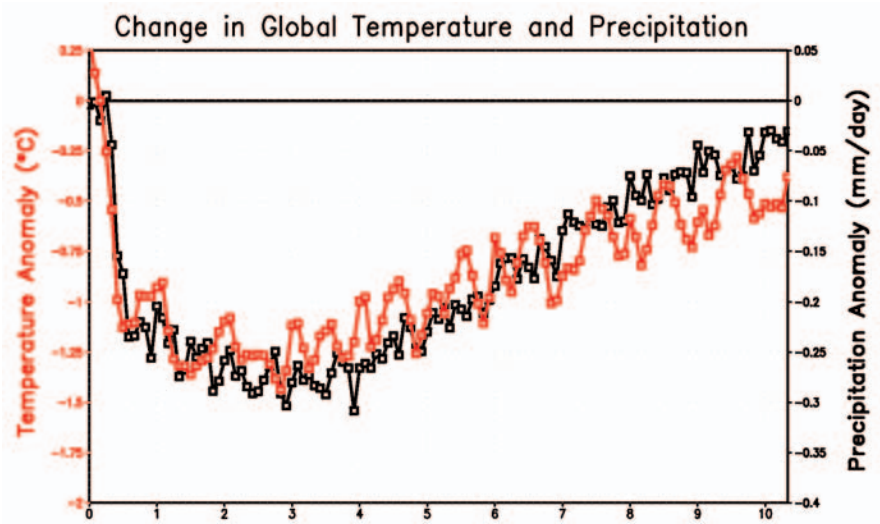
Nuclear Famine: Climate and Health Effects of Regional Nuclear War

An IPPNW Fact Sheet

In December 2006, climate scientists who had worked with the late Carl Sagan in the 1980s to document and publicize the threat of nuclear winter produced disturbing new research about the climate effects of low-yield, regional nuclear war. These experts found that even a limited regional nuclear war on the order of 100 Hiroshima-sized nuclear weapons could result in tens of millions of immediate deaths and unprecedented global climate disruption.



The debris injected into the atmosphere from the explosions and resulting fires would produce an average surface cooling of -1.25ºC that would last for several years. Even 10 years out, there would be a persistent average surface cooling of -0.5ºC. (Graph courtesy of Alan Robock)

The Nuclear Threat in Context

The number of nuclear warheads in the world has fallen to about a third of its peak since 1986, but currently stands at about 25,000. Therefore, nuclear winter itself cannot be ruled out as the result of a possible misstep involving the US and Russian arsenals. Moreover, the number of nuclear weapon *states* is increasing. The most recent additions—India, Pakistan, and North Korea—have long histories of conflict. The political crisis in Pakistan has exacerbated public anxiety about that country's nuclear weapons—and their future ownership and potential use. Iran may be pursuing a nuclear weapons program, in part as an answer to Israel's nuclear capability, heightening the risks of nuclear war in the Middle East.

Furthermore, all the existing nuclear weapon states are modernizing their arsenals and are redefining their nuclear policies in dangerous ways. While most of the world's nations are calling for the elimination of nuclear weapons, a few states are making them permanent features of national security policy, and are provoking others to do the same. All these factors increase the risk that nuclear weapons may be used.

Regional War, Global Consequences

India and Pakistan currently possess an estimated 100 nuclear weapons or more between them. Some Indian leaders have suggested that their country has set a goal of 300-400 nuclear weapons within the next several years. A regional nuclear war in South Asia involving only 100 15-kiloton weapons targeted on megacities would have devastating immediate effects. The explosions would kill 20 million people outright, a number equal to half of all those killed worldwide during the six years of World War II. In addition, there would be tremendous public health, environmental, and economic consequences. These horrifying local and regional effects would be dwarfed by the global climate consequences—and ensuing casualties—of such a conflict.

The explosions would ignite fires that would burn whole cities, lofting soot high into the atmosphere where it would absorb incoming sunlight and produce a persistent average surface cooling of -1.25ºC that would last for several years. Reductions in precipitation would last for more than a decade. Over the following year, a 10% decline in average global rainfall and a large reduction in the Asian summer monsoon would have a significant impact on agricultural production. These effects would persist over many years. The growing season would be shortened by 10 to 20 days in

More than 800 million people in the world consume less than the minimum required daily caloric intake of 1,800-2,000 calories. Even a modest, sudden decline in agricultural production could trigger massive famine.

many of the most important grain producing areas in the world, which might completely eliminate crops that have insufficient time to reach maturity.

Massive ozone loss

To make matters even worse, smoke injected into the stratosphere would cause a huge reduction in the Earth's protective ozone. A study published in April 2008 by the National Academy of Sciences, using a similar nuclear war scenario involving 100 Hiroshima-size bombs, showed ozone losses in excess of 20% globally, 25–45% at midlatitudes, and 50–70% at northern high latitudes persisting for five years, with substantial losses continuing for five additional years. The resulting increases in UV radiation would have serious consequences for human health.

Evidence from the past and present

Past episodes of abrupt global cooling produced by volcanic eruptions, such as the well documented Tambora eruption in 1815, were milder than those projected here and yet have caused major crop failures and famine. The climate effects due to a regional nuclear war are expected to cause far more severe shortfalls in agricultural production.

As of mid August of this year, global grain stocks were approximately 322 million tons with annual consumption at 2,098 million tons. Expressed as days of consumption, world grain stocks are therefore approximately 56 days, lower than at any point in the last 50 years, and dramatically lower than the 100 to 120 days of consumption available in the 1980s and 1990s. These stocks would not provide any significant reserve in the event of a sharp decline in global production.

There are currently more than 800 million people in the world who are chronically malnourished and several hundred million more live in countries that depend on imported grain. Even a modest, sudden decline in agricultural production could trigger significant increases in the prices for basic foods, as well as hoarding on a global scale, making food inaccessible to poor people in much of the world.

While it is not possible to estimate the precise extent of the global famine that would follow a regional nuclear war, it seems reasonable to anticipate a total global death toll in the range of one billion from starvation alone. Famine on this scale would also lead to major epidemics of infectious diseases, and would create immense potential for war and civil conflict.

Nuclear famine? Or nuclear abolition?

These preliminary findings have significant implications for nuclear weapons policy. They are powerful evidence in the case against the proliferation of nuclear weapons and against the continued possession and modernization of arsenals in the existing nuclear weapon states. Even more important, they argue for a fundamental reassessment of the role of nuclear weapons in the world. If even a relatively small nuclear war, by Cold War standards, could trigger a global catastrophe resulting in a billion deaths, a devastated environment, and a traumatized global economy, the only viable response is the complete abolition of nuclear weapons.

IPPNW has launched the International Campaign to Abolish Nuclear Weapons (ICAN), with the goal of achieving a nuclear-weapon-free world through the negotiation and adoption of a Nuclear Weapons Convention. Nuclear abolition is the only responsible way to prevent a nuclear war and to ensure our common security.

Additional Reading

O. B. Toon, R. P. Turco, A. Robock, C. Bardeen, L. Oman, G. L. Stenchikov. Atmospheric effects and societal consequences of regional scale nuclear conflicts and acts of individual nuclear terrorism. Atm Chem Phys 2007;7:1973-2002.

A. Robock, L. Oman, G. L. Stenchikov, O. B. Toon, C. Bardeen, R. P. Turco. Climatic consequences of regional nuclear conflicts. Atm Chem Phys 2007;7:2003-2012.

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M. J. Mills, O. B. Toon, R. P. Turco, D. E. Kinnison, R. R. Garcia. Massive global ozone loss predicted following regional nuclear conflict. PNAS 2008;105(14):5307-5312.

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(Above articles available at http://envsci.rutgers.edu/~robock)

This fact sheet is adapted from the paper "An Assessment of the Extent of Projected Global Famine Resulting From Limited, Regional Nuclear War," by Ira Helfand, MD. IPPNW gratefully acknowledges the work of O. B. Toon and Alan Robock.

For more information about nuclear famine and the International Campaign to Abolish Nuclear Weapons, please visit www.ippnw.org, or www.icanw.org, or contact John Loretz (jloretz@ippnw.org).