Thank you Setsuko for your moving testament to the vast human suffering that the detonation of a nuclear weapon will produce.

And thank you, Mr. Chairman, for the opportunity to review with you today the medical consequences that will result from nuclear war. It is the belief of the International Physicians for the Prevention of Nuclear War, the World Medical Association, the World Federation of Public Health Associations and the International Council of Nurses that a full understanding of the humanitarian impact of nuclear weapons, an understanding of what nuclear weapons will actually do when they are used, must lie at the core of policy discussion about what to do with these most dangerous of all weapons of mass and indiscriminate destruction.

The nuclear destruction of Hiroshima and Nagasaki killed over 200,000 people and left a legacy of radiation induced illness and death that persist today 70 years after the bombings.

The Recent Nuclear Security Summit focused attention on the possibility of terrorists obtaining a nuclear weapon or the fissile material needed to make one. The concern was well founded.

An attack today using a simple fission bomb would have effects similar to the Hiroshima and Nagasaki disasters. A report in the British Medical Journal in 2002 showed that the heat and blast from a Hiroshima sized bomb, smuggled into the port of New York and detonated as the ship approached the dock, would kill 44,000 people and the radiation emanating from the explosion at the moment of detonation would kill another 10,000. The radioactive fallout generated by this ground level explosion would kill a further 250,000.¹

A simulation of a similar attack on Bombay concluded that the death toll there could be as high as 800,000.²

But while the danger of a single nuclear detonation from an act of nuclear terrorism demands our attention, it must not blind us to the far greater danger posed by the nuclear weapons in the state arsenals of the nine countries that possess nuclear weapons. And the images of Hiroshima and Nagasaki must not serve as the model for what will happen if nuclear weapons are used again. For
the next nuclear war will not involve a single weapon and the weapons used will be far larger and more destructive than the bombs used against Japan.

Recent studies have shown that even a very limited nuclear war will cause catastrophic damage on a global scale. A number of reports have examined the possibility of a regional war between India and Pakistan in which each side uses 50 small, Hiroshima sized bombs, less than half of their current arsenal and less than 0.5% of the world’s nuclear weapons. These nuclear powers have fought three major wars in the last 70 years and are engaged in a dangerous nuclear arms race. There are multiple potential flashpoints in the relationship between the two and nearly daily fighting across the line of demarcation that separates their forces in Kashmir.

The immediate effects of a limited nuclear war will constitute a humanitarian disaster in South Asia on the scale of World War II. Some 20 million people will die in the first week from the fires, explosions and immediate radiation effects. In addition huge areas will be contaminated with radioactive fallout.

But these catastrophic local effects will be only a small part of the story. The firestorms caused by these 100 small nuclear weapons will loft up to 6.5 million tons of soot into the upper atmosphere blocking out sunlight and dropping temperatures across the globe 1.3 to 2.0°C. This worldwide cooling will persist for decades shortening the growing season, disrupting precipitation patterns and triggering a global “nuclear famine”. Maize production in the US will fall by 12% for a decade or more. In China, maize will decrease by 15%, middle season rice by 17% and winter wheat by a truly catastrophic 31%. Worldwide, sustained declines in food production of this magnitude will put two billion people at risk.

The death of two billion people, a third of humanity, would be an event unprecedented in human history. It would not mean the extinction of our species but it would almost certainly mean the end of modern civilization. No civilization in human history has withstood a shock of this magnitude and there is no reason to believe that our complex interdependent society would fare better.

A war between the United States and Russia will be far worse. For 25 years we have been told that we did not need to worry about such a conflict. The US and Russia were no longer enemies and they would never go to war. As recently as September of 2014 a high ranking State Department official assured me that the
US government simply did not consider the possibility of such a war. The rising tensions between these two nuclear superpowers, the conflicts in Syria and especially Ukraine, and the enormous and destabilizing modernization plans for their nuclear arsenals, all reveal how hollow those assurances have been. In fact, nuclear war between the US and Russia is a very real possibility. So let us consider what that will look like.

Let me start by describing a modern nuclear attack on a large city. Unlike Hiroshima, such an attack will not involve a single weapon. Rather a major city like New York or Moscow or London will be targeted with 10 to 20 bombs each 10 to 50 times more powerful than Hiroshima. It is somewhat difficult to describe 10 or 20 explosions going off simultaneously, so I will use the model of a single 20 megaton explosion. The megatonage is somewhat greater, but the actual destruction is less than we will see with 10 or 20 smaller bombs which spread the impact out more efficiently over a larger area. Still this model provides an adequate approximation.

Within one thousandth of a second of the detonation of this device a fireball will form reaching out for 3 kilometers in every direction, 6 kilometers across. Within this area the temperature will rise to 10 million degrees C, hotter than the surface of the sun, and everything will be vaporized: the buildings, the trees, the people, the upper level of the earth itself will disappear.

To a distance of 6 kilometers in every direction the explosion will generate winds in excess of one thousand kilometers. Mechanical forces of this magnitude can destroy anything that people can build.

To a distance of 9 kilometers in every direction, the heat will be so intense that automobiles will melt.

To a distance of 15 kilometers the winds will still be in excess of 300 kilometers per hour. Forces of this magnitude will destroy masonry and wood frame buildings. Modern steel frame buildings will have the floors and walls swept out; a steel skeleton will remain

To a distance of 25 kilometers in every direction the heat will still be so intense that everything flammable will burn. Cloth, paper, gasoline, heating oil, plastic—it will all ignite causing hundreds of thousands of fires, which, over the next half
hour, will coalesce into a giant fire storm 50 kilometers across covering 2000 square kilometers. Within this entire area the temperature will rise to $800^\circ$C, all the oxygen will be consumed and every living thing will die. In the case of a city like New York we are talking about 15 million dead in a half hour.$^{13}$

If this attack is part of a full scale war between the US and Russia this same level of destruction will be seen in every major city in both countries, and If NATO is drawn into the conflict, most of the major cities in Europe as well. A 2002 study showed that if only 300 of the warheads in the Russian arsenal reach targets in urban areas of the US, 75 to 100 million people will die in the first half hour.$^{14}$ In addition, the entire economic infrastructure of the country will be destroyed—the public health system, the electric grid, the banking system, the internet, the food distribution system. All of the elements of society necessary to sustain the population will be gone. Under these conditions the vast majority of the people in the US, Russia and Europe who did not die in the initial attacks will succumb over the following months from starvation, exposure, radiation poisoning and epidemic disease.

But as was true with a limited war in South Asia, these direct effects are only a small part of the story. A war involving the nuclear weapons currently deployed by the US and Russia will put 150 million tons of soot into the upper atmosphere dropping temperatures across the globe $8^\circ$C.

In the interior regions of North America and Eurasia, temperatures will fall 25 to $30^\circ$C producing conditions not seen since the last Ice Age. Ecosystems will collapse, food production will collapse and the vast majority of the human race will starve.

The danger of nuclear war is not some theoretical possibility. Tensions in South Asia and between the US and Russia are significant and growing. Leaders in both the US and Russia have warned in recent months that we are closer to nuclear war than at any time since the 1980’s. Even if some crisis does not escalate to a deliberate decision to use nuclear weapons, there is always the possibility that a false warning, or a terrorist cyberattack will lead to an unintended nuclear war. There have been at least five incidents since 1979 when either Moscow or Washington prepared to launch nuclear war in the mistaken belief that it was already under attack. The most recent occurred well after the end of the cold war.
A larger majority of the nations of the world have reviewed this evidence and concluded that nuclear weapons must be abolished, and their possession must be prohibited under international law.

Nine nations have chosen to defy this consensus and continue to possess nuclear weapons. They pay lip service to their obligations under Article VI of the Non Proliferation Treaty and speak of eliminating their nuclear arsenals at some distant time, when “the conditions are right.” But their actions speak louder than their words. All nine are engaged in major programs to modernize their nuclear arsenals, to make them more “usable” and to guarantee their existence for decades to come.

They are supported by a number of “umbrella” states which are allied with one of more of the nuclear powers. They say that the humanitarian concerns I have discussed must be balanced against “security concerns” and at first glance it is understandable that those who possess nuclear weapons should feel that these weapons make them more secure. During most of human history possessing larger, more powerful weapons than a potential enemy did convey some measure of security. If you are walking down a dark street and someone is coming towards you with a big stick, you probably are a little safer if you have a bigger stick. This insight has become deeply embedded in our way of thinking. But as Einstein pointed out some 70 years ago, the splitting of the atom has changed everything except the way we think. The new reality that we must absorb and understand is this: weapons whose use will obliterate human civilization do not, cannot contribute to anyone’s security.

It is argued, of course that these weapons exist as a deterrent so that they will not be used. As Patricia Lewis pointed out so clearly two days ago, this is simply not true. Given the nature of human and technical systems, there is always a risk, growing over time, that they will in fact be used, and the question is not “if” but “when.”

In fact deterrence which is supposed to guarantee these weapons are never used has already failed repeatedly. During the Cuban missile crisis, while neither sided wanted a nuclear war, both were prepared to wage one and for two weeks they
stumbled in the dark on the brink of a nuclear catastrophe and the world was saved by good luck.

During the five episodes when Moscow or Washington thought they were under attack by the other side, any idea that these weapons should never be used was abandoned and again we were saved by luck, not by magical thinking that nuclear war can’t happen.

But of course, we must be honest: nations do not possess nuclear weapons merely to deter nuclear attack by other countries. They possess nuclear weapons to project national power. No nuclear weapons state has exploded an atom bomb on an enemy since Nagasaki, but they use them all the time to bully and intimidate the rest of the world. And in order to maintain that power they threaten the security of their own citizens and all of humanity.

The unprecedented working paper submitted jointly by IPPNW, The World Medical Association, the World Federation of Public Health Associations and the International Council of Nurse, representing between them more than 15 million health professionals, concludes that an evidence based understanding of the humanitarian consequences of nuclear war invalidates any conceivable argument for the continued possession of these weapons. Their use in even a limited nuclear war will destroy those who use them as well as the rest of human civilization. They are in fact suicide bombs on a global scale and our knowledge of what they will do leads inescapably to the conclusion that they must be prohibited and eliminated.

It is time and past time to abolish these weapons and if the nuclear weapons states will not lead this process it is up to the rest of the world to do so.