

# WAR *is* NOT *the* ANSWER



THE MEDICAL AND PUBLIC  
HEALTH CONSEQUENCES OF  
ATTACKING IRAN



BY  
MARTIN BUTCHER

MARCH 2007

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ATTACKING IRAN

**MARCH 2007**

**PHYSICIANS FOR SOCIAL RESPONSIBILITY**

1875 Connecticut Avenue, NW, Suite 1012  
Washington, DC 20009

Telephone: (202) 667-4260

Fax: (202) 667-4201

E-mail: [psrnatl@psr.org](mailto:psrnatl@psr.org)

Web [www.psr.org](http://www.psr.org)



US Affiliate of International Physicians for  
the Prevention of Nuclear War



# Executive Summary



## THE GROWING CRISIS

The crisis with Iran has been building since 2002, when groups opposed to the clerical Iranian government first began to reveal previously hidden details of Iran's nuclear program. The Bush Administration has taken a consistently aggressive line in dealing with this crisis, pushing for strong action, while simultaneously refusing to negotiate directly with Iran on issues of concern.

Now, in early 2007, it seems as if the U.S. Administration, certain that Iran must be prevented from acquiring a nuclear weapon by any means, is moving toward a military solution. This is consistent with counterproliferation policy and doctrine, which under the Bush Administration has come to emphasize military action over diplomatic negotiation as the preferred means to prevent and roll back nuclear proliferation, with unimpressive results.

A national security decision such as launching a war with Iran has profound human consequences. Thousands, maybe tens of thousands, of people would immediately be killed or injured. Others would lose access to medical care, safe drinking water, and adequate supplies of food. Expensive infrastructure would be destroyed. Untreated chronic conditions such as diabetes could quickly become deadly diseases. Compromised water treatment and sanitation could cause infant mortality rates to soar. Can this be described as action

proportional to the threat we face? This report considers this question.

## IRAN'S ILLICIT NUCLEAR PROGRAM

From 1985 onward, Iran has pursued a clandestine nuclear program that has led to the establishment of a dispersed and sophisticated infrastructure. There is considerable, although circumstantial, evidence that Iran is seeking nuclear weapons capability. According to even the worst-case estimates, however, Iran is still several years away from being able to manufacture a nuclear weapon.<sup>1</sup>

The International Atomic Energy Agency (IAEA) began inspections in Iran in September 2002. The most serious examples of specific Iranian nuclear activities that have now come to light include:

- experiments in plutonium separation dating from 1988;
- the purchase through the A.Q. Khan network of increasingly sophisticated centrifuges for uranium enrichment;
- the purchase (possibly through the A.Q. Khan network) of diagrams and technical specifications (some 900 pages in all) explaining how to machine uranium into hemispherical form — something that has no use except in a nuclear weapon;

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1 Deutch, John. "The Threat of Nuclear Diversion," Statement for the Record to the Permanent Subcommittee on Investigations of the Senate Committee on Government Affairs." Washington, DC. March 20, 1996.

- the refusal to hand over copies of this documentation to the IAEA for analysis;
- the creation of technical drawings and plans for a nuclear test bore hole and measuring instrumentation;
- the refusal of full access to IAEA inspectors at Lavizan and Parchin, both sites controlled not by the Energy Ministry of Iran but by the Revolutionary Guards; and
- a refusal to allow access to two sites, at Lavizan and in Tehran, followed by the bulldozing of the suspect buildings and the removal of everything at both sites, including several inches of topsoil.<sup>2</sup>

This constitutes substantial circumstantial evidence that Iran is pursuing a nuclear weapons program. This poses a direct threat to the nuclear non-proliferation regime, since Iran is a member of the Non-Proliferation Treaty (NPT) and has, for nearly 20 years, been covertly pursuing nuclear activities which it is legally bound to report to the IAEA. This serious non-compliance with IAEA safeguards, and thus the NPT, raises the issue of how best to deal with the risk of proliferation by Iran.

## HOW TO DEAL WITH IRAN

In 2003, Iran offered to negotiate with the United States directly, not just on the nuclear issue, but on the full range of issues of concern to Washington. Some insiders thought the Administration should have accepted, but more senior figures in the Administration spurned the chance to talk. From 2003 to 2006, the EU3 (France, Germany, and the UK) pursued talks with Iran. In late 2004, Iran again offered to include the United States in the four party talks. Again, the White House decided

to stay away. Ultimately, these talks came to nothing because the EU3 could not offer the one thing Iran sought: guarantees that the United States would not attack. Negotiations to date have failed, largely because they have not — at least on the part of the United States — even been tried.

There were persistent media reports throughout 2006 that the Administration was preparing plans for air strikes or another form of attack on Iran.<sup>3</sup> Military planning is said to include options for both limited and more wide-ranging air strikes, with the intent of destroying either a few nuclear facilities or hundreds of nuclear and military sites. According to media reports, these plans could include the use of nuclear weapons against some targets. Other reports have also indicated Israeli preparations for strikes of their own.<sup>4</sup> It is clear that pressure from the United States on Iran was stepped up beginning in early 2007, with a surge in military deployments aimed at Iran.

Detailed consideration of the major health consequences of U.S. actions should be an integral part of national security decision-making. This report examines the likely medical consequences of a limited military attack on Iran of the kind under consideration by the Pentagon.

There are a number of attack scenarios that seem credible:

In a 'minimalist' scenario a small number of targets might be attacked, so-called "chokepoints" which, if destroyed, might delay the Iranian nuclear program by a number of years. This option, focusing on a narrow range of targets, is most likely one that Israel might plan. Such an attack carries the same political and military risks of Iranian retaliation as do larger attack scenarios, but the operation would do the least to delay the Iranian program.<sup>6</sup>

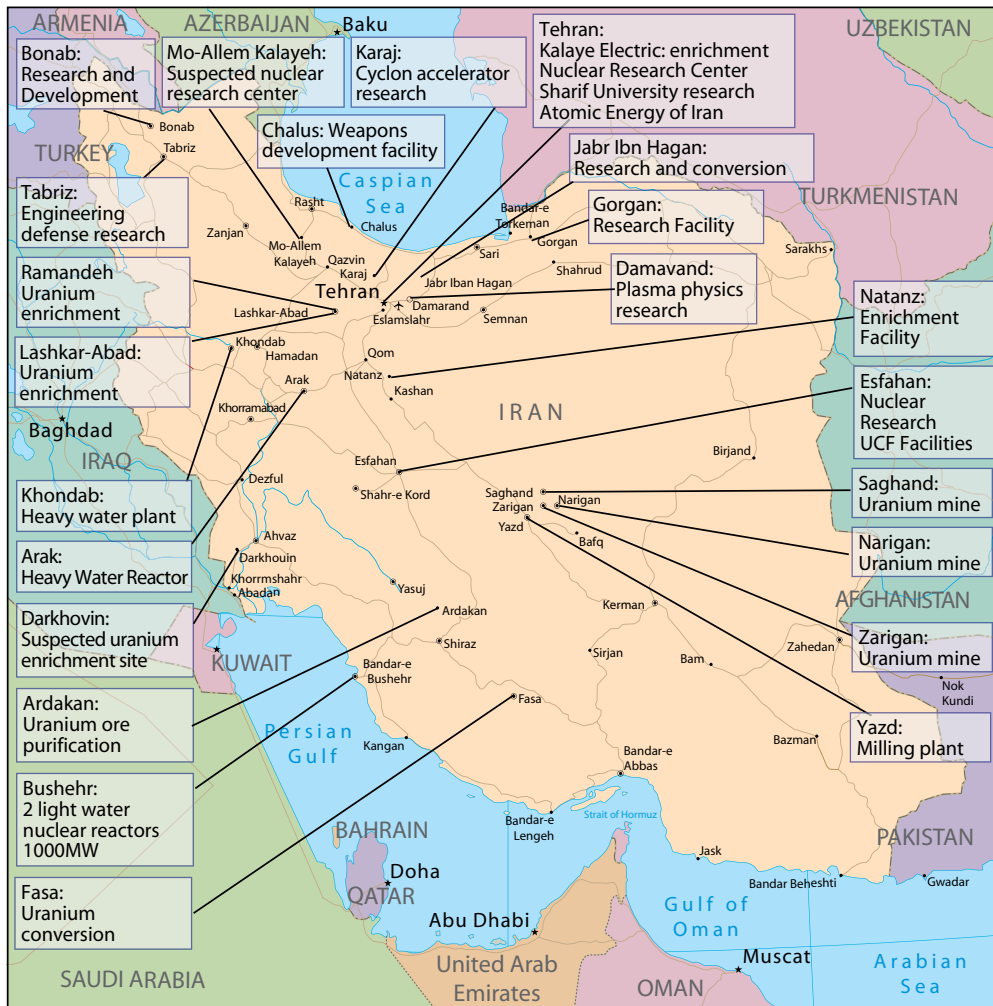
2 A collection of IAEA documents on Iran is available at the website of the Federation of American Scientists <http://www.fas.org/nuke/guide/iran/nuke/index.html> — accessed December 28, 2006. The website of the IAEA has a special page on its relationship with Iran. Available at <http://www.iaea.org/NewsCenter/Focus/laeaIran/index.shtml> - accessed December, 28 2006.

3 Hersh, Seymour. "Last Stand—The Military's Problem with the President's Iran Policy." *The New Yorker*, July 10, 2006.

4 Peter Baker, Dafna Linzer and Thomas E. Ricks. "U.S. Is Studying Military Strike Options on Iran." *The Washington Post*, April 9, 2006.

5 Mahnaimi, Uzi and Sarah Baxter. "Revealed: Israel plans nuclear strike on Iran." *The Sunday Times*, January 7, 2007.

6 A detailed and excellent treatment of this attack scenario and the possibility of an Israeli attack on Iran can be found at the MIT website at [http://web.mit.edu/ssp/Publications/working\\_papers/wp\\_06-1.pdf](http://web.mit.edu/ssp/Publications/working_papers/wp_06-1.pdf) — accessed on January 17, 2007.

**Figure 1: Iranian Nuclear Facilities**

Source: www.nti.org, copyright 2006 Nuclear Threat Initiative (NTI). All rights reserved.

A broader scenario might include attacks on a wider range of nuclear facilities, yet stop short of massive attacks against Iranian military infrastructure in general. In this scenario, President Bush would order attacks on many or all of the 23 sites shown in the map above. Strikes might also be ordered against other research sites linked to the nuclear program at universities across Iran. This scenario is unlikely, as it would increase potential risks, without dramatically increasing the likelihood of setting back the Iranian program.

The broadest approach would entail attacks on nuclear sites, command and control facilities, and military units, as well as power plants and other

civilian infrastructure essential to resistance, such as roads, bridges, and ports. This approach would be the most likely to delay the Iranian nuclear program for a sufficiently long period of time to meet the Administration's current counterproliferation goals. It would also be consistent with the possible goal of overthrowing the current Iranian government. This is also the option that carries the greatest risk of Iranian retaliation, and of increased global tension and hatred of the United States. Obviously, such wide-ranging attacks would also result in the most serious collateral damage to public health facilities, roads, and electrical centers, as well as the greatest number of civilian casualties.

## LIKELY MEDICAL CONSEQUENCES OF A MAJOR ATTACK ON IRAN

Widespread air strikes against a broad mix of targets inside Iran, including those located in heavily populated areas, now seem increasingly likely. Some experts have assessed that the U.S. military would be able to conduct strikes on as many as 10,000 targets in the first 24 hours of an assault on Iran.<sup>7</sup> This report examines the likely medical effects of the use of conventional weapons against targets in Iran, and also the possible use of nuclear weapons. It also briefly reviews the capacity of Iranian medical and public health authorities to cope with the consequences of a broad air attack.

The Centers for Disease Control and Prevention (CDC) states that:

- Bombs and explosions can cause unique patterns of injury seldom seen outside combat.
- The predominant post explosion injuries among survivors involve standard penetrating and blunt trauma. Blast lung is the most common fatal injury among initial survivors.
- Explosions in confined spaces (mines, buildings, or large vehicles) and/or structural collapse are associated with greater morbidity and mortality.<sup>8</sup>

Any U.S. air assault would not be limited to the use of high explosive weapons, however. Attacks on hardened and buried facilities would very likely also involve the use of both thermobaric and depleted uranium weapons.

Thermobaric weapons produce a fireball capable of reaching temperatures up to 3000°C and blast overpressure in excess of 430 pound per square inch (psi). The fireball not only burns, it creates a vacuum which kills everything in its path. The primary injury mechanisms are blast and heat,

with secondary effects from flying fragments and toxic detonation gases.<sup>9</sup> The “kill radius” for the blast is usually greater than that for burns, so that protection against thermal injuries has little benefit. Blast injuries include internal injuries that can be difficult to diagnose and treat without sophisticated medical support.<sup>10</sup>

Depleted Uranium (DU) is used to ensure that a high explosive charge or kinetic warhead penetrates a hardened target. Depleted uranium is both a radiological and chemical toxic hazard. As an emitter of alpha radiation, it is potentially carcinogenic and mutagenic. Because DU is also a heavy metal, it can produce kidney damage.<sup>11</sup>

## WOULD NUCLEAR WEAPONS BE USED?

Would the Administration ever sanction the use of nuclear weapons in an attack on Iran? Many observers believe that this option is unlikely, yet the Administration has prepared a policy that allows for the use of nuclear weapons for exactly this kind of mission. In the case of Iran, doubts about the vulnerability of Natanz and Isfahan to conventional attack could prompt the selection of these sites as potential targets for nuclear weapons use.

If nuclear weapons were dropped on a target as a surface or sub-surface burst, as might well be the case with Natanz, the initial heat and blast damage would be much more extensive than that from a conventional weapon. Prompt radiation effects and initial heat and blast damage would be substantial, although less severe than those from an air-burst nuclear weapon. Initial injuries suffered by troops or civilians on the ground would be immense and deadly. These effects are well known and predictable for blast injuries, burns, and radiation. The nuclear scenarios in this report reveal

7 Plesch, Dan. “Iran— Ready to Attack.” *New Statesman*. London. February 18, 2007.

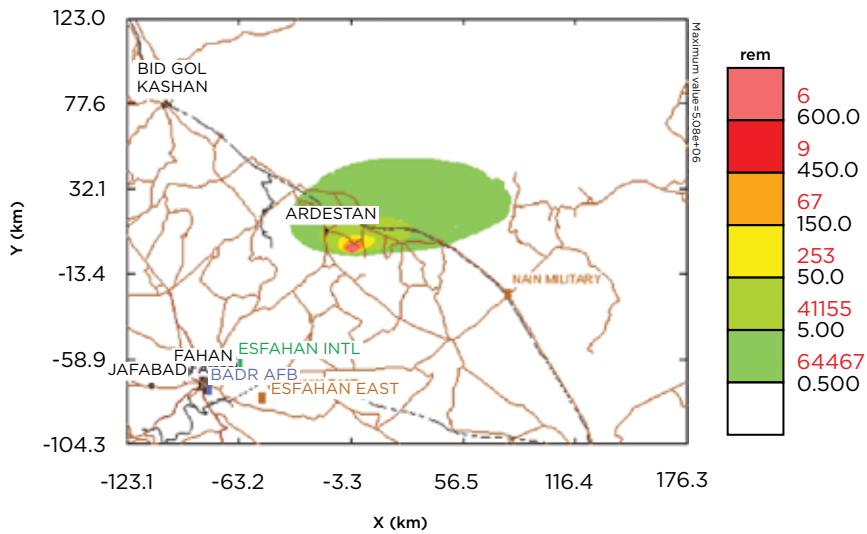
8 U.S. Government. Centers for Disease Control and Prevention. *Explosions and Blast Injuries: A Primer for Clinicians*. Atlanta: 2003.

9 “Thermobaric Weapon.” *Chemistry Daily*, January 4, 2007. Accessed March 2, 2007 [http://chemistrydaily.com/chemistry/Fuel-air\\_explosive](http://chemistrydaily.com/chemistry/Fuel-air_explosive)

10 Wildegger-Gaissmaier, Anna E., Aspects of Thermobaric Weaponry. Weapons Systems Division, Defence Science and Technology Organisation, Edinburgh, SA, 12 February 2003. Accessed on January 17, 2007. [http://www.defence.gov.au/dpe/dhs/infocentre/publications/journals/NoIDs/adfhealth\\_apr03/ADFHealth\\_4\\_1\\_03-06.html](http://www.defence.gov.au/dpe/dhs/infocentre/publications/journals/NoIDs/adfhealth_apr03/ADFHealth_4_1_03-06.html)

11 Bernard, Kimberly, Butcher, Martin, Farrell, Roy, et al. Physicians for Social Responsibility. *DU: Health and Public Health Issues Arising from the Use of Depleted Uranium Munitions*. Washington, 2005.

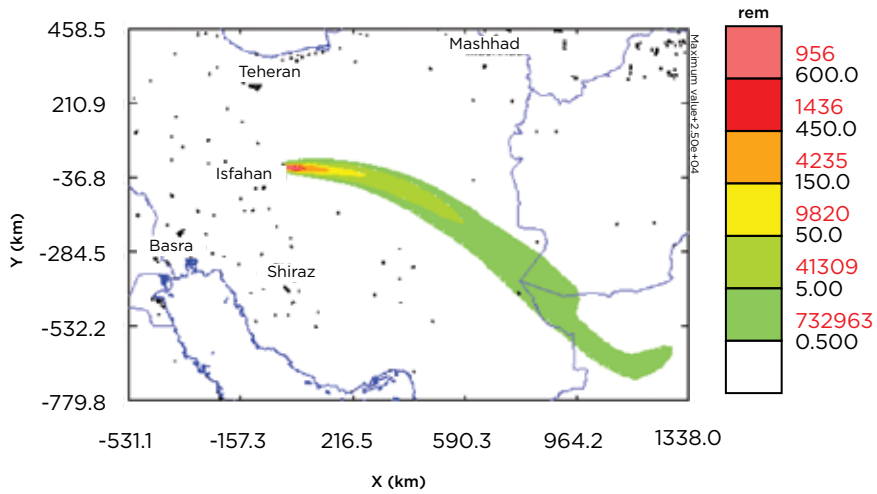
**Figure 2: Nantanz Surface Bursts 3 Nuclear Weapons at 3kt each**



Mean population exposed at indicated level

NOTE: Exposures based only on the displayed population

**Figure 3: Nantanz Surface Burst 400kt weapon**



Mean population exposed at indicated level

NOTE: Exposures based only on the displayed population

that, because the Natanz facility is located in a mountainous desert region, the number of dead and injured might be limited to the low hundreds in the short term. Even in such a remote area, however, the number of people exposed to ionizing radiation would be in the tens of thousands, and the panic caused by the detonation of a nuclear weapon would undoubtedly affect many more.<sup>12</sup>

### HOW MANY CASUALTIES CAN BE EXPECTED?

It is impossible to predict in advance the number of people that would be killed and injured in an attack on Iran's nuclear facilities. If only the "chokepoints" were attacked, civilian and other casualties would likely be limited, unless a large nuclear weapon were used. If many nuclear-related sites were attacked, a higher number of casualties could be expected, because many of those sites are located in cities, on university campuses, or near business zones or residential neighborhoods. Logically, the greatest number of casualties would be expected from a wide-ranging target set, including the nuclear-related sites, military bases and command and control facilities, and even power plants and other infrastructure targets.

### COULD IRANIAN HEALTH SERVICES COPE?

There is no direct example from which to draw an analysis of Iran's ability to provide medical care for victims of major air strikes. The case of the earthquake measuring 6.6 on the Richter scale that hit the city of Bam in December 2003 — killing some 30,000 people and leaving more than 30,000 in need of medical care — can provide some guidance.<sup>13</sup> Despite major investment in medical and public health networks, Iran was

immediately forced to rely on support marshaled by the World Health Organization from more than 40 countries. This is same scale of disaster relief operation that might be needed after a major series of air strikes against hundreds of targets, including nuclear, military, and leadership facilities in a number of Iranian cities, as well as in more isolated areas.

In the event of nuclear weapons use, Iran would undoubtedly need assistance with housing of internally displaced persons fleeing the fallout and assessing and treating those exposed. Afghanistan, Pakistan and other countries in the region — might also require assistance, either for treatment and decontamination of fallout victims, or simply to cope with internally displaced persons fleeing fallout plumes. In the end, the ability of Iran's health services to cope would be determined by the scale of the attack, whether basic public health necessities such as water and electricity could be maintained, the condition of roads needed to transport the injured, the number of essential personnel injured or killed, and other factors. If Iran required outside support, UN or NGO agencies would be hesitant to assist unless they could be certain that their staff would not be subject to further waves of air strikes.

### HOW MIGHT IRAN RETALIATE?

Iran might respond to a U.S. attack by seeking to further destabilize Iraq; prompting Hezbollah in Lebanon to attack Israel; launching missile attacks against Gulf allies of the U.S., Iraq, and Israel; and/or disrupting shipping and end oil exports from the Gulf. Any military response by Iran would only spread the human consequences across international borders, fuelling instability across the wider Middle East.

12 This section is based in large part on the May 2005 PSR publication *Projected Casualties Among U.S. Military Personnel and Civilian Populations from the Use of Nuclear Weapons Against Hardened and Deeply Buried Targets* by Peter Wilk MD, Sarah Stanlick, Martin Butcher, Michael McCally MD, Ira Helfand MD, Robert Gould MD, John Pastore MD. All references to this section can be found in that report available at [www.psr.org](http://www.psr.org).

13 U.S. Geological Survey. *Preliminary Earthquake Report*. <http://earthquake.usgs.gov/eqcenter/eqinthenews/2003/uscvad/> — accessed 3/1/2007.

Iran's political recourse includes withdrawal from the NPT, as well as encouraging further isolation of the U.S. from much of the international community.

### WOULD AIR STRIKES SUCCEED?

It is possible that a thorough destruction of Iran's known nuclear-related infrastructure would delay the bomb program, but for how long? At best, the program — which is not well understood — might be set back for a few months or a few years. But this delay would be gained at a huge security cost in terms of diplomatic disadvantage, increased hostility to the United States, and turmoil in the region. In addition, air strikes cannot destroy facilities unknown to intelligence analysts, nor the expertise and knowledge held by Iranian scientists and technicians. Nuclear physicist Frank Barnaby recently published a report detailing the possibility that air strikes could actually speed Iranian acquisition of a nuclear weapon by shifting the program from a broad-based, dual-use effort to a dedicated crash program with no international constraints.<sup>14</sup>

### POLICY CONCLUSIONS

This report examines the Iranian nuclear program and concludes that Iran has not been forthright about its proliferation activities. Iran has conducted illicit dealings on the international nuclear black market and has sought to conceal its program from the IAEA. Iran has been successful at concealing even major facilities from the international community. The point must be underlined, however, **that this does not mean that it would be sensible or effective policy to isolate and attack Iran in an attempt to delay, disrupt, or even terminate its nuclear program.**

The devastating short-term medical consequences of massive attacks on the full range of Iranian nuclear and military infrastructure could only increase enmity against the United States and allies, in the region and across the globe — increasing the threat from extremist groups such as Al Qaeda against all Americans.

But the principle argument against the use of military force in Iran is that it would cause terrible human suffering without achieving our goals. War is not the answer.

### RECOMMENDATIONS

PSR has a number of policy recommendations that would enhance the likelihood of a successful, effective, and nonviolent end to the Iranian nuclear program:

#### ■ Offer Immediate Negotiations

As President Nixon went to China, President Bush should go to Tehran. The United States should offer immediate and unconditional talks to the Iranian government. Such talks would have no preconditions of any kind.

#### ■ Put Iran's Nuclear Program in the Context of a WMD-Free Middle East

Iran undoubtedly has its own security concerns relating to Israeli and American nuclear weapons and their overall military power in the Middle East. Iran is one of several countries in the region with stocks of chemical and biological weapons. It could only contribute to the security of this unstable region if Middle East nations were to commit themselves to a Weapons of Mass Destruction Free Zone. This would surely entail complex negotiations, but it is an approach that is eminently worth pursuing.

<sup>14</sup> Barnaby, Frank. Oxford Research Group. *Would Air Strikes Work? Understanding Iran's Nuclear Programme and the Possible Consequences of a Military Strike*. London: 2007.

- **Strengthen the Global Non-Proliferation Regime**

Other countries find it hard to take the United States seriously when it calls for them to abstain from nuclear weapons acquisition, while it designs its own new warheads and makes plans to build a nuclear weapons infrastructure that would last for the next century. If the United States were to show good faith in implementing its own NPT promise to disarm, Iran would have more incentive to reciprocate by upholding its NPT promise not to acquire nuclear weapons.

- **Strengthen IAEA Safeguards and Enforcement Mechanisms**

The lesson we must take from this case is that more frequent and intrusive inspections backed

by early, non-military enforcement through the United Nations Security Council must be employed as a tool to prevent proliferation.

- **Incorporate Medical and Public Health Consequences of Actions into Decision-Making Processes**

We likely have 5–10 years before Iran acquires nuclear weapons. That gives us a significant period of time to try to solve this crisis through diplomatic and political channels. Before using military force, the United States should, as a matter of policy, consider the short-term medical and long-term public health consequences of its actions, especially since the chances of securing the desired outcome through military action are so poor.





## WHO IS PSR?

Guided by the values and expertise of medicine and public health, Physicians for Social Responsibility works to protect human life from the gravest threats to health and survival. PSR is a nonpartisan, nonprofit organization representing 26,000 physicians, public health professionals, and concerned citizens working to eliminate nuclear weapons and address the public health and environmental legacy created by our military and civilian nuclear enterprise, including the testing, production and stockpiling of nuclear weapons. Since its founding forty-five years ago, PSR has dedicated its efforts to educating the medical and public health community, the public, policymakers and the media about the menace of accidental or intentional nuclear war and proliferation of nuclear weapons and materials.

PSR also has a long history of bringing to light the fallacy of U.S. nuclear weapons policy and inadequacy of U.S. public health infrastructure in responding to a full-scale nuclear war scenario. Throughout the Cold War years, PSR physicians published articles and studies in medical journals, such as the *New England Medical Journal* and the *Journal of American Medical Association*, detailing the medical consequences of a nuclear war between the United States and the Soviet Union. Through research, public education and advocacy, PSR, with our international federation the International Physicians for the Prevention of Nuclear War, highlighted the health effects associated with testing, production and stockpiling of nuclear weapons and the nation's continued reliance on nuclear weapons and nuclear power. This work was recognized globally when IPPNW was awarded the Nobel Peace Prize in 1985, in which PSR shared.

Over the last two decades, PSR's work has focused on educating the public and policy makers about the continuing threat of nuclear proliferation and the health legacies of nuclear weapons build-up during the Cold War. PSR continues to advocate for rapid reduction and eventual elimination of U.S. and global nuclear stockpiles — ultimately the only sure way to eliminate the threat of the use of nuclear weapons whether by an adversary state or by a terrorist group.

Recognizing that new dangers now threaten us, PSR in 1992 expanded its mission to include environmental health, addressing issues such as global climate change, proliferation of toxics, and pollution.

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1875 Connecticut Avenue, NW, Suite 1012  
Washington, DC 20009

Telephone: (202) 667-4260

Fax: (202) 667-4201

E-mail: [psrnatl@psr.org](mailto:psrnatl@psr.org)

Web [www.psr.org](http://www.psr.org)



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