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AND BOOK OF FACTS

2003

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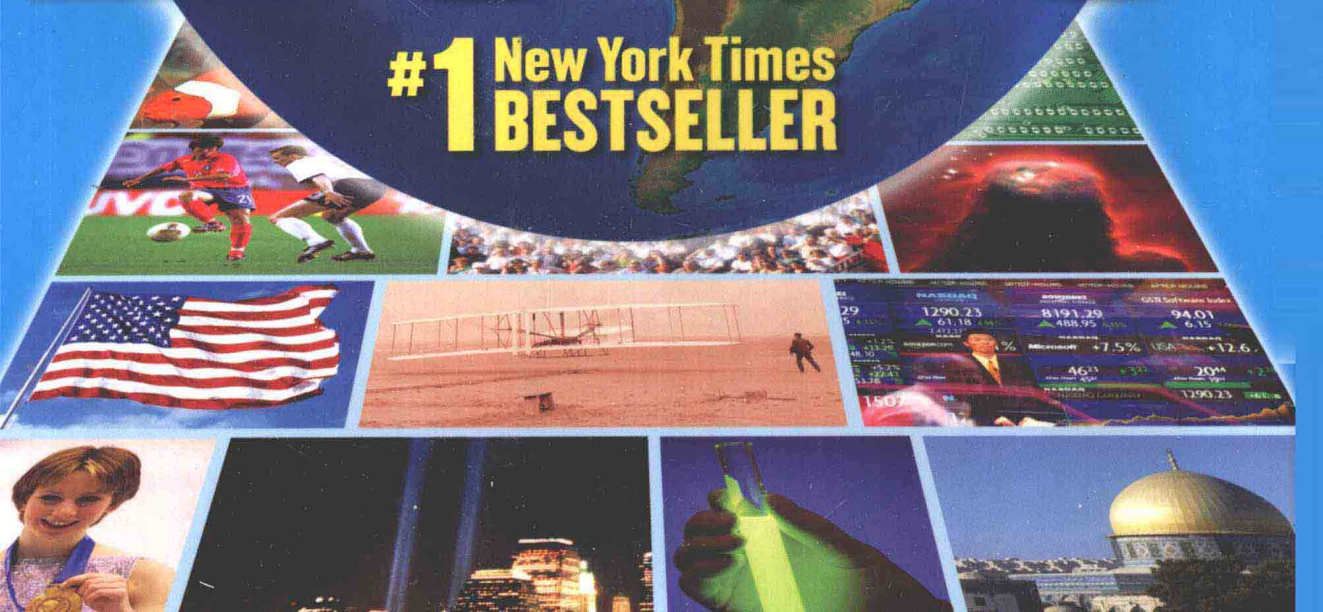

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WORLD ALMANAC BOOKS

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THE TOP TEN NEWS STORIES OF 2002

1. The U.S. and its allies continued their **war on terrorism** seeking to rout out members of the **al-Qaeda** terror network, held responsible for the Sept. 11, 2001, attacks in which some 3,000 people were killed, and their Afghan **Taliban supporters.** Despite some success, the whereabouts and fate of al-Qaeda leader Osama bin Laden and of Taliban leader Mullah Mohammed Omar remained unknown as of mid-Oct., and there were renewed terrorist attacks, including an Oct. 12 bombing in a tourist district of Bali, Indonesia, that killed more than 180 people. Some al-Qaeda were taken into custody by the U.S. and detained at its naval base in Guantanamo Bay, Cuba. Suspected terrorists were arrested in many countries, including Pakistan, Germany, Italy, Singapore, Sudan, Spain, and the U.S. The stability of **Afghanistan's new government** remained at risk, underlined by a Sept. 5 assassination attempt on Pres. Hamid Karzai. **At home,** U.S. leaders sought policies to better protect against attacks. The federal government Feb. 17 took control of security at commercial airports; Pres. George W. Bush June 6 proposed a cabinet-level Dept. of Homeland Security to coordinate domestic antiterrorism efforts; and U.S. lawmakers investigated evidence of pre-Sept. 11 intelligence lapses. Amid concerns about civil liberties, federal courts made conflicting rulings over whether to release names of hundreds detained in the antiterrorism drive.
2. Congress passed a resolution Oct. 10-11 giving Pres. Bush a broad mandate to use **military force** against "the continuing threat" posed by the regime of Saddam Hussein in **Iraq**; the vote was 77-23 in the Senate and 296-133 in the House. As of mid-Oct., the UN Security Council was still trying to reach agreements to return international inspectors to Iraq, in an attempt to verify whether Iraq had weapons of mass destruction and perhaps avoid war.
3. **Violence between Israelis and Palestinians** continued, with little progress toward a peace settlement. A 2-year cycle of Palestinian attacks (frequently suicide bombings) and Israeli military incursions and targeted attacks on militant leaders had left about 600 Israelis and 1,600 Palestinians dead by Oct. 2002.
4. The U.S. corporate community was battered by **accounting scandals and bankruptcies** that led to congressional hearings and arrests, and further undermined a weakening **stock market**—which hit 5-year lows in early Oct. Telecommunications giant **WorldCom Inc.,** July 21, filed the U.S.'s largest-ever bankruptcy; it eventually disclosed more than $7 billion in accounting irregularities. A probe into the Dec. 2001 bankruptcy of energy trader **Enron Corp.** led to congressional hearings, the June 15 conviction of its outside auditor, **Arthur Andersen LLP,** on federal obstruction of justice charges, and the Oct. 2 arrest of its former CFO on fraud and other charges. Congress passed and Pres. Bush on July 30 signed a measure aimed at overhauling the federal accounting, securities fraud, and corporate governance laws.
5. The U.S. Roman Catholic Church was engulfed in a scandal over its handling of **sexual abuse of minors** by priests. Following up on a meeting in April between Pope John Paul II and U.S. cardinals in Rome, the U.S. Conference of Catholic Bishops, in Dallas, TX, June 13-15, agreed to stringent steps, including removing from ministry any priest credibly accused of sexually abusing a minor; however, the Vatican Oct. 18 called for revision of these policies. In Sept. the Boston archdiocese agreed to pay $10 million to settle a suit by 86 plaintiffs against defrocked priest John Geoghan.
6. Control of the U.S. Congress was at stake in **midterm elections** set for Nov. 5. There were 34 races for seats in the Senate, currently split 50-49 in favor of the Democrats. Also at stake were all 435 House seats, and 36 governorships. *For election results*, visit www.worldalmanac.com/2002elections.
7. The **Washington, DC, suburbs** were terrorized by a series of **sniper shootings,** beginning Oct. 2. The attacker or attackers, firing single shots with a high-powered rifle, usually from far away, killed 9 people and injured 2 through Oct. 14; as of that date police had not made an arrest in the case.
8. Rising tensions in May between **India and Pakistan** aroused fears that their longstanding dispute over the Kashmir region would erupt into a full-fledged war between the 2 nuclear-armed nations, but steps taken in June reduced this threat.
9. Pres. Bush Mar. 26 signed a **campaign-finance reform bill,** capping a 7-year effort by sponsors Sen. John McCain (R, AZ) and Russell Feingold (D, WI) to impose a ban on unregulated "soft money" contributions to political parties and restrict so-called issue ads by interest groups. It was the most comprehensive campaign-finance overhaul since 1974, when Pres. Gerald Ford signed landmark post-Watergate reforms.
10. The **North Korean government** of Kim Jong Il admitted it has been pursuing a **clandestine nuclear weapons program,** U.S. officials disclosed Oct.16. Officials said the U.S. would withdraw from a 1994 pact under which the West provided aid to North Korea in exchange for a freeze in nuclear arms development.

The Ongoing War Against Terrorism

By Geoffrey M. Horn

Geoffrey M. Horn, a freelance writer and editor, writes about U.S. politics and current affairs.

More than a year after the attacks of Sept. 11, 2001, the war against terrorism continued to dominate the American agenda. Even as the U.S. turned its attention toward another Near East nemesis—Iraqi leader Saddam Hussein—a spate of deadly attacks in October from Kuwait to Bali and the Philippines gave evidence that the al-Qaeda terrorist network, though weakened by its defeat by Alliance forces in Afghanistan, was beginning to regroup.

Al-Qaeda's October resurgence came despite damage to its highest echelon. Training director Mohammed Atef of Egypt was believed to have been killed Nov. 13, 2001, in a U.S. bombing raid near Kabul, and the man believed to be Atef's successor, Abu Zubaydah, a Palestinian born in Saudi Arabia, had been captured Mar. 28, 2002, in Pakistan and detained for questioning by the U.S. There was no hard evidence that al-Qaeda leader Osama bin Laden remained alive (though the failure to capture either Bin Laden or Taliban leader Mullah Mohammed Omar meant that they might still be active).

International Battlefront

One top aide to Bin Laden who survived the U.S. onslaught was Ayman al-Zawahiri, an Egyptian surgeon and the founder of Egyptian Islamic Jihad, who called the Sept. 11 attacks "a great victory" in a videotape broadcast Apr. 15, 2002. Release of the video followed by 4 days a truck bombing at a synagogue on the Tunisian island of Djerba in which at least 17 people were killed, many of them German tourists. "We've sent a message to Germany," Zawahiri said in an audiotape aired Oct. 8.

That message (together with communications purporting to come from Bin Laden) coincided with the wave of terrorist operations in which many analysts saw the hand of al-Qaeda and its allies. On the S Philippine island of Mindanao—where U.S. forces and Filipino government troops were

fighting Abu Sayyaf, an Islamic guerrilla group linked with al-Qaeda—a nail bomb mounted on a motorcycle exploded Oct. 2, killing an American Green Beret and 3 other people. An explosion and fire Oct. 6 damaged a French oil tanker, killed one crew member, and spilled 90,000 barrels of oil into the Gulf of Aden, off Yemen. An attack Oct. 8 by Kuwaiti gunmen killed one U.S. marine and wounded another. A huge blast and fire Oct. 12 claimed the lives of at least 180 people, many of them young Australian tourists, in the Kuta beach district of Bali, Indonesia. The Bali explosion was attributed to al-Qaeda "with the cooperation of local terrorists" by Indonesian Defense Minister Matori Abdul Jalil.

Repair, Rebuild, Remember

The war on terrorism in Afghanistan resulted in the overthrow of oppressive Taliban rule and the installation of a functioning government, with a mission to rebuild the country. Meanwhile, at home, Americans sought to honor the heroes and victims of the 2001 attacks, repair and rebuild the sites struck by the hijackers, revive the damaged U.S. economy, and determine why U.S. intelligence and law enforcement agencies had been unable to prevent the terrorist acts that had killed more than 3,000 people.

At Wedge 1 of the Pentagon, where 125 workers died, the Phoenix Project construction team completed repairs June 11 to the limestone facade through which American Airlines Flight 77 had crashed. Thirteen thousand people gathered for a special ceremony in front of the rebuilt section on Sept. 11, 2002—one of many hundreds of commemorations held in churches, town squares, and other places throughout the U.S. on that day.

At the site where World Trade Center had stood, the task of removing 1.62 million tons of rubble while searching for human remains officially ended July 15, 2002. New York City's official list of the dead and missing had been pared to 2,801 by Sept. 11, 2002, when all the names were read at a ceremony held at the site. Discussions of how to redevelop the area revealed divisions between those who wanted to replace the lost office space (and the economic benefit it represented) and those (including many of the victims' families) who regarded the site as holy ground fit only for a permanent memorial.

A report released Sept. 4 by the New York City comptroller, *One Year Later: The Fiscal Impact of 9/11 on New York City*, estimated that the overall cost to the city of the terrorist attacks could reach as high as $95 billion. Other financial statistics were equally sobering. The sluggish economy, declining tax revenues, plunging stock prices (exacerbated by an epidemic of corporate scandals), and increased spending on national defense and homeland security combined to transform a federal budget surplus of $127 billion for the 2001 fiscal year to a deficit of $157 billion in fiscal 2002. Revenues had suffered their largest percentage drop in 50 years and spending had shown its most rapid increase in two decades. Forty-six state governments had to address budget shortfalls totalling $37.2 billion for the fiscal year ended June 30, according to the National Conference of State Legislatures.

What Went Wrong?

A crucial question confronting Congress was whether government intelligence and law enforcement could have anticipated and prevented the Sept. 2001 attacks. Beginning Sept. 18, 2002, a series of joint hearings by the House and Senate Intelligence Committees presented a portrait of an overworked and stressed-out intelligence community that had overlooked some clues, undervalued others, and failed to share information effectively. The initial report noted that although Director of Central Intelligence George Tenet had declared "war" against al-Qaeda as early as Dec. 1998, neither the Central Intelligence Agency nor the Federal Bureau of Investigation had reallocated its resources accordingly. Former FBI Director Louis J. Freeh responded that Congress had not appropriated the funds that he had sought to fight terrorism.

A 2nd report, released 2 days later, argued that by Jan. 2000, the CIA had good reason to be suspicious of Khalid al-Mihdhar and Nawaf al-Hazmi, 2 Saudi citizens who were among the 5 hijackers who crashed Flight 77 into the Pentagon. However, the CIA did not circulate an alarm until Aug. 23, 2001, by which time the 2 men were already in the U.S.

The joint committee also focused on the failure of FBI higher-ups to heed an urgent warning from an agent in Phoenix, AZ, who contended in an electronic memo on July 10, 2001, that Bin Laden had launched a coordinated effort to send students to the U.S. for civil aviation training. Also unheeded was a high-priority request from an FBI supervisor in Minneapolis, MN, for a warrant to search the laptop computer of Zacarias Moussaoui, who was detained Aug. 16 after arousing suspicions at a local flight school.

Facts Related to the War Against Terrorism

(All figures latest as of Oct. 2002, unless otherwise indicated.)

- **Victims of the Sept. 11 attacks:** 3,021. Official count for the World Trade Center disaster was 2,797 (4 fewer than the number of names read at Ground Zero ceremonies on Sept. 11, 2002). Including the 147 on board the 2 aircraft that crashed into the Twin Towers.
  - The New York City listing included 1,411 victims who had been identified. Other victims: 184 at the Pentagon (of whom 59 were on board American Flight 77) and 40 on board United Flight 93, which crashed near Shanksville, PA.
  - Victim figures do not include the 19 hijackers, all presumed to have died that day.
- **Average initial Victim's Compensation Fund payment:** $1.56 million. 749 claims; 67 award letters issued, of which 41 were accepted as of mid-Oct.
- **Projected increase in annual U.S. defense spending:** 43.4% between the 2001 and 2007 fiscal years. Defense expenditures were forecast to rise from $309 billion in fiscal 2001 to $379 billion by fiscal 2003 and $442.5 billion by fiscal 2007.
- **Persons with terrorist connections:** more than 70,000 on the U.S. State Dept. "watch list."
- **Suspected terrorists arrested worldwide:** more than 2,400 in 90 countries since Sept. 2001.
- **Prisoners held at Guantánamo Bay Naval Base, Cuba:** about 550. These al-Qaeda and Taliban fighters captured in Afghanistan are classified as "enemy combatants" by the U.S. government.
- **Items seized at U.S. commercial airports:** more than 3 million items, such as guns, knives, box cutters, scissors, razors, and other prohibited objects, with 720 people held for weapons violations, from Feb. 17, 2002, when the federal government took over security, to Sept. 30, 2002.
- **U.S. troops deployed to combat terrorism:** more than 60,000, including those assigned to Afghanistan, the Philippines, Georgia, and Yemen.
- **U.S. military casualties, worldwide in terror war:** 52 deaths, more than 200 injured, as of Sept. 2002.
- **Afghan casualties:** Unknown; estimates of civilian dead range from below 1,000 to over 3,000.
- **Bombs dropped in Afghanistan by the U.S. and its allies:** 24,000 as of Sept. 2002; of these, 13,000 were precision guided.
- **Refugees returned to Afghanistan:** about 2 million. In addition, 630,000 internally displaced persons had returned to their homes. A year earlier, at the start of U.S. bombing, more than 3.5 million Afghans were living in refugee camps in neighboring countries, and over 1.3 million were internally displaced.
- **Food delivered to Afghanistan:** more than 575,000 metric tons since Oct. 2001.
- **International aid pledges to Afghanistan for 2002:** $2 billion, of which about $1.3 billion had been used or was expected to become available before the end of 2002. Afghanistan's national budget for 2002 was $460 million, for a national population of about 28 million.

Search for Security

Both at home and overseas, the Bush administration and Congress moved to bolster American security. Legislation signed by Pres. Bush on Nov. 19, 2001, authorized a federal force to screen passengers and baggage at major airports, increased the number of sky marshals, and provided for the strengthening of cockpit doors to ward off intruders. On Mar. 12, 2002, Homeland Security Director Tom Ridge unveiled a five-step, color-coded alert system ranging from green (low risk of attack) up to red (severe risk); the level remained at yellow (elevated risk) throughout the spring and summer but was raised to orange (high risk) for a 2-week period while the U.S. marked the 1st anniversary of the Sept. 11 attacks.

Pres. Bush June 6 proposed the creation of a new cabinet-level Department of Homeland Security, comprising some 22 separate agencies with about 170,000 employees. Included in the new department would be the INS, the Coast Guard, the Secret Service, the Customs Service, and the Federal Emergency Management Agency, along with the Transportation Security Administration, which had been established the previous November. The proposal—the most ambitious executive branch reorganization since the creation of the Department of Defense in the late 1940s—passed the House of Representatives 7 weeks later, by a vote of 295-132, but stalled in the Senate because of a wrangle over the employees' civil service and collective bargaining rights.

By autumn, new Coast Guard maritime safety and security teams were patrolling the harbors of Seattle, Los Angeles, Houston/Galveston, and Chesapeake, VA. The computer network of the Centers for Disease Control and Prevention was linked with those of some 2,000 local health agencies, while programs to combat bioterrorism received a fourfold increase in the budget for the 2003 fiscal year.

Another approach to securing the homeland was cutting the flow of funds to terrorists. According to the U.S. State Dept., more than 160 countries have frozen the financial assets of suspected terrorists. A UN report leaked to the *Washington Post* in Aug. 2002 suggested that about $100 million in assets had been blocked from Sept. through Dec. 2001, but only about $10 million since that time. By Jan. 2002 more than 50 countries, not including the U.S., had detained at least 800 terrorist suspects. Documents released 8 months later, however, indicated that the State Department's "watch list" of persons with terrorist connectons exceeded 70,000 and was expanding at a rate of about 2,000 a month.

To tighten enforcement of immigration laws, the names of over 300,000 foreigners living in the U.S. who had ignored deportation orders were entered into a national FBI crime database; the INS acknowledged, however, that it would not be able to meet a congressionally mandated deadline for tracking the more than 500,000 foreign nationals who hold student visas. On Oct. 1, 2002, immigration authorities began implementing a controversial policy of routinely registering, fingerprinting, and photographing men entering the U.S. from certain Middle Eastern and North African countries.

Some government actions raised concerns among civil liberties advocates. About 1,200 people—nearly all men of Middle Eastern or South Asian origin—were secretly arrested and held in the immediate aftermath of the Sept. 11 attacks. Civil and human rights groups filed suit calling on the Justice Dept. to release the names of the detainees, and in August a district court judge ordered the names released (the order was stayed pending appeal); by that time fewer than 100 reportedly remained in custody, with most having been deported. Concerns were also raised about the indefinite detention of Taliban and al-Qaeda prisoners at a prison camp at Guantánamo Bay, Cuba.

In pursuing the war on terrorism abroad, the U.S. to some extent downplayed human rights considerations. Pakistan's military ruler Pervez Musharraf emerged as an invaluable ally, and the U.S. also tightened defense ties with some Central Asian regimes with poor human rights records, such as Uzbekistan and Tajikistan. Concerns about continued American vulnerability to terrorist attacks in part prompted a shift in global defense strategy, as outlined in the administration's *National Security Strategy,* released in Sept. 2002. This document argued that the policy of deterrence, pursued effectively against the Soviet Union during the cold war, was no longer viable. Mindful of Sept. 11, the Bush administration placed new emphasis on possible preemptive action against terrorist groups and rogue states. The policy was controversial, but Congress appeared to endorse it when, on Oct. 10-11, the House and Senate approved a resolution authorizing Pres. Bush to use military force against Iraq "as he determines to be necessary and appropriate" to defend national security and enforce UN resolutions.

Legal Cases Related to the War Against Terrorism

The following are some of the major cases, with their status as of mid-Oct. 2002.

- **Enaam Arnaout**, U.S. citizen born 1962 in Syria, executive director of Benevolence International Foundation (BIF), an Illinois-based Islamic charity. Indicted Oct. 9 on racketeering and fraud charges for allegedly funneling charitable donations to al-Qaeda.
- **Ramzi bin al-Shibh**, born 1972 in Yemen. Alleged al-Qaeda leader and key planner of Sept. 11 attacks. Roommate of hijacker Mohamed Atta in Hamburg, Germany, 1998-99. Fled Germany Sept. 5, 2001. Indicted in Germany in absentia for the murder of over 3,000 on Sept. 11. Captured in Karachi, Pakistan, Sept. 11, 2002. Transferred Sept. 16 to U.S. custody.
- **Yaser Esam Hamdi**, born 1980 to Saudi parents in East Baton Rouge, LA. Taken into custody in Afghanistan and detained at U.S. naval base, Guantánamo Bay, Cuba. Transferred as an enemy combatant Apr. 5, 2002, to Navy brig at Norfolk (VA), after claiming U.S. citizenship.
- **John Walker Lindh**, the "American Taliban"; born 1981 in Washington, DC. Fought in 2001 with Taliban against Northern Alliance in Afghanistan. Indicted Jan. 15, 2002, in U.S. federal court; pleaded guilty July 15 to serving as a soldier for the Taliban. Sentenced to 20 years in prison.
- **Zacarias Moussaoui**, sometimes called the "20th hijacker"; French citizen of Moroccan descent; born 1968. Detained on immigration charges Aug. 16, 2001, after a Minneapolis, MN, flight school suspected his motives in seeking to fly a commercial jetliner. Indicted Dec. 12 for conspiracy to carry out Sept. 11 attacks. Trial postponed to June 30, 2003.
- **José Padilla**, also known as Abdullah Al Muhajir; born 1970 in Brooklyn, NY. Arrested May 8, 2002, in Chicago in connection with a plot to detonate a "dirty bomb" containing radioactive materials. Classified as an enemy combatant June 9, and held in a Navy brig in Charleston, SC.
- **Richard Reid**, known as the "shoe bomber"; British citizen born 1973 in suburban London. Subdued Dec. 22, 2001, by flight attendants and passengers on an American Airlines flight from Paris, France, to Miami, FL, as he tried to ignite plastic explosives hidden in the soles of his shoes. Indicted Jan. 16 on multiple charges, including attempted murder. Pleaded guilty Oct. 4, declaring that he was a member of al-Qaeda, a follower of Bin Laden, and an enemy of the U.S.
- **Earnest James Ujaama**, born 1965 in Denver, CO, as James Earnest Thompson; known in Seattle, WA, as entrepreneur and community leader. Detained July 22, 2002, in Alexandria, VA, as material witness in federal terror investigation. Indicted Aug. 28 in Seattle for conspiring to set up a terrorist training camp in Bly, OR.
- **Suspected U.S. Terrorist Cells:** Five **Detroit** area residents (Karim Koubriti, Ahmed Hannan, Youssef Hmimssa, Ahmed Hannan, Farouk Ali-Haimoud, and a man known only as Abdella) were indicted Aug. 28 and accused of being part of a "sleeper operational combat cell." The first 4 were in federal custody; Abdella, the alleged ringleader, was still at large at that time. Five U.S. citizens of Yemeni ancestry (Yahya Goba, Sahim Alwan, Shafal Mosed, Yasein Taher, and Faysal Galab), all living in Lackawanna, N.Y., a suburb of **Buffalo**, were arrested Sept. 13-14 and charged with receiving terrorist training at an al-Qaeda camp near Kandahar, Afghanistan. A 6th suspect in the case, Mukhtar al-Bakri, was arrested Sept. 15 in Bahrain. Six residents of **Portland, OR** (Jeffrey Leon Battle, October Martinique Lewis, Patrice Lumumba Ford, Muhammad Ibrahim Bilal, Ahmed Ibrahim Bilal, and Habis Abdulla al Saoub) were indicted Oct. 3 on charges of conspiring to assist al-Qaeda. The first 4 were arrested Oct. 4; the other 2 were at large and believed to be overseas.

Nuclear Terrorism: Assessing the Risk

By Richard Hantula

Richard Hantula is a freelance editor and writer who frequently covers scientific and technical topics.

The nuclear bomb was used as a weapon for the first and, to date, last time in the bombing of Japan that ended World War II. The bombs dropped on Hiroshima and Nagasaki in Aug. 1945, each the equivalent of some 20,000 tons (20 kilotons) of TNT, destroyed a large part of both cities and killed more than 100,000 people within days. After that, the balance of power in the world and fears of massive retaliation deterred the small body of nuclear nations from using this weapon again.

But the suicide attacks that killed 3,000 people in the U.S. on Sept. 11, 2001, focused attention on a new threat: an apparently well-financed worldwide network of fanatical Islamic terrorists who might not shrink from using radiation as a weapon, perhaps even exploding a nuclear device if they could. Without a definable homeland, such terrorists would not be deterred by fear of massive retaliation—and they probably would not fear the serious health risks from handling nuclear materials.

The Availability of Weapons

Nuclear weapons rank among the most fearsome options potentially available to terrorists. The more powerful devices among today's fission and fusion weapons are many times more destructive than the bombs that hit Japan. Besides their direct damage, they release radiation—which if it does not kill quickly may cause disease and a slow and painful death. However, such weapons are generally kept under tight control. Terrorists would find it difficult to acquire one— though not necessarily impossible; they might steal one, or buy it from corrupt officials, or get it from a nation willing to use terrorism to advance its foreign policy objectives.

According to the Center for Defense Information (CDI), a nonpartisan research group based in Washington, DC, as of early 2002 the number of nuclear warheads in world stockpiles, including smaller tactical weapons as well as powerful strategic devices, exceeded 20,000. It was believed that Russia and the U.S. each had more than 10,000, China about 400, France 350, Britain 200, Israel perhaps 100-200, India 60 or more, and Pakistan at least 2 dozen. North Korea in Oct. 2002 admitted it had been pursuing a clandestine nuclear arms program.

Concerns over the security of these nuclear devices have been voiced particularly about Pakistan, where Muslim extremists enjoy significant popular support, and Russia, which inherited the bulk of the formidable Soviet arsenal after the Soviet Union's 1991 disintegration but found it difficult to finance strict security procedures. The late Gen. Aleksandr Lebed, who once served as secretary of Russia's Security Council, claimed in 1997 that 84 "suitcase" nuclear devices were found to be missing in the 1990s, though some senior Russian officials have denied this. These small, portable bombs could produce an explosion equivalent to perhaps 1,000 tons of TNT, with a blast radius of 1,600 ft. The al-Qaeda terrorist network has reportedly spent heavily on efforts to acquire portable nuclear devices from the former Soviet Union.

Besides North Korea, Iran and Iraq are suspected of having secret nuclear weapons programs, and may have the necessary materials for making them. If terrorists purchased or stole these ingredients, they might be able to do the same. According to the CDI, some 90 lbs. of enriched uranium and plutonium suitable for weapons have been stolen from nuclear facilities in the former Soviet Union since its 1991 collapse; most of the material was recovered, but not all.

Alternatively, terrorists might opt to build a small, primitive weapon from lower-grade ingredients. According to a 2002 report issued by the Oxford Research Group, a British think tank, terrorists could "relatively easily" make a modest nuclear explosive by obtaining reactor-grade plutonium from MOX, a mixture of plutonium oxide and uranium oxide used for reactor fuel in some countries. According to the report's author, the chemistry involved in separating out the plutonium "is less sophisticated than that required for the illicit preparation of designer drugs." Such a device would be far weaker than the bombs dropped on Japan. But the blast, heat, and radiation even from a bomb equivalent to 100 tons of TNT could wreak havoc, especially in urban areas. The spread of radioactive particles would depend on meteorological conditions and on the height at which the explosion occurred, but the report's author estimated the lethal area for radiation emitted in the first minute after the blast at about ½ mile.

Radiation's Havoc in One City

A 1987 incident in Goiânia, Brazil, a city of close to 1 million people at the time, gives an idea of how even unintentional exposure to medical-grade radioactive material can wreak havoc. An abandoned radiation therapy machine containing powdered radioactive cesium-137 was found by scavengers looking for scrap metal. The cesium capsule was cut open, and the "pretty" powder ended up being distributed about the city. Some 250 people experienced significant contamination, over 2 dozen had radiation burns, and 4 eventually died. Over 100,000 were subjected to monitoring. The cleanup operation produced 125,000 drums and 1,470 boxes of contaminated clothing, furniture, dirt, and other materials; about 85 houses were destroyed.

Radiation Terrorism

An easier alternative to obtaining or building a nuclear bomb of some kind is so-called radiation terrorism. In the eyes of many experts this is a more likely path for terrorists. It covers a range of options that fall short of bringing about "mass destruction" but can release enough radiation to induce panic. A piece of highly radioactive material can be transformed into a weapon of terror by merely leaving it in a public place. Terrorists could generate mass fear by hijacking a truck full of radioactive waste and using it to, say, contaminate a public water supply. Or they could seek to release significant amounts of radiation by sabotaging a nuclear power plant or by exploding a so-called radiological, or radiation, dispersal device, or "dirty bomb." This is an ordinary explosive device to which radioactive material (e.g., nuclear reactor wastes or radioactive substances from industrial or medical equipment) has been added. The blast spreads the radioactive particles, which may then be inhaled or ingested, and can remain a lingering source of contamination. While a dirty bomb's toll in death and destruction would probably be small (compared to a true nuclear device), it could create a powerful psychological shock and bring long-term economic and social disruption—the affected area would likely need to be evacuated and decontaminated even if the immediate health risks were judged to be only moderate. Material suitable for radiation terrorism is relatively common. Radioactive waste from nuclear reactors, for example, could be used; it is found around the world and tends to be less well guarded than nuclear weapons. Another potential source is industrial and medical equipment using certain radioactive substances.

The first known instance of radiation terrorism occurred in 1995, when rebels from the separatist Russian region of Chechnya buried a dirty bomb in Izmailovo Park in downtown Moscow. The device, reportedly consisting of dynamite plus cesium-137, was not detonated, and was removed by Russian authorities after the Chechens announced its presence. The cesium was believed to have been stolen from an industrial facility in the Urals.

Al-Qaeda has reportedly worked on development of a dirty bomb. Abu Zubaydah, who was al-Qaeda's operations chief until captured in Pakistan in Mar. 2002, reportedly told U.S. investigators that the organization had the ability to make a dirty bomb and also get it into the U.S. Officials were skeptical, however.

Radiation and Its Effects

There are various kinds of radiation, harmful or not, whether in the form of electromagnetic waves, like X rays or gamma rays, or in the form of particles, such as in cosmic rays. Light, for example, is a form of electromagnetic radiation that does not, so far as is known, harm living tissue, except in very high doses. A nuclear bomb blast generates a super-sized dose of light, but it also produces ionizing radiation, which can damage living tissue even at lower doses. Such radiation has sufficiently high energy to affect atoms that it hits, causing neutral atoms to gain or lose electrons and thereby become "ions." Ionizing radiation is also produced by the radioactive materials used in terrorism.

What to Do in a Radiation Emergency

In the event of a radiation emergency, the U.S. Centers for Disease Control and Prevention (CDC) recommends that you find shelter in a stable building and check your radio or TV for emergency-alert information. If you live near a nuclear power plant, you should have a copy of its emergency plan, avaliable from the plant. Every household should also have its own emergency plan.

Officials may advise you to "shelter in place," in which case you should avoid opening doors and windows, close fireplace dampers, and turn off fans, air conditioners, and heating units that draw in outside air; it's generally safer in an inner room or basement. If possible, change your clothes, sealing the potentially contaminated clothes in a plastic bag. Showering or washing yourself will reduce any radioactive particles on the skin. It's a good idea to always keep an emergency kit on hand, with items such as flashlight, portable radio, extra batteries, bottled water, canned and packaged food, hand-operated can opener, first-aid kit, and needed prescription drugs and personal items. If told to evacuate to another location, it is useful to bring such items, plus cash and credit cards. You may have to leave pets behind, since they are often not allowed in emergency shelters.

Some common forms of ionizing radiation—including alpha particles and, to a lesser extent, beta particles—can generally be readily blocked. Alpha particles are relatively large particles, the nuclei of helium atoms, and travel short distances; they can be stopped by a piece of paper. They ordinarily present a danger only if their source is within the body, as a result, say, of inhalation or ingestion. The much smaller and lighter beta particles, which are electrons, usually won't penetrate more than a few inches into the body and can be blocked by thin layers of metal or plastic. They can cause a type of skin injury that doctors sometimes call a "beta burn," and present a danger inside the body. Other kinds of ionizing radiation—such as high-energy neutrons and gamma rays—have much greater penetrating power.

Highly penetrating neutrons and gamma rays typically make up the radiation released immediately by a nuclear explosion; the relatively large neutrons account for the bulk of the tissue damage wrought. Also associated with a nuclear blast, however, is residual radiation released by the radioactive decay of atoms in the fallout. This longer-term radiation threat is also found in the weapons used in radiation terrorism. Generally speaking, it includes alpha and beta particles, along with, to some degree, neutrons and gamma rays. The precise nature of the radiation emitted, and the length of time the hazard lingers, depends on the radioactive substances involved. Some have a half-life (that is, time needed for half of a given amount of the substance to spontaneously decay) measured in seconds or minutes. Others pose a longer-term danger. The half-life of iodine-131, for example, is 8 days, that of cesium-137 about 30 years.

The damage to cells varies greatly, depending on such factors as the kind of radiation, the dose, and the rate at which the dose is delivered, as well as the cells' sensitivity to the radiation and their ability to recover from radiation-caused injury. The average person experiences in daily life a small amount of "background" ionizing radiation, and many experts believe that exposure to up to 20 times the annual background dose is usually harmless. But exposure to up to 1,000 times the background amount can lead to nausea, vomiting, hair loss, immune system impairment, and blood disease. Generally, if the whole body experiences a rapid, heavy radiation dose, death may follow in hours or days. Less extreme exposure may lead to impairment of organs or body functions, gangrene, birth defects, or cancer.

Countermeasures

Experts point to several ways of reducing the risk of nuclear terrorism. One, of course, is to upgrade the intelligence collected on terrorist groups. Also important is spotting terrorist nuclear devices or materials that are in transit. In the wake of Sept. 11, U.S. authorities began building a network of detectors at key transportation locations, among them airports, seaports, and border crossings. The federal government also stepped up research to improve devices and procedures for detecting nuclear materials, including those whose radiation may be masked by shielding. Sept. 11 also prompted some countries, including U.S. and U.K., to expand their stocks of the drug potassium iodide, which can help prevent thyroid cancer if taken immediately prior to, or right after, exposure.

Also helpful are tighter controls on nuclear weapon, nuclear materials used for other purposes, and nuclear waste. The U.S. government after Sept. 11 pushed for tightened security at private nuclear power plants. However, a Sept. 2002 report by the Project on Government Oversight (POGO), a Washington, DC-based watchdog group, found that security forces at many nuclear power plants were inadequately equipped and trained, and suffered from low morale and overwork. A proposed bipartisan Nuclear Security Act would mandate measures to upgrade power plant security such as introducing new hiring and training standards for security staff, assigning a federal security coordinator to each plant, and authorizing plant security officers to use deadly force.

At the G8 summit of major powers in June 2002, Western leaders agreed to contribute $20 billion over the next decade, including $10 billion from the U.S., to projects aimed at countering "the spread of weapons and materials of mass destruction." Nuclear weapons and materials in Russia were a major focus of this initiative, which included "dismantlement of decommissioned nuclear submarines, the disposition of fissile materials, and the employment of former weapons scientists"—this last point reflected concern that highly skilled but now jobless engineers and scientists might accept work from terrorists. Outside Russia, highly enriched uranium can be found at well over 300 research reactors in nearly 60 countries, in some cases under very lax security.

Further Information

For more information on radiation and its effects, visit the Univ. of Michigan's Radiation and Health Physics Page, www.umich.edu/~radinfo, as well as websites of the Health Physics Society, www.hps.org/publicinformation/ate; National Center for Environmental Health at the CDC, www.cdc.gov/nceh/radiation; National Council on Radiation Protection and Measurements, www.ncrp.com; and the U.S. Environmental Protection Agency, www.epa.gov/radiation/understand

In Aug. 2002 hundreds of Yugoslav scientists, technicians, and officials, with the aid of U.S., Russian, and International Atomic Energy Agency (IAEA) specialists and under the watchful protection of Yugoslav Army helicopters and troops, removed nearly 100 lb of weapons-grade uranium—enough for 2 or 3 bombs—from a decrepit research institute in Belgrade. This was the first of what many hoped would be a series of multinational operations to secure such materials.

A June 2002 report by the IAEA noted that security problems extend far beyond the relatively few facilities with plutonium or enriched uranium. Many governmental, educational, and industrial facilities around the world have other radioactive materials that could be used in a dirty bomb. According to the report, over 100 countries lack adequate controls to prevent, or detect the theft of, these materials. Since 1996, U.S. companies have lost track of some 1,500 radioactive sources, according to the U.S. Nuclear Regulatory Commission. Contentious talks under UN auspices have been under way since the late 1990s on an international Draft Convention on Nuclear Terrorism. Such a pact, if agreed upon, could help standardize and streamline procedures for suppressing nuclear terrorism.

The Threat from Biological and Chemical Weapons

By Richard Hantula

Richard Hantula is a freelance editor and writer who frequently covers scientific and technical topics.

The terrorist attacks of Sept. 11, 2001, and the subsequent discovery of letters laced with anthrax, heightened concerns about the possibility of terrorist or state-sponsored attacks using biological or chemical agents.

A variety of microorganisms and chemicals, many of them extremely difficult to detect, could be employed for that purpose. Some, such as the virus that causes the highly contagious disease smallpox, could be considered weapons of mass destruction because of their power to kill thousands, even millions. Experts estimate that if terrorists could infect 100,000 individuals with highly contagious smallpox, as many as 30 million deaths could ensue within 4 months.

Most harmful biological and chemical agents don't match smallpox in their capacity to cause widespread illness and death, but many may still suit the needs of terrorists who aim to weaken their enemy by generating panic among its population or sabotaging its economy. Not long after the Sept. 11 attacks, a few individuals in the media, Congress, and elsewhere received envelopes containing spores of the bacterium that causes anthrax, sent by an unknown person or group. Fewer than 2 dozen confirmed or suspected cases resulted, and 5 people died. Nonetheless, the anthrax cases precipitated widespread social disruption. Public health agencies were inundated with samples of spore-like powder and with worried people describing suspicious symptoms. Buildings were closed for decontamination, and the U.S. Postal Service irradiated mail sent to some government offices. Stores saw a run on gas masks, and the demand for antibiotics used in treating anthrax threatened to exhaust the supply in some areas. People were afraid.

Historical Perspective

Rudimentary biological and chemical weapons were used in antiquity. In the 5th century B.C., the Scythians dipped the heads of their arrows with blood from decaying corpses, and toxic fumes were put to military use in Greece's Peloponnesian War. In the mid-14th century A.D., besieging Mongols tossed plague-ridden corpses over the walls of the Crimean city of Kaffa. During the French and Indian Wars of the 18th century, the British may have given hostile Indians blankets in which smallpox victims had been wrapped. But not until the 20th century did large-scale research into and production of biological and chemical weapons get under way. Poison gases such as tear gas, chlorine, the lung irritant phosgene, and the blistering agent known as mustard gas were first used in World War I. Also during that war, Germany used anthrax and the horse disease glanders to infect sheep, horses, and mules intended for use by the Allies. The 1930s saw the use of biological weapons by Japan in China and the development of the nerve gases tabun and sarin by Germany. Several other countries mounted substantial biological and chemical weapon programs beginning in World War II, among them Britain, the Soviet Union, and the U.S.

An international convention banning biological weapons came into force in the mid-1970s, followed some 2 decades later by a pact banning chemical weapons. The chemical weapons treaty included a mechanism for verifying compliance. The biological pact, however, did not, and the Soviet Union (and perhaps some other signatories) continued secret production of bioweapons, manufacturing, for instance, enormous quantities of weaponized anthrax and smallpox.

Potential Biological Weapons

- **Anthrax.** The bacterium *Bacillus anthracis* causes anthrax, which normally afflicts grazing animals, such as sheep or cows. It enters the body through skin wounds or abrasions, or by inhalation or ingestion. Natural human cases occur relatively rarely. After an incubation period of several days or longer, the **inhalational** form of the disease attacks quickly, typically leading to overwhelming infection and often respiratory failure, if antibiotic treatment is not provided in time. So-called **cutaneous anthrax** is less likely to be fatal if untreated.

  For maximum casualties, the most effective way to distribute anthrax spores in a biological attack would probably be as an aerosol spray. The spores, which are extremely durable and can survive harsh conditions, could cover a great distance. A 1993 estimate by the U.S. Congress's Office of Technology Assessment put the number of potential deaths resulting from the release of 100 kg (220 lb) of spores at 130,000 to 3 million. After the accidental release of aerosolized anthrax spores in 1979 at a military biology facility in Sverdlovsk (now Yekaterinburg), Russia, as many as 250 cases may have occurred, of which some 100 were fatal.

  As of late 2002, anthrax vaccine existed only in limited quantities in the U.S. and was not available to the public. In Oct., the U.S. Dept. of Health and Human Services said it had contracted with 2 companies to produce 25 million doses of an improved vaccine.
- **Botulism.** Botulism is a rare but serious paralytic illness resulting from a toxin produced by the bacterium *Clostridium botulinum*. Classic symptoms include double or blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. If untreated, the illness may progress to paralysis of the arms, legs, trunk, and respiratory muscles. In severe cases a person may need to be kept on a breathing machine (ventilator) for weeks. With botulism spread via an aerosol, symptoms would typically appear 12 to 72 hours after exposure. If diagnosed early, botulism can be treated with an antitoxin.
- **Plague.** The Black Death, which killed about 25 million people in Europe in the mid-14th century, was a form of plague. It comes from the bacterium *Yersinia pestis*, usually transmitted by fleas that fed on bacteria-infected rodents. Symptoms, generally appearing in 2 to 10 days, include high fever, malaise, headaches, and extremely tender, swollen lymph nodes. Treatment with antibiotics should begin within 24 hours of the first symptoms. Otherwise, respiratory failure, shock, and death may follow.
- **Smallpox.** Smallpox, caused by the virus variola, gets its name from the characteristic blisters it causes. It can spread through the air. The incubation period is about 12 days. Within 2 weeks of developing the first symptom, a red rash, about 30% of victims die. Although there are no known treatments, a prototype for an effective vaccine was developed in 1798. Vaccination programs from 1967 to 1980 eradicated the disease worldwide, leading to the dismantling of production facilities for vaccines. Virus samples were to be kept in 2 laboratories, one in the U.S. and one in Russia. Some nations or groups, however, may have preserved secret supplies, perhaps in weaponized form. If an outbreak occurred, it would be hard to contain.

  Few Americans born after 1973 have been vaccinated, and since experts are unsure how long smallpox inoculation remains effective, people vaccinated years ago may be vulnerable again. The U.S. has or will soon have enough vaccine to vaccinate every American. As of Oct. 2002 the White House was considering offering the vaccine to the public; however, mass vaccinations would entail some risk: research from the 1960s suggested that a proportion of those vaccinated, 1 out of every 150,000, would develop serious complications, and 1 or 2 in a million would die.
- **Tularemia.** The bacterium *Francisella tularensis*, which causes tularemia, is one of the most infectious known. In nature, tularemia affects primarily animals, and human-to-human transmission has not been documented. Aerosol dissemination in a populated area would be expected to result in many cases of acute, nonspecific feverish illness in a few days (normal incubation range, 1-14 days), with inflammation of the lung sacs often developing. Without antibiotic treatment, the disease could progress to respiratory failure, shock, and, or in 30% or more of inhalational cases, death.
- **Viral hemorrhagic fever (VHF).** This is actually a group of illnesses, some of them life threatening, caused by several distinct families of viruses. Some, such as Ebola and Marburg, can spread from one person to another. Initial symptoms often include marked fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion. Severe cases commonly show signs of bleeding under the skin, in internal organs, or from body orifices. There is no cure. Vaccines exist only for yellow fever and Argentine hemorrhagic fever. Depending on the strain of virus, up to 90% of Ebola cases lead to death within a week.

According to the Center for Nonproliferation Studies at the Monterey (CA) Institute of International Studies, by the end of the century up to 20 countries were developing a chemical weapons capability, and more than a dozen were conducting bioweapon programs. Countries currently belonging to neither weapons pact include Egypt, Israel, and Syria.

Iraq acceded to the biological convention after its 1991 defeat in the Persian Gulf War but did not agree to a chemical weapons pact. In the mid-1980s Iraq reportedly did use chemical weapons—mustard and nerve agents—to suppress its Kurdish population and also in war against Iran. Following the Gulf War, UN arms inspectors worked in Iraq until 1998, by which time it had been established that among the weapons in Iraq's arsenal were a number of bioweapons, including anthrax, botulinum toxin, ricin, aflatoxin, wheat cover smut, and the potent nerve agent VX. Some experts suspect Iraq may currently have a stockpile of smallpox, perhaps developed from a natural outbreak there in 1971-72.

Military and Terrorist Use

By and large biological and chemical weapons were used only sporadically in the 20th century. A 1925 League of Nations curb may have helped limit their use, as well as a fear of enemy retaliation in kind, and practical problems, such as the unpredictability of winds, which makes weapons disseminated in the form of an aerosol, or tiny airborne particles, difficult to control. Bioweapons also do not usually produce instant results. An incubation period must pass before an infected person begins to show symptoms.

While such disadvantages constitute an obstacle for the military, they may not bother terrorists. A group with access to the necessary skills and/or money may undertake to construct biological or chemical weapons on its own. That's what the cult Aum Shinrikyo did near the end of the 20th century in Japan. More recently, documents found in Afghanistan indicated that the al-Qaeda terrorist network has carried on research toward developing biological and chemical weapons. It takes considerable expertise, however, to produce some of the more devastating weapons (as well as to store and distribute them effectively). Terrorists may be able to obtain efficient biological or chemical weapons in simpler ways—by theft, purchase, or gift, from the arsenals of rogue states such as Iraq or from inadequately guarded stocks remaining after the 1991 dissolution of the Soviet Union.

Biological Agents

Many infectious organisms could be made into bioweapons, but certain agents are of particular concern because they are especially deadly, can be distributed or transmitted relatively easily, and could create severe social disruption. The U.S. Centers for Disease Control and Prevention (CDC) classifies several as such "Category A" threats (*see box*, page 9).

Chemical Agents

Certain deadly industrial chemicals are amenable to widespread dissemination through the air. In 1984 the accidental release of methyl isocyanate gas from a Union Carbide pesticide plant in Bhopal, India, resulted in some 14,000 deaths. According to a 2001 study by the U.S. Army surgeon general, a terrorist attack on a chemical plant that unleashed deadly gas over a heavily populated urban area could cause up to 2.4 million deaths and injuries. A less devastating but perhaps easier option for terrorists is to employ common poisonous substances, like pesticides or mercury, as weapons. More sophisticated agents that can be used include those shown in the *box* below.

Defensive Measures

Preventive vaccines exist for some diseases that can be used as bioweapons. But the only defense against most chemical weapons is protective clothing and masks that can prevent exposure. Experts do not recommend, however, that most individuals buy a simple gas mask to keep on hand as a precaution. A gas mask has to be airtight, and so should fit its wearer precisely. Special training is needed in order to use it properly. Furthermore, there is almost no way of knowing in advance when you might be exposed.

Detection of a bioattack in time to avert casualties is a major concern. If authorities have to wait until an unusual wave of symptoms appears, and until they analyze the cases correctly, it may be too late to take effective countermeasures.

Among measures recently taken to upgrade U.S. capability to discover the existence of an attack, the CDC has set up a Rapid Response and Advanced Technology Laboratory for quick identification of naturally occurring biological agents (such as anthrax) ordinarily seldom seen in the U.S. In Oct. 2002 the CDC announced the funding of a pilot early-warning system to continually scan existing managed-care networks for suspicious disease clusters. Researchers are exploring expanded use of environmental monitors, such as the electronic noses used to detect chemicals like explosives. Creating a sensing system that can distinguish between ordinary dust and smoke, harmless microorganisms, and dangerous pathogens is, however, an extremely tough job, and the difficulty is compounded if the sensor has to work quickly.

For further information, visit the website for U.S. Centers for Disease Control, www.bt.cdc.gov; the Center for Nonproliferation Studies at the Monterey Institute of International Studies, cns.miis.edu/research/cbw; Henry L. Stimson Center, www.stimson.org/cbw; and MEDLINEplus at the U.S. National Library of Medicine, www.nlm.nih.gov/medlineplus/biologicalandchemicalweapons.html

Chemical Agents

- **Blood Agents.** These interfere with the absorption of oxygen into the bloodstream. The chemicals, which include hydrogen cyanide and cyanogen chloride, can be stored as a liquid in shells, converting to a thick gas upon detonation. In high concentrations, cyanide inhalation kills quickly, within minutes after exposure. Antidotes, which must be intravenously administered immediately after exposure, are highly effective. Because the chemicals used in blood agents are highly volatile and are lethal only in large doses, their military usefulness is considered limited.
- **Nerve Agents.** Sarin, tabun, soman, GF, VX and related nerve agents are among the most toxic of all known chemicals. When they touch the skin or are inhaled, nerve agents can cause death within minutes. The chemicals disable enzymes needed for the transmission of nerve impulses. Initial symptoms may include runny nose, watery eyes, drooling, excessive sweating, tightness of the chest, and difficulty in breathing. Strong doses may lead to the loss of consciousness, convulsions, and death within 10 minutes.

  Although antidotes exist, the extremely rapid action of nerve agents often demands immediate treatment. As a result, most U.S. soldiers facing possible chemical attack carry the necessary drugs with them. Aum Shinrikyo used sarin in a 1994 terrorist attack in Matsumoto that killed 7 people and a 1995 attack on the Tokyo subway system that left 12 dead and thousands injured. The low casualty figures were presumably due to the fact that the group lacked expertise.
- **Pulmonary (Choking) Agents.** Choking agents, such as phosgene and chlorine, are dispersed when a liquid-filled shell explodes, creating a cloud of gas. When the gas is inhaled, the lungs become filled with liquid, making breathing increasingly difficult. Victims often choke to death or die from a respiratory infection.

  Depending on which chemical agent is used, lethal effects can be felt anywhere from 10 minutes to 24 hours after exposure. There are no treatments or cures for choking agents.
- **Vesicant (Blister) Agents.** Mustard, the best-known vesicant weapon, has been considered a major military threat since its widespread use in gas form during World War I. It is easily deliverable by rockets, bombs, and artillery shells, and makes the affected territory temporarily unusable by the enemy.

  In both liquid and gas forms, mustard causes burning blisters on the skin, eyes, and lungs within 2 to 24 hours after exposure. Respiratory failure, pneumonia, and immune system failure may result from high doses. Mustard is less deadly than nerve agents but can cause permanent injury and may lead to cancer and birth defects.

  Other vesicants, such as lewisite, have similar effects and act more rapidly. Although no specific antidote for vesicants exists, the effects of the attack can often be lessened through the application of ointments and antibiotics on the blisters, or by rinsing exposed flesh with water.

SPECIAL SECTION: FOCUS ON THE ELDERLY

Older Americans: Living Longer, Living Better

By Donna E. Shalala

Dr. Donna E. Shalala is president of the University of Miami. As secretary of Health and Human Services for a record-setting eight years, she oversaw programs including Medicare, Social Security, Medicaid and the National Institutes of Health.

We have transformed what it means to grow old in America. My own mother, a 91-year-old lawyer, vividly illustrates this transformation. She has an active law practice. She played on the senior amateur tennis circuit until just a few years ago. She participates in classes and trips sponsored by the Institute for Retired Professionals.

In the past, aging was often feared as a steep descent into a nightmare of disability, depression, and isolation. Today—though seniors still face challenges—we know that this nightmare is far from reality. The fact is: older Americans are now living not only longer but also *better*.

"Active Aging"

The lives of the elderly have changed partly because more people are adopting the idea of "active aging."Active aging means encouraging—and supporting—seniors to remain involved and engaged. Now the seniors of my mother's generation, and the legions to come as the baby boomers age, will continue to make major contributions to our society:

They will work full time in every field.

They will start businesses and second careers.

They will raise children and grandchildren.

They will volunteer in our communities.

In short, they will enrich the lives of all Americans.

Active aging means preserving curiosity and contributing even more to the world. It is a time to celebrate the wisdom and the peace of a life well lived—and a life worth living.

Just ask the seniors' grandchildren, and their great-grandchildren. When I was secretary of Health and Human Services, I received a collection of essays written by second-graders at Meadow Lane Elementary School outside Kansas City, explaining what it means to grow old:

"When people get old they get wrinkles on their face ... but their brain gets smarter," wrote Justin Pannullo.

"Older people like to fish and they go to church," wrote Matt Sherman.

Tyler Willis said, "My grandma runs a lot and has a man."

And Cole Julo summed it up: "Growing old means you don't have to brush your teeth anymore. You just take them out at night."

Government's Role

By the middle of this century, the United Nations estimates, 1 in 5 people in the world will be 60 or older, and more than 2 million people will be 100 or older. The world's fastest-growing age group, by percent, is 80 and older.

With the transformation of what it means to be elderly in the U.S. has come an evolving role for government. Medicare, which provides health insurance to virtually all older Americans, and Social Security are pillars of the American dream. These landmark initiatives say to all Americans: Work hard and play by the rules, and this country will provide you with security when you retire.

Like Social Security, Medicare is a "social insurance" program: it offers health care protection to all eligible elderly and disabled people no matter what their income or medical history. People contribute to Medicare while working so they will have health insurance when they retire.

In providing security for older Americans, Medicare and Social Security also benefit their children. Without this help from the government, middle-class Americans might exhaust their savings—and dreams—paying for the medical care of older family members. They might not be able to send their children to college or buy their own homes.

Max Frankel, a reporter for the *New York Times* who later became the newspaper's executive editor, was present in Independence, MO, when Pres. Lyndon Johnson signed the Medicare legislation in 1965. Johnson went to Independence so he could hand Harry Truman, who had long fought for national health insurance for the elderly, and his wife, Bess, the first two Medicare cards. As the ceremony ended, Frankel said to the president, "My mother thanks you."

"No," Johnson replied, "it is *you* who should be thanking me."

Indeed, Medicare has emancipated children as it cares for their parents. But Johnson meant more. He saw that Medicare is a living program, one whose promise will be just as important for each succeeding generation of Americans.

Needs to be Met

More must be done. Essentially, we must create a seamless system of supports for America's aging population. These supports must reach across retirement systems to health care systems to care-giving systems to our national infrastructures—from our highways to our sidewalks—to help seniors live longer and live better. These supports must include technological advances that promote greater independence and provide greater dignity for older Americans.

The enormous increases in the elderly population mean all our programs, including Medicare, must continue to be reinvented. The 1 in 10 Medicare beneficiaries over age 85 belong to a group with high levels of chronic illnesses and conditions requiring medical care. Dr. Carl Eisdorfer, chairman of Psychiatry at the University of Miami and an internationally known expert on aging, has come up with a formula he calls Eisdorfer's Rule: For every five years of life after 65, we see a doubling of medical morbidity. A 10-year increase in life expectation means a four-fold increase in medical problems. So it is of no small significance that the number of Medicare beneficiaries 85 and older is predicted to more than double by the year 2030.

While we have made huge gains in providing security for older Americans, it is a national tragedy that significant numbers of them still do not get enough to eat. Elderly women on their own are particularly vulnerable to poverty. We need a national strategy for long-term care that guarantees a safe, dignified quality of life for our oldest citizens.

Depression is a widespread, and widely undiagnosed, problem in the elderly. The symptoms—isolation, loneliness, pain—are too often thought to be an unavoidable part of growing old. This failure to diagnose and treat depression has formidable consequences: People 65 and older have the highest suicide rates of any age group. Those over 85 have a rate nearly double the overall national rate. We must raise the index of suspicion that part of an elderly patient's problem may be mental health, and follow up with appropriate treatment.

The elderly themselves are not the only ones affected by the physical and emotional ravages of aging. Their caregivers, most often untrained family members, face overwhelming psychological and physical challenges. Dr. Eisdorfer found in research on caregivers of Alzheimer's patients, for example, that clinical depression affects about 60% of all wives and daughters, 33% of husbands, and 28% of sons.

In the face of this suffering, there is ample reason for hope. We are on the verge of discovering the causes and cures of many of the most intractable diseases. Biomedical research is bringing us ever closer to figuring out how to protect against neurodegeneration, how to predict disease risk, how to repair and replace human tissue.

Government programs must keep pace with the promise of medicine, with ever-accelerating technological and scientific breakthroughs, so that all Americans have access to the most sophisticated care.

A Moral Test

As Vice Pres. Hubert H. Humphrey said at the 1977 dedication of the Health and Human Services headquarters building that bears his name: "The moral test of a government is how that government treats those who are in the dawn of life—the children; the twilight of life—the elderly; and the shadows of life—the sick, the needy, and the handicapped."

Through Medicare and Social Security, this nation continues to pass Humphrey's moral test. Our enduring commitment to that challenge means the seniors of today—and for generations to come—will continue to chart new territories and explore for all of us how to live a long and fulfilled life.

The Wonderful World of Longevity

By Robert N. Butler, M.D.

Dr. Robert N. Butler, 75, a noted gerontologist, is the president and CEO of the International Longevity Center and was director of the National Institute on Aging at the U.S. National Institutes of Health (NIH) from 1976 to 1982. He received a Pulitzer Prize in 1976 for his book Why Survive? Being Old in America.

The world has experienced three waves of increasing longevity, and in the 21st century we are likely to experience a fourth. The first occurred between 2.5 million and 100,000 years ago, when evidence suggests a doubling of the length of life as hominids evolved to *Homo sapiens*.

The second wave happened 12,000 years ago, during the Neolithic period, when animal husbandry and agriculture became established. Humankind no longer had to survive as hunter-gatherers. But greater density of settlements brought closer contact with animals and insects, and therefore with diseases; life expectancy may have been about 20 years.

Beginning in the 18th century, the Industrial Revolution resulted in major increases in longevity. For example, in 1776 in the U.S., average life expectancy was 35. In 1900, it was 47. Today it is 77. So, in the U.S., we have gained 40 years of life expectancy since the American Revolution and 30 years since the beginning of the 20th century. The last increase exceeds what had been attained during the whole preceding 5,000 years of human history! This revolution in longevity is occurring throughout the world.

In the 21st century, following effective biomedical research, we're likely to experience a fourth wave of longevity gains. There are new possibilities for retarding the process of aging. Finding biological methods to commit embryonic stem cells to specific tissue and organ destinations will give birth to regenerative medicine. Less likely—but possible, and even more exciting—would be the discovery and usability of genes that determine the length of life of our species.

We're living better as well as longer. Deaths from cardiovascular disease and stroke dropped 60% between 1950 and 2000 in the U.S., and disability rates have also declined significantly

We need to prepare individuals and society for population aging and longevity and to do so in *positive and productive ways*. Three big tasks lie ahead: to improve and maintain the expectation of a continuing healthy life into great old age, to extend the productive work life, and, of course, to contribute to the adaptation of the changing family. We may soon have large numbers of four- to five-generation families.

At the same time as we address the issues of public pension and health care costs, we must also look to the worlds of work and health. We must look more broadly at the implications of the great social upheaval likely to parallel and follow the revolution of longevity. It is instructive to think back to 1900 when the normal workweek was 60 hours and the average life expectancy was 47. Now we have a 40-hour workweek, or less, and average life expectancy is 77. We must conclude that individuals and society are not fully prepared for this longevity.

For one thing, we haven't yet successfully facilitated new careers for older workers. And we have yet to establish affordable, community-based long-term care, at least in the United States. (The Netherlands, Germany, and Japan are making rapid advances in this area.)

The United States and other countries lack geriatric specialization. Only 4 of the over 100 American medical schools have departments of geriatrics. We have a long way to go, too, in developing "magic bullets" that cure specific diseases without untoward side effects.

Who Is Responsible?

Who is responsible for old age? The family, government, civil society, and business all have a role. For example, the National Institute on Aging has helped us confront Alzheimer's disease, as well as other debilitating conditions. National and international associations concerned with Alzheimer's disease have grown, and pharmaceutical company laboratories are focusing on this devastating disease.

But finally, it is the individual who must prepare. People need to plan for aging in a variety of ways. They need financial planning, intellectual stimulation, and a sense of purpose. Meaningful social interactions are especially important. One reason women live longer than men—by about 5 years in the U.S.—is that women tend to have more intimate social support systems than men. Social interaction also contributes to our maintaining intellectual function.

Happily the prescription for longevity also encompasses robust exercise for the brain: brain jogging. People need to remain intellectually active. This includes anything from enrollment in adult education classes and Elderhostel trips to crossword puzzles and bridge and book clubs, to the development of new interests and the acquisition of new skills.

Productive Aging

In some ways retirement has been a 20th century aberration. It was required when the majority of workers labored in mines, factories, and farms, and it continues to be humane and necessary for individuals who have reasons to stop working after a lifetime of drudgery. But for many of us, retirement must be marked by a new kind of *responsible aging*. It is unimaginable that public benefits can be maintained if people are in retirement for 2 to 3 decades. Through paid and unpaid work, people must continue to contribute to society. Since older workers are more expensive, employers need to be offered financial incentives.

The Dependency Ratio

Frequent references are made to the "dependency ratio"—that is, the rising numbers of older persons compared to people employed in the traditional workforce. It is suggested that the aging of the population forces the workforce to shoulder an unfair burden in paying for their care. However, the *total dependency ratio*, which counts in everyone under 18 as well as those over 65, offers more insight to the situation. And when we look at this ratio, the striking decline in birth rates in most developed nations comes into play.

In the U.S., for example, we end up with the same total dependency ratio for 2050 as existed in 1900. Moreover, while in the U.S. very few children under 18 are significant wage earners, a considerable number of people over 65 are economically able to take care of themselves. And the cost of raising a child to age 18 can be conservatively put at at least $200,000 (or, with college, at least $300,000), while the average cost of a nursing home is about $60,000 a year (with an average stay of 2-3 years).

Most important, dependency ratios matter less than *productivity per capita* in evaluating the economic health of the population. One example: at the turn of the century, 37% of the population worked in agriculture in the U.S. Today, that number is 2%, but we enjoy a more plentiful food supply.

The longevity in the 20th century has been extraordinary, accompanied by improved quality of life. In fact, economists David E. Bloom and David Canning contend (*Science*, February 2000) that *longevity has brought greater wealth to our world*. This runs counter to the worry that population aging will lead to economic stagnation. Improving health and longevity are associated with growing national wealth.

Conclusion

What will 2100 bring? Conceivably people will live for 120 years. (Most gerontologists believe the maximum life span is genetically determined to be 110-120 years.) Perhaps people will work a 30-hour workweek until they are 90, with many choosing to work at home. Perhaps a National Youth Community Service will delay entry into the workforce. Maybe many people will go on sabbaticals, as is already true in Australia and Norway.

This is the first time in human history that the prospect of living a long, healthy, and productive life has become reality for the majority of people in most parts of the world. What was once the special advantage of the few has become the destiny of many. And it is likely that this increase in longevity will continue. As important as is liberation by health, as powerful as is liberation by law, older people must be liberated, too, from stereotypes that limit their horizons. We are in the midst of the wonderful new world of longevity. It is in our power to make it a celebration.

THE ELDERLY: A STATISTICAL PORTRAIT

World Population

The number of people in the world aged 65 and over (65 +) is growing by 800,000 a month. As people around the world live longer and fertility rates decline in the developed nations and flatten in the developing world, the average age of the population is advancing. By 2050, the number of people aged 60 and over worldwide is expected to exceed the number under 15 for the first time in the history of the human race. The aging of the population is and will be especially pronounced in developed nations, especially in Western Europe.

Population 65 and Older: Selected Regions and Countries, 2002, 2030

Source: U.S. Bureau of the Census, International Data Base

	2002		2030	
	Total pop. 65 +	% 65+	Total pop. 65 +	% 65+
WORLD	440,616,212	7.1	967,425,774	11.9
Less dev. countries	264,772,222	5.3	686,169,082	9.9
More dev. countries	175,843,990	14.8	281,256,692	22.7
Continent or region				
Africa	26,766,824	3.2	61,549,369	4.5
Sub-Saharan Africa	20,398,304	2.9	43,212,702	3.7
Northern Africa	6,368,520	4.3	18,336,667	8.7
Near East	8,159,756	4.6	23,624,457	7.8
Asia (whole continent)	230,331,429	6.1	576,345,892	11.7
North America	48,407,730	9.8	104,111,706	16.4
Latin America and Caribbean	30,262,410	5.7	80,426,075	11.6
South America only	21,268,240	6.0	55,634,713	12.4
Europe	110,623,341	15.2	163,087,155	23.1
Western Europe	65,327,890	16.6	98,917,401	25.2
Eastern Europe	16,210,191	13.4	24,598,744	21.4
Baltics	1,080,216	14.6	1,413,781	20.9
Commonwealth of Independent States	32,810,336	11.6	47,662,371	16.2
Oceania	3,218,648	10.2	6,696,939	16.3
Most populous countries				
China	93,217,096	7.3	237,021,465	16.0
India	49,240,979	4.7	128,836,480	9.0
United States	35,302,936	12.6	70,319,071	20.0
Indonesia	11,118,407	4.8	34,136,543	10.9
Brazil	9,855,251	5.6	26,799,815	13.2
Russia	19,070,586	13.2	27,191,862	20.5
Pakistan	6,113,790	4.1	14,689,556	6.5
Bangladesh	4,514,130	3.4	13,207,711	7.2
Japan	22,896,026	18.0	33,049,579	28.3
Nigeria	3,676,803	2.8	8,138,686	3.7

Countries with Highest Proportion of People 65+, 2002

Source: U.S. Bureau of the Census, International Data Base

	Country	% 65+		Country	% 65+		Country	% 65+		Country	% 65+
1.	Monaco	22.4	4.	Greece	18.0	7.	Belgium	17.1	9.	Bulgaria	16.9
2.	Italy	18.6	5.	Spain	17.4	8.	Germany	17.0	10.	France	16.2
3.	Japan	18.0	6.	Sweden	17.3						

Note: In the U.S., 12.6% of the population was 65 or older.

Countries with Biggest Projected Increase in Elderly, 2000-2030

Source: Bureau of the Census, U.S. Dept. of Commerce

	Country	% 65+		Country	% 65+		Country	% 65+		Country	% 65+
1.	Singapore	372	6.	Indonesia	227	11.	Peru	197	16.	Chile	183
2.	Malaysia	277	7.	Mexico	216	12.	Thailand	196	17.	Sri Lanka	178
3.	Colombia	250	8.	South Korea	210	13.	Guatemala	193	18.	Turkey	177
4.	Costa Rica	240	9.	Egypt	207	14.	Morocco	193	19.	India	174
5.	Philippines	240	10.	Bangladesh	206	15.	Brazil	192	20.	Tunisia	171

Note: The projected increase was 102% for the U.S. and Israel, which put them in 28th place.

U.S. Population

In the U.S., there were 35 million people 65 or older, as of the 2000 census. This was a 12% increase over 1990. It is estimated that by 2040, the proportion of elderly will peak at 20.7% of the total U.S. population. Those age 85 and over are expected to make up 4.8% of the population by then.

While 14.1% of whites are 65 years or over, only 7.9% of African Americans fall into that group. The median age of whites (37.3) is significantly higher than that for blacks (29.5) or Hispanics (25.8).

In 2000, there were approximately 20.6 million women 65 or older, compared with 14.4 million men, or 70 men per 100 women. That ratio keeps dropping at higher-aged groups among the elderly.

Breakdown of Population 65+ by Age, 1990, 2000

Source: Bureau of the Census, U.S. Dept. of Commerce

	1990		2000		% of U.S. total		% change,
Age	Number	Percent	Number	Percent	1990	2000	1990 to 2000
65 years and over	**31,241,831**	**100.0**	**34,991,753**	**100.0**	**12.6**	**12.4**	**12.0**
65-74 years	18,106,558	58.0	18,390,986	52.6	7.3	6.5	1.6
65-69 years	10,111,735	32.4	9,533,545	27.2	4.1	3.4	-5.7
70-74 years	7,994,823	25.6	8,857,441	25.3	3.2	3.1	10.8
75-84 years	10,055,108	32.2	12,361,180	35.3	4.0	4.4	22.9
75-79 years	6,121,369	19.6	7,415,813	21.2	2.5	2.6	21.1
80-94 years	3,933,739	12.6	4,945,367	14.1	1.6	1.8	25.7
85-95 years	2,829,728	9.1	3,902,349	11.2	1.1	1.4	37.9
85 to 89 years	2,060,247	6.6	2,789,818	8.0	0.8	1.0	35.4
90-94 years	769,481	2.5	1,112,531	3.2	0.3	0.4	44.6
95 years and over	250,437	0.8	337,238	1.0	0.1	0.1	34.7

Number of Males per 100 Females, by Age, 2000

Source: Bureau of the Census, U.S. Dept. of Commerce

Age	Ratio	Age	Ratio	Age	Ratio	Age	Ratio
All Ages	96.3	Under 18	105.2	65+	70.0	75-84	65.2
Under 5	104.8	18-64	98.9	65-74	82.3	85+	40.7

States with the Highest Proportion of Elderly[1]

Source: Administration on Aging, U.S. Dept. of Health and Human Services; Bureau of the Census, U.S. Dept. of Commerce

	Total pop. 65+	% 65+		Total pop. 65+	% 65+		Total pop. 65+	% 65+
Florida	2,848,438	17.4	North Dakota	93,756	14.8	South Dakota	107,805	14.2
Pennsylvania	1,908,159	15.5	Maine	184,857	14.4	Arkansas	374,035	13.9
West Virginia	275,556	15.3	Rhode Island	152,289	14.4	Connecticut	470,472	13.7
Iowa	432,944	14.8						

(1) As of July 2001 (estimated).

U.S. Elderly Population by Age, 2000-2040

Source: Administration on Aging, U.S. Dept. of Health and Human Services; Bureau of the Census, U.S. Dept. of Commerce

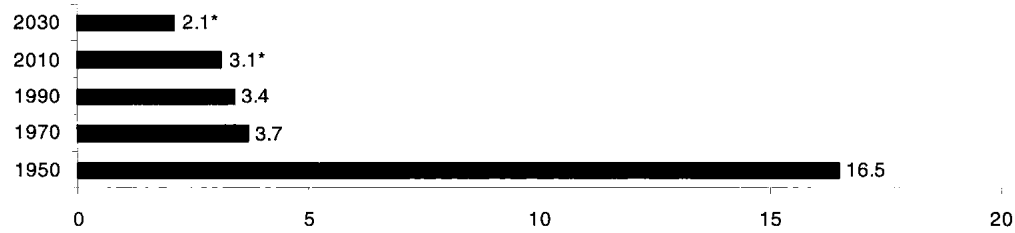
Census year	65-74 years Number in thousands	65-74 years % of total pop.	75-84 years Number in thousands	75-84 years %	85+ years Number in thousands	85+ years %	65 and over Number in thousands	65 and over %	Total, all ages
2000	18,391	6.5	12,361	4.4	4,240	1.5	34,992	12.4	281,422
2020	30,910	9.5	15,480	4.7	6,959	2.1	53,348	16.4	325,942
2040	33,968	9.1	29,206	7.9	13,840	3.7	77,014	20.7	371,505

Note: Data are July 1 projections and are Middle Series (middle fertility, mortality, and immigration assumptions).

Social Security Contributors vs. Beneficiaries, 1950-2030

Source: Social Security Administration.

The ratio of covered workers to those drawing Social Security benefits has decreased sharply since 1950, and is projected to decrease further in the 21st century. By 2030 there will only be 2 workers for every beneficiary. (Asterisks indicate projected values.)



U.S. Vital Statistics

The 65-year-old woman in the U.S., as of 2000, could expect to live another 19.2 years; a man the same age, 16.3 years. (For life expectancy at various ages, see Vital Statistics chapter.)

In 2000, there were 3.9 million multigenerational families in the U.S., defined as families where grandparents lived with 2 or more generations of descendants. However, many older Americans live alone. As of 2000, 39.6% of U.S. women 65 or older, but only 17.0% of men those ages, lived alone. For those 75 or older, the figure was 40.4% for women, 21.4% for men. As of 1999, 18.3% of Americans 85 or older lived in a nursing home. (The figure was 11.7% for men and 21.1% for women.)

Marital Status, U.S. Population 60+, 2000

Source: Bureau of the Census, U.S. Dept. of Commerce

(in thousands)

Marital status and sex	Total 60-85+ years NUMBER	%	60-64 years NUMBER	%	65-74 years NUMBER	%	75-84 years NUMBER	%	85+ years NUMBER	%
BOTH SEXES										
Married, spouse present	25,202	58.4	7,375	70.1	11,327	63.6	5,699	48.8	801	25.5
Married, spouse absent[1]	630	1.5	146	1.4	248	1.4	169	1.4	67	2.1
Widowed	11,518	26.7	1,034	9.8	3,722	20.9	4,704	40.3	2,058	65.5
Divorced	3,481	8.0	1,287	12.2	1,530	8.6	571	4.9	93	2.9
Separated	544	1.3	183	1.7	257	1.4	91	0.8	13	0.4
Never married	1,764	4.1	494	4.7	711	4.0	451	3.9	108	3.4
Male totals	18,918	100.0	5,032	100.0	8,049	100.0	4,796	100.0	1,041	100.0
Married, spouse present	13,980	73.9	3,896	77.4	6,170	76.7	3,367	70.2	547	52.6
Married, spouse absent[1]	269	1.4	73	1.4	100	1.2	71	1.5	25	2.4
Widowed	2,165	11.4	171	3.4	667	8.3	936	19.5	391	37.5
Divorced	1,398	7.4	549	10.9	624	7.8	195	4.1	30	2.8
Separated	249	1.3	78	1.6	139	1.7	25	0.5	7	0.7
Never married	855	4.5	265	5.3	348	4.3	201	4.2	41	3.9
Female totals	24,222	100.0	5,487	100.0	9,747	100.0	6,889	100.0	2,099	100.0
Married, spouse present	11,221	46.3	3,479	63.4	5,156	52.9	2,332	33.9	254	12.1
Married, spouse absent[1]	362	1.5	74	1.3	148	1.5	98	1.4	42	2.0
Widowed	9,353	38.6	863	15.7	3,055	31.3	3,768	54.7	1,667	79.4
Divorced	2,082	8.6	738	13.5	906	9.3	375	5.4	63	3.0
Separated	295	1.2	105	1.9	119	1.2	66	1.0	5	0.3
Never married	909	3.8	229	4.2	363	3.7	250	3.6	67	3.2

(1) Excludes separated.

Education

Nearly 36% of all people in the U.S. age 65 and over graduated from high school and did not pursue further education, compared with 33% of all those 25 and over. Another 18% of the elderly had attended some college or received an associate degree (compared with 25% of all those age 25 and over), 10% received a bachelor's degree (compared with 17% of all those age 25 and over), and 6% received an advanced degree (compared with 9% of all those age 25 and over); about 31% did not graduate from high school.

Some elderly people in the U.S. are continuing their education, with about 80,000 Americans age 60 and over taking courses of some kind, according to Census Bureau figures from 2000.

Labor Force

Despite being of what many consider "retirement age," 13.1% of people in the U.S. age 65 and over are in the work force and 12.7% are employed. Older men (17.2%) are more likely to be employed than older women (9.4%).

Employment Status of U.S. Civilians by Age and Sex, 2001

Source: Bureau of Labor Statistics, U.S. Dept. of Labor; average for the year; remainder of population not in work force.

Age TOTAL	% Working	% Unemployed	Age Men	% Working	% Unemployed	Age Women	% Working	% Unemployed
16+	63.8	4.8	16+	70.8	4.8	16+	57.3	4.7
55-59	67.0	3.0	55-59	74.8	3.2	55-59	59.9	2.8
60-64	47.5	3.1	60-64	54.5	3.6	60-64	41.3	2.5
65+	12.7	3.0	65+	17.2	3.0	65+	9.4	2.9
65-69	24.0	3.2	65-69	29.3	3.3	65-69	19.4	3.0
70-74	13.7	2.8	70-74	17.6	2.8	70-74	10.5	2.8
75+	5.2	2.8	75+	8.2	2.7	75+	3.3	2.8

Income

The 2000 U.S. median household income for those 65 and over was $23,048. This contrasts with the overall U.S. median household income of $42,148, and of $44,992 for those age 55-64. For people 65 and over reporting income in 2000, about 34% received $9,999 or less, 42% received $10,000 to $24,999, and 16% received $25,000 to $49,999; another 8% received more than that. The major sources of income were Social Security (reported by 90%) and assets (reported by 59%).

Percent of Elderly with Income from Various Sources, 2000

Source: Social Security Administration

Source of Income	55-61 years	62-64 years	65 years and over TOTAL	65-69	70-74	75-79	80-84	85+
Earnings	80%	64%	22%	44%	26%	14%	7%	4%
Wages and salaries	76	59	19	39	22	12	6	3
Self-employment	13	10	5	9	6	3	2	1
Retirement benefits	26	62	93	89	93	94	96	95
Social Security[1]	13	53	90	86	91	91	94	93
Other public pensions	7	12	15	15	15	14	15	13
Private pensions or annuities	10	20	29	28	31	31	28	22
Income from assets	61	60	59	60	59	60	62	55
Interest	57	57	57	57	57	57	59	52
Dividends	33	31	24	27	26	22	22	17
Rent or royalties	11	10	9	11	9	8	8	7
Veterans' benefits	2	2	4	4	4	6	6	3
Unemployment compensation	4	3	1	2	1	0	0	0
Workers' compensation	2	2	1	1	1	0	0	0
Public assistance	5	6	5	5	5	4	3	6
Supplemental Security Income	5	5	5	5	5	4	3	6
TOTAL POPULATION (in thousands)	**12,430**	**4,049**	**25,230**	**6,508**	**6,154**	**5,689**	**3,841**	**3,038**

(1) Social security includes retired-worker benefits, dependents' or survivors' benefits, disabiltiy benefits, and special age-72 benefits.

Poverty

In 2000, the poverty rate among those 65 and over was 10.1%, compared with 11.7% for all people in the U.S. The poverty rate was higher (11.2%), for those 75 and over. The rate was higher still for selected groups, including women 65 and over (12.4%), blacks 65 and over (21.9%), black men 65 and over (15.6%), and black women 65 and over (26.1%).

Health

While elderly Americans are healthier and living longer than in the past, they are still more likely than younger people to suffer from chronic conditions and from disabilities. Almost all older Americans have health insurance coverage of some type; a sizeable portion, however, are protected only by Medicare, which does not cover all costs and as of Oct. 2002 excluded the cost of prescription drugs. 36% of the elderly did not have private health insurance as of 1999.

Selected Chronic Conditions, per 1,000 Americans, by Sex and Age, 1995

Source: National Center for Health Statistics, U.S. Dept. of Health and Human Services

	MALE					FEMALE				
Type of chronic condition	Under 45 years	45–64 years	Total	65 years + 65-74 years	75 years and over	Under 45 years	45–64 years	Total	65 years + 65-74 years	75 years and over
Arthritis	22.4	176.7	404.7	385.5	437.0	36.0	285.4	550.2	498.2	616.1
Cataracts	1.8	16.8	125.1	72.1	214.0	1.1	21.6	182.8	132.1	247.0
Hearing impairment	41.4	203.6	366.8	332.8	423.5	26.3	89.7	224.5	159.0	307.3
Deformity or orthopedic impairment	90.0	186.6	165.9	167.1	163.9	101.3	165.2	186.8	168.0	210.5
Back problems	42.4	110.3	77.8	69.9	91.0	68.8	102.6	109.1	96.9	124.5
Ulcer	10.4	29.9	19.2	19.9	17.9	12.0	27.7	30.3	38.7	19.6
Diabetes	6.2	62.1	123.6	131.4	110.6	9.7	65.4	128.4	134.3	121.1
Anemia	3.7	5.1	15.5	15.2	16.1	25.0	31.6	23.9	9.9	41.8
Prostate disease	1.9	34.9	118.0	125.0	106.1	—	—	—	—	—
Disease of female genital organs	—	—	—	—	—	39.7	54.5	19.9	25.9	12.1
Heart disease	24.0	143.1	362.4	316.3	439.4	34.0	100.0	268.5	229.3	318.0
High blood pressure	34.0	233.2	349.3	352.0	344.5	30.3	212.9	442.1	423.8	465.3
Hardening of the arteries	0.5	12.8	44.7	31.5	67.0	.3	6.1	38.6	26.6	53.7
Varicose veins (lower extremities)	4.1	17.1	44.7	46.9	41.1	23.3	73.4	107.5	101.6	115.0

— = not applicable

Percent of Persons Age 65 and Over with Disabilities

Source: Administration on Aging, U.S. Dept. of Health and Human Services; as of 1997

Age	With any disability	With severe disability	Need assistance	Age	With any disability	With severe disability	Need assistance
65-69 years	44.9	30.7	8.1	75-79 years	57.7	38.0	16.9
70-74 years	46.6	28.3	10.5	80+ years	73.6	57.6	34.9

Deaths and Death Rates for Leading Causes, for Americans 65+, 2000[1]

Source: National Center for Health Statistics, U.S. Dept. of Health and Human Services

Cause of death	Number	Rate	Cause of death	Number	Rate
ALL CAUSES	**1,805,187**	**5,190.8**	Alzheimer's disease	48,492	139.4
Heart disease	595,440	1,712.2	Kidney disease	31,588	90.8
Cancer	392,082	1,127.4	Accidents	31,332	90.1
Cerebrovascular disease	146,725	421.9	Motor vehicle accidents	7,165	20.6
Chronic lower respiratory diseases	107,888	310.2	All other accidents	24,167	69.5
Influenza and pneumonia	60,261	173.3	Blood poisoning	25,143	72.3
Diabetes	52,102	149.8			

(1) Preliminary data; rates are per 100,000 people 65 and older.

Leisure Activities

According to a survey by the American Association of Retired Persons, 3 out of 4 people in the U.S. age 50-79 consider themselves to be in good health and 6 out of 10 say they are physically active on a regular basis, with walking the most popular form of exercise. Four out of 5 report that they frequently spend time with family, while 3 out of 10 report that they make love frequently. According to Census Bureau surveys, exercise programs and home improvement are among the most common leisure activities for all ages.

Participation in Various Leisure Activities, by Sex and Age, 1997

Source: Bureau of the Census, U.S. Dept. of Commerce

(in percent, except where indicated)

	ATTENDANCE AT...			PARTICIPATION IN...					ACTIVITIES								
	Movies	Sports events	Amusement park	Exercise program	Playing sports	Charity work	Home improvement /repair	Computer hobbies	Playing classical music	Modern dancing[1]	Drawing	Pottery Work[2]	Weaving	Photography[3]	Creative writing	Buying art work	Singing in groups
ALL AGES	66%	41%	57%	76%	45%	43%	66%	40%	1%	13%	16%	15%	28%	17%	12%	35%	10%
Sex																	
Male	66	49	58	75	56	40	71	44	9	13	15	16	5	16	10	36	9
Female	65	34	57	77	35	46	61	37	13	12	17	14	49	18	14	34	12
Age																	
45-54	65	42	53	77	40	46	75	40	15	11	13	18	29	18	10	37	13
55-64	46	33	40	69	19	44	71	23	9	8	9	10	29	10	5	31	11
65-74	38	21	29	65	23	40	55	11	6	14	7	10	32	10	5	23	10
75+	28	16	18	56	13	40	44	7	6	9	4	3	28	5	6	8	7

(1) Dancing other than ballet (e.g. folk and tap). (2) Includes ceramics, jewelry, leatherwork, and metalwork. (3) Includes making movies or videos as an artistic activity.

Health-Related Activities Reported in Past 12 Months by Persons 50-79, 2002[1]

Source: American Association of Retired Persons

		GENDER		AGE		
Activity	% TOTAL	% Men	% Women	% 50-59	% 60-69	% 70-79
Had blood pressure checked	93	92	94	91	96	94
Discussed health issues with a doctor	82	80	84	77	86	86
Tried to control their weight	78	75	80	79	79	74
Had cholesterol checked	76	74	78	70	82	81
Tried to manage stress	73	65	79	77	71	66
Read books or articles on health	68	59	75	64	73	67
Ate more healthy foods than last year	62	52	70	66	60	56
Took a specifc action to prevent disease	59	55	63	56	64	60
Learned how to avoid accidents while driving	57	57	56	53	63	57
Had prostate or skin cancer screening	53	52	55	49	59	55
Changed what they ate to prevent disease	51	45	56	55	49	44
Started an exercise program	43	44	41	44	44	37
Made changes in their home to prevent falls and accidents	33	28	38	31	32	39
Used Internet for health information	29	28	29	41	24	11

(1) Percentages based on survey with 1,000 respondents—375 men, 625 women; 379 aged 50-59, 339 aged 60-69, 282 aged 70-79.

WORLD ALMANAC QUICK QUIZ

A 65-year-old American woman in 2000 has a life expectancy of what age?

(a) 72 (b) 77 (c) 84 (d) 89

For the answer look in this chapter, or see page 1008.