



**CND Cymru Briefing: 5**

**THE  
EFFECTS  
OF  
NUCLEAR  
WEAPONS**

**Nuclear weapons - used twice**

Nuclear weapons have been used twice in wartime. In August 1945, the United States targeted each of the Japanese cities of Hiroshima and Nagasaki with nuclear bombs. Atmospheric test explosions of nuclear weapons, and nuclear power accidents, have also contributed to our now well-documented knowledge of what nuclear weapons will do if used.

Modern nuclear weapons generally have much greater explosive power than those first two bombs – for example, the British Trident nuclear warheads are each 8 times more powerful than the Hiroshima bomb – therefore the effects would only increase in scale.

The effects can be split up into what happens instantly close to the explosion, what happens almost immediately slightly further away, what happens over the next few months, and what happens over a longer timescale.

**Instant effects**

The heart of a nuclear explosion reaches a temperature of several million degrees centigrade. Over a wide area the resulting heat flash literally vaporises all human tissue. 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.

**Almost immediate effects**

Beyond this area all living things caught in the open will be killed by the heat and blast waves. People inside buildings or otherwise shielded will be indirectly killed by the blast and heat effects, as buildings collapse and all inflammable materials burst into flames. The immediate death rate will be over 90%.

The many individual fires will combine to produce a fire storm as all the oxygen in the area is consumed, the hot air rises, and cold air is then drawn in from the periphery at or near ground level. This will result in lethal, hurricane





force winds, enabling the fire to continue burning using the freshly drawn in oxygen. Such fire storms have also been produced by intense, large scale conventional bombing in cities such as Hamburg and Tokyo.

Even people in underground shelters who survive the initial heat flash will die as all the oxygen is sucked out of the atmosphere.

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

Even those with possibly survivable injuries will die, since almost all rescue and medical services will have been destroyed and their personnel killed.

The death rate among the seriously injured will approach 100%. Survival rates among the potential survivors will depend on the extent of rescue and medical services that can be brought in from outside. Many of the medical services needed, such as specialist burns units, are in strictly limited supply.

The sheer scale of the casualties would overwhelm any state's medical resources even in peace time.

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**

Many survivors, either uninjured or with survivable injuries, will be affected within a matter of days by radioactive fall-out.

The amount and extent of fall-out will vary according to whether the nuclear explosion was an air-burst (as at Hiroshima) or a ground-burst.

Air-bursts create more heat and blast effects, whilst ground-bursts throw up much larger quantities of radioactive debris into the atmosphere.

The area covered by fall-out is determined by wind speed and direction. The heavier particles of radioactive material will fall in the immediate or close vicinity. Finer particles will be wind blown over longer distances before they descend.

Very fine particles may be blown very long distances before they combine with water vapour and fall as radioactive rain.

The effects of exposure to high levels of radioactive fall-out, often called radiation sickness, include hair loss, cataracts, bleeding from the mouth and gums, internal bleeding and haemorrhagic diarrhoea, gangrenous ulcers, vomiting, fever, delirium and terminal coma. There is no effective treatment. Death follows in a matter of days.

At lower levels of exposure, while there is an increasing chance of at least short term survival, the death rate remains high. Even where long term survival is probable, pregnant women are likely to miscarry or give birth to babies with a range of disabilities.

***During the first few days following the 1986 Chernobyl nuclear power explosion and fire in the Ukraine, radioactive rain fell over 1000 miles from Chernobyl on mid and north Wales.***

***Radionuclides were also spread across much of Northern Europe including Scandinavia and Scotland. Restrictions were immediately placed on 334 sheep farms in north Wales, because of the amount of radioactive grass that the sheep were eating; these restrictions were only lifted in 2012, 26 years later.***

Healing from injuries will often be slow, leaving distinctive scar tissue. Damage to the immune system is probable.

### **Longer Term Effects**

Radiation-induced cancers will affect many survivors, often twenty or more years later. Certain cancers such as thyroid cancer in children are particularly associated with exposure to radiation. There are statistically higher than normal birth abnormalities and leukaemia rates in the children of exposed survivors of Hiroshima and Nagasaki.

Because of the long period between exposure and eventual cancer it is difficult to attribute a particular cancer to a particular cause. The correlation is described as epidemiological, rather as the connection between smoking and lung cancer was statistically established before the medical links had been uncovered.

### **Effects on the Environment**

Nuclear weapons cause severe damage to the environment on a scale of which no other weapon is capable.

The likely consequences of nuclear war have been described as: 'making other threats to the environment pale into insignificance. One thermo-nuclear bomb [hydrogen bomb] can have an explosive power greater than all the explosives used in wars since the invention of gunpowder. In addition to the destructive effects of blast and heat, immensely magnified by these weapons, they introduce a new lethal agent' ionising radiation 'that extends lethal effects over both space and time'.

A certain effect of the massive exchange of nuclear weapons is the 'nuclear winter', which would arise as a result of hundreds of millions of tons of soot in the atmosphere from fires caused by nuclear weapons. The smoke cloud and debris from multiple explosions will blot out sunlight, leading to crop failures throughout the world and starvation.

**Hiroshima, 6<sup>th</sup> August 1945**

Hiroshima stands on a flat river delta, with few hills to protect sections of the city. The bomb was dropped on the city centre, an area crowded with wooden residential structures and places of business.

These factors meant that the death toll and destruction in Hiroshima was particularly high.

The firestorm in Hiroshima ultimately destroyed 13 square kilometres (5 square miles) of the city. Almost 63% of the buildings in Hiroshima were completely destroyed after the bombing, and nearly 92% of the structures in the city had been either destroyed or damaged by blast and fire.

The generally used minimum figure for immediate and short term deaths at Hiroshima is 140,000, out of a population of 350,000.

**Nagasaki, 9<sup>th</sup> August 1945**

Due to the hilly geography of Nagasaki and the bomb exploding away from the city centre, the excessive damage from the bombing was limited to the Urakami Valley and part of downtown Nagasaki.

The centre of Nagasaki, the harbour, and the historic district were shielded from the blast by the hills.

The nuclear bombing did nevertheless prove devastating, with approximately 22.7% of Nagasaki's buildings being consumed by flames, but the death toll and destruction was less than in Hiroshima. Estimates of casualties from Nagasaki have generally ranged between 50,000 and 100,000.

The fact that the Nagasaki bomb was more powerful and also the narrowing effect of the surrounding hills did mean that physical destruction in the Urakami Valley was even greater than in Hiroshima.

Virtually nothing was left standing.



## Paper cranes

The city of Hiroshima invites people from around the world to participate in making paper cranes to remember those who died in Hiroshima and Nagasaki. This action started in memory of Sadako who was two years old when the atomic bomb was dropped on Hiroshima and later died of leukaemia caused by the exposure to nuclear radiation.

Believing that folding paper cranes would help her recover, she kept folding them until she passed away on October 25th, 1955, after an eight-month struggle with the disease.

Sadako's death inspired a campaign to build a monument to pray for world peace. A Children's Peace Monument was built with funds donated from all over Japan. 10 million cranes are placed annually at the Children's Peace Monument.

Anyone may place paper cranes before the Children's Peace Monument in Peace Memorial Park. Those unable to go to the monument itself can post cranes to:

Peace Promotion Division  
The City of Hiroshima  
1-5 Nakajima-cho Naka-ku  
Hiroshima 730-0811 JAPAN

You are asked to include your name, the name of your organisation (if you are participating as a school or any other group), your address (or the address of the organisation), your e-mail address, the number of cranes, and any message you wish to submit.

This way your information can be submitted to the Paper Crane database and your desire for peace will be recorded.

Instructions on how to fold paper cranes:  
<http://tinyurl.com/ct3e8s>



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