall as radioactive rain. In the aftermath of the Chernobyl nuclear power explosion and fire in Ukraine in 1986, radioactive rain fell over the next few days in a wide arc across Northern Europe – from Scandinavia to Scotland, Cumbria and Wales, a distance of over 1,700 miles from Chernobyl.

The effects of exposure to high levels of radioactive fall-out include hair loss, bleeding from the mouth and gums, internal bleeding and haemorrhagic

diarrhoea, gangrenous ulcers, vomiting, fever, delirium and terminal coma. There is no effective treatment, and death follows in a matter of days.

At lower levels of exposure, while there is an increased chance of at least short-term survival, the death rate remains high. Those who survive would face many complications. Pregnant women would be likely to miscarry or give birth to babies with a range of disabilities. Healing from injuries would likely be slow, leaving distinctive scar tissue. Damage to the immune system would be probable.

Long term effects

Radiation-induced cancers would affect many, often over twenty years later. Certain cancers, such as thyroid cancer, in children are particularly associated with exposure to radiation. The children of those exposed to radiation are statistically more likely to be born with abnormalities and suffer from leukaemia. Because of the long period between exposure and the onset of cancer, it is difficult to attribute a particular cancer to a particular cause. The correlation is described as epidemiological, like the connection between smoking and lung cancer was statistically established before the medical links had been uncovered.

Accurate estimates of long-term fatalities at Hiroshima and Nagasaki are not possible given the large-scale destruction of records, population movements and a general censorship on nuclear effects by the US. But at least 75,000 died in the first hours after the bomb was dropped on Hiroshima, with around 140,000 dead by December 1945. The death toll reached around 200,000 by the end of 1950. 70,000 people died in Nagasaki as a result of the bomb by the end of 1945, and around 140,000 by the end of 1950.

But the generally used estimates of casualties are 140,000 in Hiroshima and 75,000 in Nagasaki. This would be far, far higher if a nuclear bomb was used today due to the higher destructive power of today's bombs.

Nuclear weapons cause severe damage to the climate and environment on a scale incomparable to any other weapon. Research by the International Red Cross shows the effect of a 'limited' nuclear war involving 100 Hiroshima-sized bombs (i.e. less than half a per cent of the world's stockpile). The five million tonnes of soot produced by the ensuing fires would cause global temperature to fall by an average of 1.3C. The disrupted global climate would have an overwhelming impact on food production. It is estimated that a billion people around the world could face starvation as a result of nuclear war.

No nuclear war

The possibility of nuclear war is the greatest for many decades, and the effects outlined above must be avoided at all cost. As the crisis in Ukraine escalates, and the risk of nuclear war comes ever closer, the need for diplomacy is more urgent than ever. Political leaders must actually understand what the use of just a single nuclear weapon would mean. The catastrophic human and environmental destruction, the incineration of cities and populations, and the appalling deaths from radiation poisoning, should be remembered at all times. A nuclear exchange would be catastrophic, and nuclear war between NATO and Russia would present an existential threat with the possibility of the destruction of humanity. Only dialogue will make a difference.

Join CND's calls for an end to conflict in Ukraine so we can avoid the threat of nuclear war.

