HOW TO SURVIVE
WHEN THE BOMB FALLS

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IUS VERITATIS

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How to Survive When the Bomb Falls

Cover Credit: Luc Vanhixe

Contents

The only thing we learn from history,

is that we don’t learn anything from history.

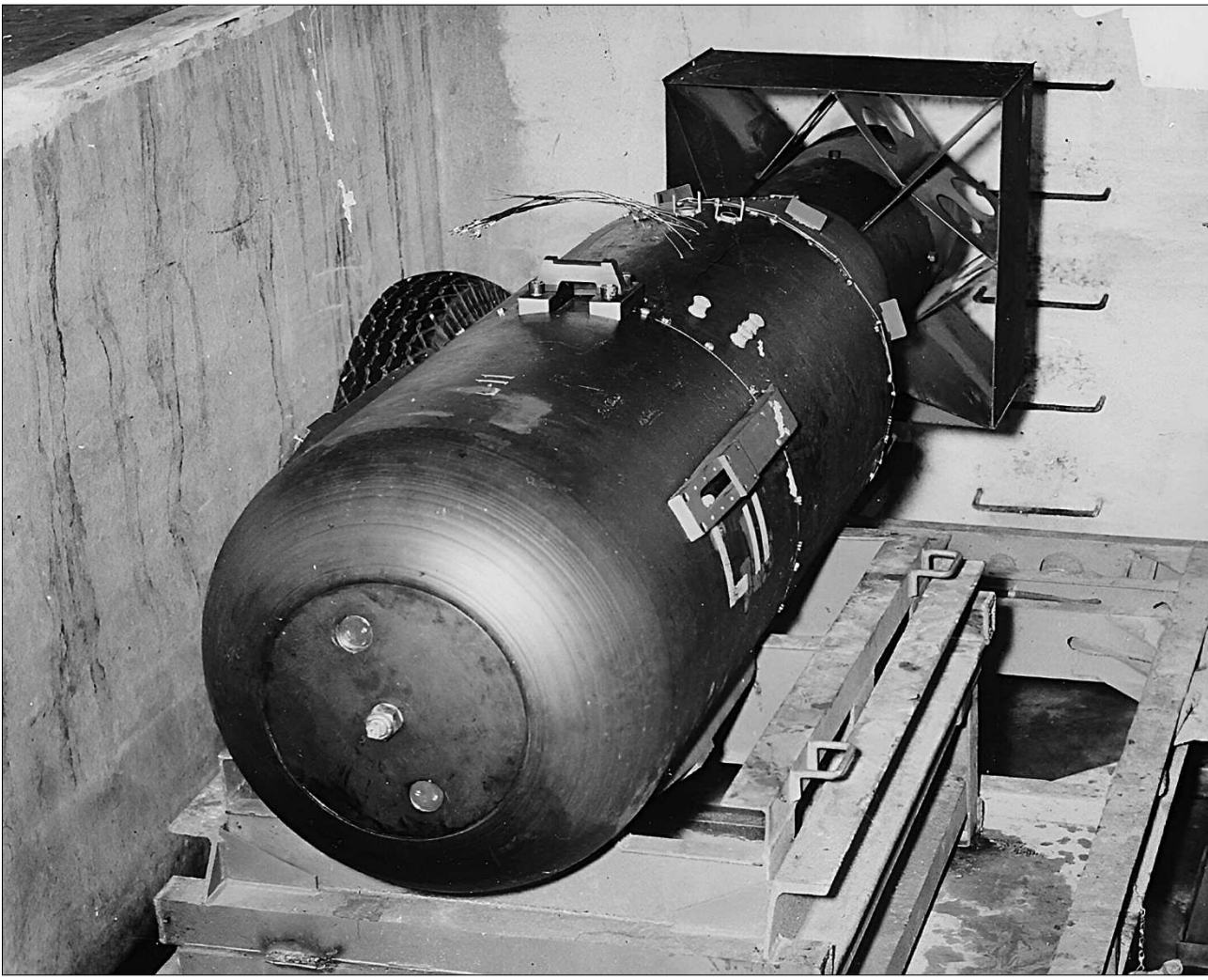
Hegel

Nuclear Warfare

Preface

The atomic bombings of Hiroshima and Nagasaki in August 1945 represent watershed moments in human history that demonstrated the devastating power of nuclear weapons. These attacks resulted in unprecedented levels of immediate destruction, with approximately 214,000 people killed by the end of 1945 and massive infrastructure damage across both cities. Within seconds, the bombs generated temperatures reaching millions of degrees, creating thermal flashes that caused severe burns on exposed skin up to 20 miles away, followed by powerful blast waves that leveled buildings and generated deadly flying debris. The immediate aftermath saw a healthcare system in ruins, with 90% of medical personnel in Hiroshima killed or injured, leaving survivors with radiation sickness, severe burns and traumatic injuries without adequate treatment options. The events of August 6th and 9th, 1945 forever altered our understanding of warfare and demonstrated the horrific immediate human, structural and environmental consequences of nuclear weapons.

Looking back at the events of 1945, it would seem that no one could survive a nuclear attack, and in a number of cases this is the sad reality. Anyone near ground zero would have no chance. And if the nuclear superpowers were to use a large portion of their arsenals, it would certainly mean the end of humanity. But a nuclear attack with one or a few nuclear weapons at a certain distance can be survived with the necessary knowledge and preparation. Man is a tough species. When the dust settles and the nuclear winter begins, the survivors will crawl out from the rubble.



‘Little Boy’ (Hiroshima), ready for loading into the Enola Gay.

Type: gun-type fission bomb. Fissile Material: highly enriched uranium-235 (approx. 64 kg). Dimensions: length 3.0 m (10 ft), diameter 71 cm (28 inch). Weight: about 4,400 kg (9,700 lbs). Mechanism: the bomb used a gun-assembly design, in which two subcritical masses of uranium-235 were brought together rapidly by firing one piece into another using conventional explosives. This formed a supercritical mass, initiating a nuclear chain reaction. Explosion Details: detonated at an altitude of approximately 580 meters (1,900 ft) above Hiroshima, the bomb released energy equivalent to about 15–16 kilotons of TNT. Radius of total destruction: about 1.3–1.6 km, with fires spreading over 11 km^2. Efficiency: only about 1.7% of the uranium underwent fission, making the device relatively inefficient.

Hiroshima and Nagasaki

The Atomic Bombings: Context and Detonation

The US dropped the first atomic bomb on Hiroshima on August 6, 1945, three days later followed by a second bomb on Nagasaki on August 9, marking the first and only use of nuclear weapons in warfare. The Hiroshima bomb detonated over the city center, an area densely populated with wooden residential structures and businesses, maximizing casualties and destruction in the flat river delta landscape.

In contrast, the Nagasaki bomb detonated away from the city center, with the hilly geography partially shielding downtown areas and the harbor from the full force of the blast. The immediate sequence of events during detonation followed a similar pattern in both cities: an intense flash of light, described by survivors as turning ‘the world bright white,’ followed by momentary blindness and the devastating thermal and blast effects.

The weapons nuclear reactions instantly produced an intense burst of direct radiation, primarily gamma rays and neutrons, lasting less than a second. What had been solid material microseconds earlier transformed into gas hotter than the sun's core, radiating energy as X-rays that heated the surrounding air. This immediate reaction vaporized nearly everything at the hypocenter, with temperatures reaching up to 20 million degrees Fahrenheit, instantly obliterating buildings, infrastructure and people.

‘Fat Man’ (Nagasaki), ready for loading into the B-29 Bockscar.

Type: implosion-type fission bomb. Fissile Material: plutonium-239. Dimensions: length 3.25 m, diameter 1.52 m. Weight: about 4,500 kg (4.5 tons). Mechanism: the bomb used an implosion design. Subcritical portions of plutonium-239 were surrounded by conventional explosives. When detonated, these explosives compressed the plutonium core inward, achieving a supercritical mass and initiating a nuclear chain reaction. (This implosion method was necessary for plutonium due to its higher spontaneous fission rate, which made the simpler gun-type assembly unreliable for this material.) Explosion Details: detonated at an altitude of about 500 meters above Nagasaki, the bomb released energy equivalent to approximately 21,000 tons of TNT.

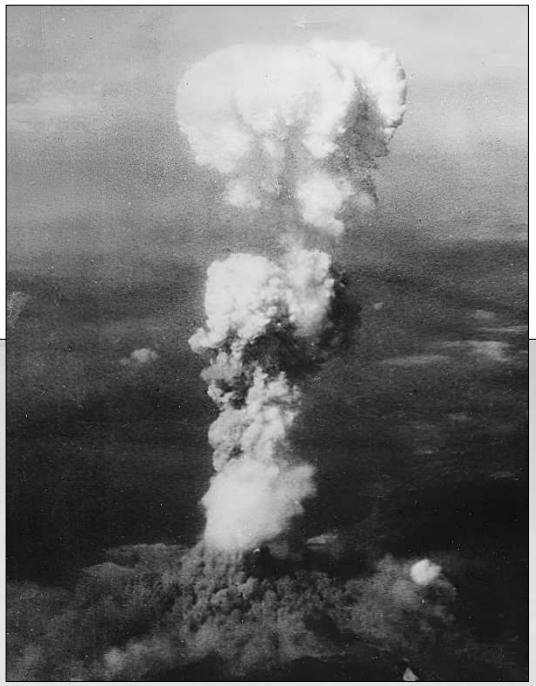
Within moments of detonation, a sequence of destructive forces - radiation, heat, blast and subsequent fires - began devastating both cities in ways that would affect survivors for decades to come.

Immediate Physical Destruction - Hiroshima's Devastation

The physical destruction of Hiroshima was catastrophic and occurred within moments of the bomb's detonation. The firestorm generated by the explosion destroyed approximately 11 square kilometers (five square miles) of the city, an area that represented the heart of Hiroshima's urban landscape. Nearly 63% of all buildings in Hiroshima were completely destroyed by the blast and subsequent fires, while many more sustained significant damage. In total, an astonishing 92% of all structures in the city were either destroyed or damaged, instantly wiping out most of the city's infrastructure.

Hiroshima: about 200 yards from ground zero.

The bomb's devastation was particularly severe in Hiroshima because the city was located on a flat river delta with few hills or natural features to limit the effects of the blast, allowing the destruction to spread evenly in all directions. The combination of wooden residential buildings, the detonation of the bomb directly over the city center and the flat terrain created optimal conditions for maximum destruction.



This image, captured from the Enola Gay, was taken approximately 30 seconds after the explosion. The cloud rose to over 60,000 feet in just ten minutes.

300 yards from ground zero, concrete buildings were blown to smithereens. Pictures below: Hiroshima before and after the explosion.

Nagasaki's Destruction

While the physical destruction in Nagasaki was still devastating, it followed a different pattern due to geographical differences and the placement of the bomb. The hilly topography of Nagasaki and the fact that the bombing focus was away from the city center limited the excessive damage primarily to the Urakami Valley and part of downtown Nagasaki. The center of the city, its harbor and the historic district received some protection from the blast due to the hills surrounding the Urakami River acting as natural barriers. Nevertheless, the nuclear detonation proved enormously destructive, with approximately 22.7% of Nagasaki's buildings consumed by flames and 42% of the city's urban terrain completely flattened. Within a one-kilometer radius of the hypocenter, total devastation occurred as the intense heat instantly carbonized everything in its path. The destruction pattern observed in Nagasaki offers a compelling example of how geographical features can influence the distribution of damage from nuclear weapons, even while the overall destructive power remains catastrophic.

Pattern of Destruction

In both cities, the pattern of destruction followed concentric circles radiating outward from the hypocenters, with damage severity decreasing with distance. At ground zero, the extreme temperatures vaporized nearly everything, including people and buildings, leaving behind only shadows burned into remaining surfaces. Moving outward from this point, the thermal radiation set countless fires that merged into devastating firestorms, consuming oxygen and creating hurricane-force winds that pulled victims toward the flames. Beyond the immediate blast radius, buildings collapsed from the shockwave, which traveled outward at supersonic speeds, crushing structures and generating deadly flying debris that caused numerous secondary injuries. The immediate destruction was so complete in the central areas that in Hiroshima, 42 of 45 hospitals were destroyed, eliminating the possibility of organized medical response. This pattern of concentric destruction is characteristic of nuclear weapons, with thermal effects, blast damage and radiation exposure decreasing with distance from the hypocenter, but remaining lethal across vast areas.

Human Casualties - Immediate Death Toll

The immediate human toll of the atomic bombings was unprecedented in both scale and nature. In Hiroshima, estimates of total deaths range generally between 100,000 and 180,000, out of a total population of approximately 350,000, with most sources agreeing on about 140,000 deaths by the end of 1945. In Nagasaki, death toll estimates range between 50,000 and 100,000 people, with approximately 74,000 deaths by the end of 1945. Combined, the atomic bombs killed approximately 214,000 people in total by the end of 1945. Tens of thousands died immediately at the moment of detonation, particularly those closest to the hypocenters, while many more succumbed to their injuries in the hours, days, weeks and months that followed as burns, blast injuries and radiation sickness claimed additional lives.

Pattern of Casualties

The casualty pattern revealed that both death and injury rates were highest near ground zero and declined at similar rates with increasing distance from the hypocenter. However, the cumulative death rates in both cities rose dramatically during the first two weeks following the bombings, then leveled off in subsequent weeks as the most severely injured victims succumbed to their injuries. According to medical analysis, approximately 90% of immediate deaths resulted from thermal injury and blast effects, while about 10% were attributable to acute radiation exposure.

This pattern changed over time as radiation sickness began claiming more lives in the intermediate stage (10-12 weeks post-bombing), particularly among those who had received median lethal radiation doses. The casualties represented all segments of the population, as the bombs made no distinction between military and civilian targets, creating a devastating humanitarian crisis that overwhelmed the few remaining medical facilities.

Medical Effects - Burns and Blast Injuries

Burns represented the most common and visible immediate injuries among survivors of the atomic bombings. The burns occurred in two principal categories: primary flash burns from the initial thermal radiation - the thermal radiation led to direct flash burns on exposed skin, with heat so intense that it caused severe burns even through clothing - and secondary burns (scorch, contact and flame burns) from fires that broke out across both cities. Many victims suffered both types of burns simultaneously, creating complex injury patterns that were nearly impossible to treat effectively in the chaotic aftermath. In Hiroshima, an estimated 60 percent of all immediate deaths were caused by burns from either direct thermal radiation or secondary fires.

The severity of the injuries decreased with distance. Close to ground zero, people were completely vaporized, leaving only a shadow.

Farther away, victims suffered terrible burns that, combined with radiation, led to death immediately or days, weeks, months, even years later.