

The Public Health Costs of War in Iraq: Lessons from Post-War Lebanon

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Since March 2003, the United States has been at war in Iraq, with tens of thousands of US and Iraqi casualties. However, the casualties of war and the embodied suffering of the Iraqi people cannot be measured only by body counts. War takes its toll on public health in numerous direct and indirect ways. This paper looks at six major public health costs of war (physical, mental, reproductive/demographic, social structural, infrastructural, environmental), examining how these have played out in the aftermath of a 15-year civil war in Lebanon (1975–1990). Although the causes and magnitude of the current war in Iraq are different, this article uses the example of neighboring Lebanon to examine the public health consequences of war in Iraq, including such controversial issues as the effects of depleted uranium (DU) on human health and debates over the number of Iraqi civilian casualties.

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1. Introduction

In September 1978, the World Health Organization (WHO) convened an historical meeting on global health in the Central Asian city of Alma-Ata, Kazakhstan. Called the International Conference on Primary Health Care, the

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conference led to a drafting of a path-breaking document called the "Declaration of Alma-Ata." This ten-point charter for world health initiated a new movement in "primary health care" (PHC), where health was asserted to be a fundamental right of the world's citizens. Indeed, the first article of the declaration states:

The Conference strongly reaffirms that health, which is a state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity, is a fundamental human right and that the attainment of the highest possible level of health is a most important world-wide social goal whose realization requires the action of many other social and economic sectors in addition to the health sector.

14 This definition of health, which was defined by the conference as a goal for the year 2000 ("Health for All by the Year 2000"), was perhaps the most lasting contribution of the declaration, and is still seen as the official WHO-sponsored definition of global health. Yet, there were many other important points in the Declaration of Alma-Ata, including some that have been much less emphasized. In particular, the declaration ends with a stern warning about the violent state of world affairs. Article XI cautions:

An acceptable level of health for all the people of the world by the year 2000 can be attained through a fuller and better use of the world's resources, a considerable part of which is now spent on armaments and military conflicts. A genuine policy of independence, peace, détente and disarmament could and should release additional resources that could well be devoted to peaceful aims and in particular to the acceleration of social and economic development of which primary health care, as an essential part, should be allotted its proper share.

In these two articles, the Declaration of Alma Ata pointed to a fundamental global health dilemma: namely, global health can never be achieved as long as wars are being waged around the world. Wars not only make "health for all" impossible through their direct effects, but also lead to a critical misdirection of funding away from health and toward military spending. The fact that "Health for All by the Year 2000" (HFA2000) was never achieved by the end of the 20th century was due in part to the ongoing, even escalating, political violence around the world. As we enter the new millennium, the profound global health costs of political violence continue, as civil wars, guerrilla wars, genocides, riots, and wars between countries rage around the world.

In general terms, war affects the public health of populations in six important ways, with costs to physical, mental, reproductive/demographic, social structural, infrastructural, and environmental health. In addition, war disrupts the lives of four major groups of people: those who actually fight wars (i.e., combatants, including soldiers and militia members), refugees and internally displaced persons, those left behind (i.e., mostly women, children, and the elderly), and health care professionals. Wars create chaos, both personal and social, for individuals and for societies at large. Using the metaphor of "disrupted lives" as a framework for understanding the effects of war on individual and social well-being, it is clear that the disruptions of war are significant, per the definition of "disruption" forwarded by Becker:

15 In all societies, the course of life is structured by expectations about each phase of life, and the meaning is assigned to specific life events and roles that accompany them. When expectations about the course of life are not met, people experience inner chaos and disruption. Such disruptions represent loss of the future. Restoring order to life necessitates reworking understandings of the self and the world, redefining the disruption and life itself. (1999, 4)

This article examines the disruptions to physical and social well-being brought about by war in the Middle East, including the current war in Iraq. Indeed, it has been more than three years since the United States invaded Iraq, with no end to the violence in sight. At this point, it is crucial to assess not only the political

costs of the war, but the public health consequences as well. During wartime, the toll on public health is significant, lingering on for many years in war's aftermath. This may be especially true in contemporary Iraq, where the public health infrastructure, water treatment facilities, electricity, and transportation were seriously undermined by the first US invasion of that country in 1991. Subsequent economic sanctions gravely affected the health of the Iraqi populace over the past decade. The current violence in that country does not bode well for public health, with massive additional loss of life and health to be expected over the next decade, even if the fighting were to stop today.

The article is divided into three sections. The first section provides a general overview of the six major health costs of war, as they are understood on a global level. The second section examines these six health costs as they have played out in Lebanon, a Middle Eastern country that was gravely impacted by a 15-year civil war, resulting in enduring political violence in the new millennium. Reflecting upon the experiences Lebanon, the final section of the article turns to contemporary Iraq, a country that has endured generations of both internally produced and externally produced violence, including two US-waged wars against the country. Given what we know about war and its public health effects, the article attempts to assess the damage to Iraqi public health, especially given real concerns about war-produced environmental toxicity in the country.

2. The Public Health Costs of War: An Overview

Physical Costs: The first and perhaps the most important public health cost of war involves its physical toll on human health—namely, the years of healthy life lost to death and disabilities, including among civilian populations, who are the major victims of this direct consequence of war (Ghobarah, Huth and Russett 2004, 869–884). In terms of death, war kills people both directly and immediately, usually through violence. But war also leads to a variety of types of indirect deaths, which may or may not be immediate.

WHO estimates that 269,000 people around the world died from the direct effects of war in the year 1999 alone (ibid.) This represents 8.44 million healthy

years of life lost as a direct and immediate cost of all wars, both civil and international, for that year. However, the indirect effects of war in that same year were staggering: The additional burden of death and disability incurred in 1999 alone as a result of the *lingering effects* of civil wars fought in the previous years of that decade (1991–1997) was nearly double the number incurred directly in 1999. In other words, an estimated 15 million lives were lost in 1999 due to the indirect effects of wars and from various diseases circulating through these war-torn countries and their neighbors (ibid.).

As suggested by these data, bombs and bullets are not the only causes of death in war. Deaths occur from many other sources, primarily in the vulnerable civilian population, which suffers the bulk of war's physical effects. As noted by Ghobarah, Huth, and Russett in their excellent review of the public health effects of civil conflict, "Whoever the actual combat deaths during the war may represent, in their long-term impact the most frequent victims of civil wars are women and children" (ibid., 880).

For one, wars tend to displace civilians, leading to large refugee populations (who are forced to flee across international borders), as well as internally displaced persons (IDPs) (who are forced to flee to a different location within the country) (ibid.). Currently, there are more than 20 million officially recognized refugees worldwide, a figure that doubled over one decade (WHO 2001). In addition, there are at least as many IDPs. Thus, according to the United Nations, in the single year of 1999, there were estimated to be a total of 50 million refugees and IDPs worldwide, more than 50 percent of them women and children (ibid.). Unfortunately, less than half (about 23 million) were being protected and assisted in that year by the Office of the United Nations High Commissioner for Refugees.

Refugee and IDP populations tend to live in crowded and makeshift refugee camps (both official and unofficial), which lack sufficient food, safe water, and adequate sanitation. As such, refugee camps become veritable breeding grounds for infectious diseases and malnutrition, as well as additional violence from unresolved disputes and the presence of small arms. Infectious diseases are hypothesized to be the principal cause of indirect deaths from war, with war raising the incidence of infectious diseases already existing in the population (e.g., malaria, tuberculosis, respiratory infections, diarrheal disease), as well as

introducing new infectious diseases (e.g., measles, human papilloma virus, HIV/AIDS). Indeed, according to Ghobarah, Huth, and Russetts' analysis, HIV/AIDS "tops the list" of war-induced infectious diseases, hitting both genders, especially in the most productive age groups, with "devastating impact" (878). Indeed, war-related movements of both refugees and soldiers are "heavily implicated in the spread of AIDS in Africa" (872).

Not only refugees but those left behind in wars, including disproportionate numbers of women, children, and the elderly, can be regarded as the long-term victims of war, because they suffer significant excess deaths from such preventable problems as severe malnutrition from food shortages, maternal mortality, and epidemics of otherwise vaccine-preventable diseases, such as measles. Women of reproductive age suffer from a variety of maternal conditions, with deaths from cervical cancer topping the list of war-induced maternal effects (881). Indeed, during periods of war, both women and children suffer many excess deaths, with survivors representing a generation of physically and psychologically damaged individuals.

Although men may largely be blamed as the perpetrators of war, it is important to remember that many men remain peaceful civilians in periods of conflict and may suffer civilian diseases and injuries just like women and children. For men as both combatants and non-combatants, the physical costs of both death and war-related disability are quite real. Not only do men suffer from the physical injuries incurred during fighting, but they may also be at great risk from explosions of various kinds (including from land mines placed in their fields), from artillery crossfire, and from vehicular and other transportation accidents, which increase during wartime (ibid.). For both men and women, war creates decreases in life expectancy, not only from deaths and disabilities, but also from the "weathering" effects of stress, which compromises people's health and immune systems (Geronimus 1996).

Mental Health Costs: Mental health is also compromised during wartime. Wars lead to epidemics of mental health disorders, resulting from a number of "triggering" factors, including the witnessing of atrocities, periods of imprisonment and torture, child soldiering, death or disappearance of family

members, forced flight from homes, sexual abuse, and war rape, and a host of other incalculable miseries.

According to the 2001 World Health Report, which focused on global mental health, between one-third and one-half of all persons affected by violent conflicts, including international wars and civil strife, experience mental distress. Post-traumatic stress disorder (PTSD) is the most frequent diagnosis made. PTSD arises "after a stressful event of an exceptionally threatening or catastrophic nature and is characterized by intrusive memories, avoidance of circumstances associated with the stressor, sleep disturbances, irritability and anger, lack of concentration and excessive vigilance" (43). Although many individuals who live through wars may not merit such a PTSD diagnosis, it is generally recognized that individuals who live through violent conflicts report a variety of psychological symptoms indicative of mental distress. Wars may trigger anxiety and depressive disorders in both the combatant and civilian population. Furthermore, rates of acute psychosis and schizophrenia may increase during and in the immediate aftermath of war, as will be shown later in this article.

In addition, war leads to behaviorally related mental health problems. Alcohol and substance abuse increase during wartime, perhaps as a coping mechanism. Because of the increased prevalence of weapons, both homicide and suicide rates rise within countries during wartime, tending to peak in the first year after war (Ghobarah, Huth, and Russett). Suicidality and homicidality are intensified by the widespread availability of small arms, including their circulation in refugee camps, during and in the aftermath of war. Although young men tend to be both the perpetrators and the victims of homicide and suicide, homicide is also a consequence for girls and younger women; indeed, the chief victims of war-related homicide are women and younger men (ibid.).

Reproductive and Demographic Costs: Because of significant wartime disruptions in the life trajectories of both young men and women, wars have significant reproductive and demographic consequences, both direct and indirect. War disrupts childbearing because of the exodus of young men as soldiers and the flight of reproductive-aged women as refugees. Men and women are often separated during wartime, leading to depressions in the natural fertility rate. Furthermore, the absence of men leaves women in charge

of their households and often in very vulnerable situations of economic and physical risk.

As discovered through analysis of WHO cross-national data, one of the apparent effects of civil wars involves increasing rates of cervical cancer among women. According to Ghobarah, Huth, and Russett, there may be two possible connections of civil war to cervical cancer: (1) the breakdown of social norms, leading to forced sexual relations and subsequent transmission of human papilloma virus (HPV), which is the causal factor in cervical cancer; and (2) civil wars in general increase the incidence of infectious diseases, including infections causing cancer (*ibid.*).

Women die not only from war-related cervical cancer and HIV/AIDS but from a host of maternal ills, including obstetric emergencies in the absence of adequate wartime health care, including emergency transport to hospitals. As noted by Ghobarah, Huth, and Russett, "the damage is severe, amounting to almost 1 year of healthy life per 100 women in the major child-bearing age group" (880). Women who are infected by HIV/AIDS during wartime may also infect their infants. Thus, maternal and child health is significantly compromised during wartime, with many excess deaths.

Female-headed households, orphaning, and child-headed households may occur during and in the aftermath of war, as fathers and mothers are killed or die of various diseases. For those who survive, future marital and fertility patterns may be disrupted, by virtue of a dearth of available partners in the post-war population, as will be shown later in this article.

Social Structural Costs: Indeed, war exacts a toll on society at large, including the social structures that hold societies together. It is quite telling that between 1960 and 1999, more than 70 percent of all civil wars occurring around the world were between ethnic groups (*ibid.*). Ethnically polarized societies seem to be more war-prone than other societies, with epidemics of hatred and mistrust between ethnic groups both fueling wars and lingering in their aftermath.

In addition to exacerbating ethnic rivalries and hatreds, wars may lead to significant depopulation, not only by virtue of combatant and civilian casualties, but because of the forced or voluntary emigration of significant

segments of the population (Grove and Zwi 2006). Such loss of able-bodied citizens may have dramatic impacts on the economic growth of a nation, as well as the basic subsistence of its citizens. Increasing impoverishment during wartime may lead to petty theft and other crimes of poverty (i.e., increased prostitution). In general, social safety nets are weakened and even lost during wartime, with family members having to support each other in the absence of social services. Educational systems may break down during wartime, as spending is redirected or as teachers and pupils are unable to reach schools safely. A low educational level of the citizenry is, in turn, a key influence on the risk of war (Ghobarah, Huth, and Russett). In addition, lower levels of economic development raise the opportunity costs of violence, contributing to the likelihood of civil war.

Infrastructural Costs: Economic factors both influence the risk of war and affect health spending during and after wartime. Not surprisingly, public health both during and after wars is significantly compromised by the breakdown of the economic and public health care infrastructures. Wars typically have a severe short-term (approximately five years) negative impact on economic growth, reducing financial resources that both private sector employers and citizens can devote to health spending (*ibid.*).

In addition, wars typically damage the health care infrastructure of a nation. This damage may include through the destruction—including deliberate targeting by military forces—of clinics, hospitals, and laboratories, as well as the physical infrastructure (e.g., water treatment, electrical systems, transportation infrastructure) necessary to keep health facilities running (*ibid.*). Wartime destruction of supporting infrastructure impacts the distribution of potable water, food, medicine, relief supplies, and ambulances to health care facilities and to refugee camps where populations may be in dire need.

Beyond the physical health care infrastructure, war exacts a great toll on health care personnel. Military forces often deliberately target medical personnel, killing and kidnapping them, in order to weaken the opposition. Health care providers must make critical decisions about whether to stay and serve their country during wartime, or to flee with other exiles and refugees. The

flight of highly trained medical professionals during wartime, as well as the death of others, dramatically weakens the health care infrastructure in a nation, taking years to restore.

Finally, in the aftermath of war, public health spending may be significantly compromised. As noted by Ghobarah, Huth, and Russert,

Post-war governments face multiple competing demands for public expenditure. Long and destructive civil wars lead to such fundamental problems as: (a) a broad range of needs for reconstruction and environmental repair, (b) the need to reform and rebuild army and police forces, judicial systems, and administrative capacity, and (c) military and security spending needs that are a response to continuing military threats. Pressure for military capability raises the classic question about tradeoffs between military spending and non-defense needs such as public health. (872)

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Environmental Health Costs: Indeed, cleaning up the environment may be one of the major challenges facing post-war governments. Although environmental health issues are rarely emphasized as a consequence of war, war may wreak havoc on the environment through pollution of the air, water, and soil. Environmental toxicity from a variety of chemical weapons (e.g., mustard gas, agent orange, napalm, depleted uranium) is now realized as a potential major consequence of warfare (Ghanei et al. 2004; Safarinejad 2001; Domingo 2001; Maconochie et al. 2003 and 2004; National Academy of Science 2004; Haddad 2004). Some of these agents are used in war as defoliants, destroying the vegetation and, along with it, food-producing orchards and energy-providing firewood sources. In addition, standard weapons used during wartime, such as phosphorus bombs, may pollute the air and leave environmental residues in areas of heavy shelling and bombing.

Beyond issues of environmental toxicity, other environmental threats include landmines, which have been used heavily in some wars and which lead to increased death and disability (including limb amputations), primarily among the vulnerable civilian population (United Nations, "Humanitarian Mine Action"). In addition, improper waste disposal during war places civilian

populations at increased risk of infectious diseases, including those associated with increased pests in the environment (e.g., rodents, flies, and mosquitoes). In addition, during wartime, importation of toxic waste from other countries has been reported, usually involving bribes to militia forces. Thus, the threat of environmental toxicity from weapons (both chemical and non-chemical) may be coupled with the threat of environmental toxicity from waste (both toxic and non-toxic). Chemicals introduced into the environment during wartime may pollute the air, leach into groundwater aquifers used for drinking water, and pollute the soil used for food crops. In short, the environmental consequences of war may be severe, as will be shown in the cases of both Lebanon and Iraq.

3. The Public Health Costs of War: Lessons from Lebanon

Having outlined the six public health costs of war on a general level, it is extremely important to assess how war has compromised the health of particular nations both during and after periods of violent conflict. Unfortunately, the Middle Eastern region provides a number of salient examples, given recent or ongoing violent conflicts in countries as culturally varied and geographically dispersed as Algeria, Sudan, Israel and Palestine, and Afghanistan. Here, we will focus on Lebanon, examining the public health costs of its 15-year civil war. Then, in the following section, we will ask what lessons from Lebanon might apply now and in the future to Iraq, based on the scant public health information available from that country.

Lebanon has recently emerged from a civil war that is officially dated as beginning in 1975 and ending in 1990 (see Table 1, A Civil War Timeline). Lebanon's war is called a "civil war" because it took place on Lebanese soil between various Lebanese factions—including the Lebanese Army and many religiously based Lebanese militia groups. However, it is important to recognize that there were many external actors who added fuel to the Lebanese fire, by providing financial and military support to various local militias. As shown in the accompanying timeline in Table 1, these external actors included primarily the Palestine Liberation Organization (PLO), Syria, Israel, Iran, and the United

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States, even though the Soviet Union and several European nations were also involved (Pintak 2003).

The dating of the war from 1975–1990 is also somewhat inaccurate, if the 22-year Israeli occupation of South Lebanon and the Western Bekaa region of Lebanon is taken into consideration. Israel invaded Lebanon for the first time in 1978, occupying much of South Lebanon with the aid of the mostly Christian Southern Lebanese Army (SLA) under the leadership of General Antoine Lahad. In 1982, Israeli forces moved north to invade Beirut, where Israeli-supported massacres (by Lebanese Christian militia forces) in two Palestinian refugee camps, Sabra and Shatila, evoked international outrage (Tessler 1994).

Eventually, two southern Lebanese Shi'ite Muslim parties, Amal and Hizbullah (the latter backed by Iran), cohered in an effort to resist both the American and Israeli presence in the country (Pintak). The "liberation" of South Lebanon and the Bekaa by these two groups took more than 20 years to complete, with the eventual withdrawal of most of the Israeli forces on May 25, 2000 and the emptying of southern Lebanese political prisons (such as the infamous prison in Khiam). Thus, if the Israeli presence in Lebanon (1978–2000) is taken into consideration, then the dating of the Lebanese civil war expands from 15 to 25 years, gaining an additional decade from 1990–2000.

Unfortunately, the political violence in Lebanon has not ended as the country enters the new millennium. Forty thousand Syrian "peacekeeping" forces, including a well-embedded Syrian intelligence operation, remained in the country until April 2005, when Syria finally withdrew its troops from Lebanon under mounting international pressure. This occurred in the aftermath of the February 14, 2005 assassination of Lebanese Prime Minister Rafik Hariri, which was immediately blamed on neighboring Syria. The Hariri assassination is one of a string of politically motivated assassinations that have been occurring on a fairly regular basis in Lebanon during the past five years.

In the scholarly literature on Lebanon, which is abundant and growing (Dagher 2000; Ellis 2002; Firro 2003; Fisk 2002; Hanf 1993; Harris 1997; Johnson 2001; Khalaf 2001 and 2002; Khalifah 2001; El Khazen 2000; O'Ballance 1998; Picard 2002; Pintak, Salibi 1988; Tessler 1994), political analysts vary in their predictions about the future of the country. However, in the recent symposium "Lebanon and Syria Face the Future" (at the University of Michigan, the

authors' home institution), the predictions for Lebanon were fairly sobering. Several scholars, most of them political scientists and historians, predicted ongoing political violence, which one scholar characterized as "multiple small wars" (AbuKhalil 2006). The long war in Lebanon clearly exacerbated sectarian tensions. As of yet, no "truth and reconciliation" initiatives or any clear form of societal dialogue have taken place to heal the wounds created by the war or to mend increasing social divisions based on religion, ethnicity, and class.

Whether or not the Lebanese political situation stabilizes, the scholarly attention to that country will remain largely focused on history, economics, and politics. Unfortunately, relatively scant attention has been paid to how the Lebanese civil war has affected the health and well-being of its citizens, according to the six public health criteria outlined above. Thus, in the discussion that follows, we draw upon the fairly limited body of health scholarship, as well as our own study of war-related male infertility in the country, to suggest that Lebanon has suffered not only from the violence of war, but also from the more general public health costs of war as outlined above.

Physical Costs: The Lebanese civil war had severe impacts on the sociodemographic, economic, and health conditions in the country. In terms of the physical costs, it is estimated that the war led to the death of 7 percent of the Lebanese population and to serious injuries of 10 percent of the population (Saxena, Kulczyck, and Jurdi 2004; Jabbra 2004). Most of these deaths were due to violence, as opposed to infectious disease epidemics. But it is important to note that vaccination services were also disrupted during the war, leading to epidemics of childhood diseases, such as mumps, which would not have occurred had child health services been unaffected.

In terms of post-war death and disability, one of the unfortunate legacies of the war is the estimated 150,000 unexploded landmines and gun shells that are a "real threat to public safety" (UN Development Programme, Lebanon 2002). In a relatively small area of 850 km² in South Lebanon, as well as in the Western Bekaa region, the UN has estimated that 130,000 unexploded landmines remain, with 188 minefields and 508 other "dangerous zones" scattered over cultivated fields, roads, and other agricultural lands (ibid.). The Israeli military admits to having left behind 70,000 landmines and 288 vehicle

traps upon its retreat from Lebanon (ibid.). To date, 2,714 Lebanese have been killed or wounded by landmine explosions. Thus, the Lebanese government along with a number of other international organizations including the United Nations, has identified mine-clearing operations as a pressing public health issue for the country, according to several recent health and development reports (ibid.; UN Mine Action Service).

Mental Health Costs: The Lebanese war also taxed the mental health of citizens, in a nation already severely underserved by pre-war mental health services. In a country with approximately 4 million citizens and nearly 400,000 additional refugees, there is only one psychiatric hospital, 45 psychiatrists (ratio of psychiatrists to population of 1.2 to 100,000), and very few clinical psychologists, the latter mostly working in schools (WHO Eastern Mediterranean Regional Office). Thus, Lebanon's national mental health program "has not been satisfactory due to the war and its disruption" (ibid., Baddoura 1990). The single mental health hospital is constantly at full capacity and acute psychoses [including schizophrenia, which increased in incidence during the war (Yaktin and Labban 1992)] account for 60 percent of psychiatric hospital admissions (WHO Eastern Mediterranean Regional Office). The Lebanese Ministry of Health recognizes that it needs to provide ambulatory mental health services within primary health care centers in order to "assist the large numbers of displaced persons, the disabled, the bereaved, and so on affected by the war" (ibid.). However, to date, mental health services have not been prioritized, given the many other pressing post-war health care, environmental, and infrastructural needs.

The war took its toll on Lebanese mental health in a variety of specific ways. For one, the war led to significantly increased rates of anxiety and depression as described quite clearly and poignantly in Lebanese author Jean Samir Makdisi's war memoir, *Beirut Fragments* (1990). Many Lebanese citizens who stayed in the country during the war coped on a daily basis through psychotropic self-medication, available through a black market in such tranquilizers as Valium. Even today, many Lebanese adults take anti-depressant and anti-anxiety medications, such as Xanax and Prozac, even though they obtain these medications through psychiatric visits and prescriptions. In one

the few studies on the mental health of former prisoners and political detainees, more than half of those who had been imprisoned in South Lebanon's notorious Khiam Detention Center reported ongoing psychological distress; more than three-quarters (77 percent) reported current use of psychotropic medications, even though few of these individuals were under the regular care of mental health personnel (Saab et al 2003).

In addition, substance abuse problems, with both alcohol and drugs, increased significantly during the war period. Narcotics production of both opium and heroin tripled during the war years (WHO Eastern Mediterranean Regional Office). About 8,000–10,000 young Lebanese became addicted to drugs during the war. Today, there are an estimated 24,000 young drug addicts in the country (ibid.).

Reproductive/Demographic: The sociodemographic impacts of the Lebanese civil war, in terms of reproductive and population statistics, are also striking. Up to 30 percent of the Lebanese population emigrated out of the country during the war period on either a short-term or permanent basis. For example, the estimated population of the country was 3.2 million in 1976, but only 2.7 million in 1990 (ibid.), suggesting substantial depopulation. Although return post-war migration increased the population to 3.7 million by 1997, it is recognized that nearly 19 million Lebanese live outside the country, the result of a 20th-century exodus that dramatically increased during the civil war period.

Many of those who left the country during the war were young men, whose families feared for their lives as potential military and militia conscripts. As with wars in general, women, children, and the elderly were left behind in Lebanon, leading to unprecedented demographic disruptions. Age at first marriage was significantly delayed (to 27.5 years for women and 30.9 years for men), close to the oldest average ages at first marriage in the world and the highest in the Arab world (UN Development Programme, Lebanon). As a result of high male outmigration and high male mortality during the war, many women who were left behind were unable to marry, with demographic imbalances of marriageable males to marriageable females estimated at 1:7 or even 1:11 single males to females. Women without partners (either through lack of marriage or through husband's death or absence) meant that the number of

female-headed households in Lebanon during the war increased dramatically, one of the highest rates of female household headship ever recorded (Joseph 1994 and 2004). Furthermore, many children were left without both parents due to war-related casualties. The orphan population in Lebanon increased dramatically during the war, with the majority of orphans being raised in religious and charitable institutions throughout the country (Joseph 1994).

In addition, reproductive health suffered during the war, in ways that are only beginning to be understood. In our own study of male infertility in Lebanon carried out in 2003, we interviewed 120 infertile male cases and 100 fertile male controls regarding a number of possible risk factors for male infertility (e.g., consanguinity, childhood illnesses, reproductive tract infections, smoking and caffeine consumption, nutritional deficiencies, and occupational exposures). We also questioned men about their experiences of stress, both during and after the war period. Detailed information was collected about men's exposures to war-related events, including participation in the war as combatant, civilian residence near sites of heavy bombing, war-sustained injuries to self and to other family members, experiences of kidnapping, torture or imprisonment, and displacement from home.

In our study, infertile male cases had a 57 percent increased odds of exposure to one or more war-related events, as compared to fertile controls. Furthermore, the men who had suffered the harshest exposures to war (through combat, kidnapping, torture, and displacement) were the most likely to be infertile. Thus, our study of male reproductive health in Lebanon suggests that war diminishes male fertility, either through the impact of stress or through exposure to unspecified environmental toxins. This finding is supported by recent studies of male veterans of the first Gulf War, who have a 38–50 percent increased risk of male infertility and a longer time to conception than non-deployed veterans (Maconochie, Doyle, and Carson).

Social Structural Costs: Many Lebanese men in our study reported current high levels of stress resulting from economic and employment uncertainty coupled with a relatively high cost of living. Lebanon currently faces a serious post-war economic crisis, with debts in 2003 estimated at \$32 billion, or 18 percent of gross domestic product (GDP)—a budget deficit to GDP ratio

reaching 16.6 percent (UN Development Programme 2001–2002). In 2002, unemployment figures ranged between 12 and 25 percent, making at least one-third of the Lebanese population at risk of residing in poverty. According to a 2002 sustainable development report,

Lebanon witnessed during the last few years additional pressures due to a dramatic drop in economic growth, which reflected negatively on the class structure by a widening of the social gap: a destitute majority, a very small class of the extremely wealthy and a dramatic reduction in the middle class. Studies indicate that around 61.9% of the Lebanese households fit in the low-income bracket, and that 12.9% are in the below 70 U.S. dollar per capita group. The decline of the middle class is due to economic stagnation and soaring unemployment. Studies indicate that unemployment rates reached 21% in the year 2001. (UN Development Programme 2001–2002, 15–16)

Poverty in Lebanon is reflected in poor health care. Approximately 40 percent of the Lebanese population lacks any form of medical insurance. It is estimated that health care provided by both private sector physicians and by nongovernmental organizations such as the Red Cross and Red Crescent is beyond the financial reach of more than 80 percent of the Lebanese population (WHO Eastern Mediterranean Regional Office). In general, the war-related loss of social safety nets in Lebanon, including subsidized health care or universal medical insurance, has meant that individuals must pay out-of-pocket for health care, an impossibility for many impoverished families.

Throughout the war years and in war's aftermath, Lebanese have tended to rely heavily on family networks to sustain them through hardship. When individuals are ill, family members often rally to the cause, pooling resources needed to pay for health care. Indeed, as shown in the path-breaking work of Lebanese-American anthropologist Suad Joseph (1994 and 2004), family aid constitutes a vital social safety net in Lebanon, literally rescuing other family members in times of need, including throughout the civil war period.

However, as shown in the more recent work of Lebanese anthropologist Jihad Makhoul and her colleagues (2002, 2003, 2004), many families in Lebanon are currently facing acute stress, particularly in economically hard hit low-income urban and rural communities. The "unraveling" family in Lebanon is reflected in Makhoul et al.'s troubling data on child welfare: namely, family violence (including child abuse) is a recurring theme in many Lebanese children's lives, leading to fairly high rates of school attrition and early child labor.

This is true not only among low-income Lebanese households, but also among Palestinians living in refugee camps throughout Lebanon. Lebanon is currently home to more than 350,000 Palestinians, some of whom took refuge in Lebanon in 1948 and others who came to Lebanon via Jordan in 1970. More than half of these Palestinians reside in the 14 registered refugee camps run by the United Nations War Refugee Assistance (UNWRA) program. Others live in unofficial camps on the fringes of Lebanese communities. Palestinian refugees in Lebanon lack many basic citizenship rights; they are considered a special type of foreigner and must carry refugee identity cards, they are restricted from traveling to foreign countries, they are limited to menial work after being prohibited from practicing 77 different kinds of occupations, and they are prohibited from significant improvement in their homes, which are viewed by the Lebanese state as temporary residences (Makhoul, Abi Ghanem, and Ghanem 2003, 251).

Accordingly, most Palestinians in Lebanon live in abject poverty, in poorly built homes with little or no ventilation. The only formal medical services available to the Palestinian refugee population are run by UNWRA, but tend to be seriously overtaxed and underfunded (ibid.) In short, Palestinians in Lebanon face abhorrent living, working, and health care conditions. They are an unwanted refugee population in Lebanon, who are widely blamed by some segments of Lebanese society for helping to incite (through PLO activity) the Lebanese civil war. Thus, this refugee population within Lebanon suffers significant problems of poor health and discrimination on many levels. Yet, without return rights to Palestine, this population has nowhere else to go and is unlikely to leave Lebanon in the near future.

Infrastructural Costs: One of the major infrastructural costs of the Lebanese civil war was the growth of urban slums and squatter settlements, including of both Palestinian refugees and of Lebanese internally displaced persons, primarily from the Israeli-occupied south. Beirut, the capital city of Lebanon, is home to a number of Palestinian refugee camps, as well as substantial slums, hastily built by mostly southern Lebanese Shi'ite Muslim migrants as they poured into Beirut during the war period.

In addition to uncontrolled urbanization and the growth of an urban slum population, Lebanon's physical infrastructure was severely damaged by the civil war. As noted in a recent WHO report,

Fifteen years of civil war caused massive destruction to the country's infrastructure, estimated at \$US 500 million. Electricity, water and telecommunication systems, as well as the road network, were severely damaged. Coupled with this destruction, there has been a rapid deterioration in the quality of life of the people, in the areas affected in particular and in the whole of Lebanon in general. (WHO Eastern Mediterranean Regional Office, 1)

Some of this damage occurred directly to the health care infrastructure. Public health care facilities were either destroyed or left to deteriorate during the war period. Although there are 19 government hospitals in different districts of Lebanon, most of them are completely inactive. According to a recent WHO report, "In some cases, public hospital services have deteriorated to such an extent that they lack all basic supplies and equipment as well as the necessary staff" (ibid., 2).

Health care staff left Lebanon in large numbers during the war. Although there has been some return of qualified personnel, particularly physicians, salary levels remain so low (e.g., \$1000–2000/month) that many doctors are forced to seek employment in the private health care sector (ibid.). As a result, Lebanon now has among the highest ratio of private doctors per capita in the region. Although this partially offsets the erosion in the public health sector, "it has not contributed to a meaningful improvement in health care in general," according to WHO (ibid.).

Environmental Costs: Finally, the long Lebanese civil war took a great toll on the environment. In his article on "The Ecological Crisis in Lebanon," Fouad Hamdan begins:

Lebanon is experiencing an ecological crisis that is the result of decades of uncontrolled and unregulated development and nearly sixteen years of civil war (1975–90). The improper disposal of household, industrial, and hospital waste and industrial pollution have compromised the quality of Lebanon's air and water. Over 50 percent of Lebanon's water sources are contaminated, by World Health Organization standards, and smog has become a daily reality in its overdeveloped cities and industrial areas. The biodiversity of the Lebanese environment has been compromised by the destruction of its forests through urban development and uncontrolled fires, illegal logging, and unregulated stone quarries. The percentage of the country covered by forests has shrunk from 20 percent in 1975 to 5 percent in the late 1990s. Illegal hunting and the use of chemicals in agriculture have further aggravated these problems. The redevelopment of Beirut and other Lebanese cities in the wake of the civil war will bring more waste and pollution to Lebanon. (2002, 175)

As suggested by this quote, the civil war years of 1975–90 were devastating to Lebanon's environment on many levels. Perhaps the worst war-related environmental scandal involved the illegal importation of toxic waste. Namely, in 1987, during a period of intense inter-sectarian fighting, an Italian company shipped 2,411 tons of toxic waste in 15,800 barrels and 20 containers to Lebanon—taking advantage of "the chaos of the civil war, in a deal hammered out with a Lebanese firm and supervised by members of the now-disbanded militia, the Lebanese Forces"(ibid., 181). When the deal became known in 1988, "public outrage in Lebanon forced the Italian government to promise to return the toxic material to Italy" (ibid.). However, only 5,500 of the 15,800 barrels (about one-third) were returned to Italy, with more than 10,000 barrels and 20 containers remaining in Lebanon. As described by Hamdan,

Some of the remaining waste was used as fertilizer, pesticide, or raw material to produce paints or foam mattresses. Many barrels were burned in the open air. Others were dumped in the Kesrowan Mountains east of Beirut, endangering groundwater reservoirs. In some cases, barrels were emptied and sold for storage of gasoline, water, or food. The shipment from Italy contained a deadly cocktail of toxic materials. Among them were the explosive substance nitrocellulose, outdated adhesives, organo-phosphoric pesticides, solvents, expired medications, oil residues, and substances contaminated with highly toxic heavy metals such as lead, mercury, and cadmium, as well as arsenic, chlorinated substances, and PCBs. (ibid.)

Although the Lebanese government tried to cover up the toxic waste scandal, the Mediterranean office of Greenpeace continued to pursue the issue, arguing that all of the remaining waste should be returned to Italy. Unfortunately, public documents show that there are at least five sites in Lebanon heavily contaminated by the toxic waste from Italy, including a quarry "with the potential to spread tons of contaminated soil all over Lebanon" (ibid., 182).

In December 1996, the Lebanese Ministry of Environment adopted a regulation banning the future import of all hazardous waste into Lebanon, including for the purposes of recycling. Although this is a step in the right direction, protecting the environment is not a priority of the Lebanese government, according to Hamdan (ibid., 185). He notes that the Lebanese Ministry of the Environment, established after the war, is "small and badly equipped, without an effective professional staff" (ibid.). Instead, the Lebanese government has focused all of its funding and rebuilding efforts on the infrastructure (i.e., electricity, roads, telecommunications, water systems, and the tourist center of downtown Beirut). Such "visible" efforts to restore Lebanon's pre-war beauty are easier to publicize than environmental cleanup. However, as Hamdan concludes:

The time has come for Lebanese authorities to use their historic opportunities to rebuild Lebanon on a sound environmental basis. They must acknowledge environmental problems, set sound environmental strategies, and work with NGOs and Lebanese citizens to ensure the country's health and prosperity in the new century. (ibid., 187)

4. The Public Health Costs of War in Iraq: Lessons from Lebanon

In Iraq, it is currently unknown how all six of these major public health problems will unfold. If the current violence raging in that country turns into a long-term civil war, as most analysts now predict, then many of the public health tragedies of Lebanon will be repeated, although on a much greater scale in a country six times the population size of Lebanon. Furthermore, Iraq has already suffered from a tremendous amount of war and death during the past 50 years, making its modern history arguably even worse than Lebanon's and quite tragic indeed.

In 1963, the Baath Party rose to power in Iraq, with Saddam Hussein becoming president in 1979. Within his first year of office, he invaded Iran (on September 22, 1980), pitching his country into a bloody eight-year war, costing more than 1 million lives and representing the longest conventional war between two countries in the 20th century (Wikipedia, "Iran-Iraq War").

Only two years after that war ended, Saddam Hussein invaded another neighboring country, Kuwait, on August 2, 1990, this time bringing on the wrath of Kuwait's Western allies. The US and a coalition force of approximately 30 nations invaded Iraq in January 1991 in a six-week war that led to Saddam Hussein's surrender in February 1991 (Wikipedia, "Gulf War"). Nonetheless, the costs to Iraq as a nation lasted much longer. Iraq was economically sanctioned by the United Nations Security Council for its aggression on its neighbors. During a 13-year (1990–2003) period, Iraq faced restrictions on importation of all items except medicine (WHO, "Potential Impact of Conflict"). Not until December 1996 was an Oil-for-Food Programme initiated by the UN to attempt to alleviate major sanction-induced food shortages and malnutrition in the country.

Strikingly, the UN sanction period did not end until the US declared war on Iraq on March 19, 2003. Despite relief from sanctions, the current war in Iraq will be health-demoting to the Iraqi population on multiple levels. In the remainder of this article, we will attempt to review the limited evidence on the state of Iraqi public health. Clearly, public health in Iraq has been cumulatively compromised by almost 25 years of relentless war, the UN sanction period, and

the particular brutality of the Iraqi regime. However, our focus in this final section is on how the current war in Iraq is affecting the six major categories of public health outlined above. Although we will examine all six categories at least briefly, we attend primarily to two major public health controversies in Iraq: namely, the body count and the effects of depleted uranium (DU) on Iraqi public health.

Physical Costs: It is important to begin this discussion with the controversial issue of the "body count": Namely, no one can say precisely how many Iraqis, including civilians, have been killed. The US military forces in Iraq have not kept records of Iraqi casualties; indeed, US General Tommy Franks has publicly asserted that "We don't do body counts" (Iraq Body Count). This has become a major rallying cry for some human rights organizations, which demand US coalition accountability in this regard.

To that end, a major study was carried out by a research team affiliated with both Johns Hopkins and Columbia universities and published in the October 29, 2004 issue of the highly regarded British medical journal, *The Lancet* (Roberts et al). A cluster sample survey of mortality was undertaken throughout Iraq by a team of extremely courageous Iraqi epidemiologist-physicians during the month of September 2004. Using these survey data, the risk of death was estimated to be 2.5-fold higher after the March 2003 invasion of Iraq when compared to the pre-invasion period. Furthermore, two-thirds of all the violent deaths were reported in one cluster in the heavily bombarded city of Fallujah, even though violent deaths were widespread throughout the country. Sadly, most of the violent deaths reported were of women and children and were mainly attributed to coalition forces, particularly air strikes by US forces using helicopter gunships, rockets, and other forms of aerial weaponry. The authors estimated, conservatively, that more than 100,000 excess deaths had occurred since the beginning of the war in Iraq, mostly violent deaths among the vulnerable civilian population (ibid.).

Not surprisingly, the authors were challenged almost immediately by the US military on their epidemiological methods of calculating mortality risk. However, as the authors noted in their original article, perhaps anticipating such criticism, there is "little excuse" for the dearth of body count tallies by

coalition forces, and they called upon an independent authority, such as the WHO, to confirm their findings (ibid., 7).

To that end, a respected database called "The Iraq Body Count" has been formed by an independent group of academics and peace activists. The database is continually updated using online media reports of deaths from a variety of recognized sources within Iraq (such as mortuaries). The count includes civilian deaths caused by coalition military action as well as insurgent and terrorist attacks. It also includes excess civilian deaths caused by the breakdown in law and order that has led to increased criminal activity in the country.

Accordingly, as of May 2006, the Iraq Body Count reports approximately 35,000–40,000 Iraqi civilian casualties since the beginning of the US invasion, with the civilian death toll rising inexorably with each additional year (i.e., from 20 deaths/day in Year 1, to 36 deaths/day in Year 3) (www.iraqbodycount.net/). Increasingly, civilian deaths are occurring from so-called "sectarian violence." However, hundreds of Iraqi deaths are still occurring from direct military action by US-led forces, as well as anti-US military retaliation.

Although this Iraqi civilian death toll is much lower than the original estimates provided by *The Lancet* study, it is significantly higher than the 2,405 American military casualties reported since the beginning of the war (Ewens). Even if the nearly 18,000 Americans soldiers wounded in action is taken into consideration, the Iraqi death toll is double the number of Americans both killed and wounded. In terms of death alone, the Iraqi body count is nearly 20 times higher than the American body count. Not surprisingly, neither of these respective body counts is being publicized by the Pentagon to the American public.

Mental Health Costs: Given the Iraqi death toll and the unknown numbers of Iraqis who have been wounded, kidnapped, or exposed in numerous other ways to the horrors of war, Iraq is suspected of being in the midst of a mental health crisis. As in Lebanon, Iraq's pre-war mental health infrastructure was entirely inadequate, with only two psychiatric hospitals for a population of 24 million (Fleck 2004, 555). Although WHO is attempting to help the Iraqi Health Ministry develop a new mental health system, building a mental health infrastructure in the country is extremely challenging, given major infrastructural problems to be discussed below.

According to a recent report from Baghdad (National Public Radio 2006), Iraqis are suffering increased rates of post-invasion anxiety and depression. Since the US invasion, cases of post-traumatic stress disorder have increased by 35 percent, particularly following some of the major battles and explosions that have devastated urban neighborhoods. As in Lebanon during the civil war, Iraqi citizens are "self-medicating" through increased alcohol and substance abuse, particularly the use of psychotropic medications such as sleeping pills and tranquilizers, which are available without physicians' prescriptions. In one clinic, 60 percent of the depressed patients had become addicted to psychotropic medications; such medications were preferred over alcohol, were easier to obtain, and were considered a more discreet way to cope with mental health problems among this largely Muslim population (ibid.).

Unfortunately, the mental health toll of war in Iraq is affecting not only adults, but children as well. According to a report in the *British Medical Journal*, the vast majority of Iraq's 13 million children are likely affected by psychological trauma, in addition to the "grave risk of starvation, disease [and] death" (Clark 2003, 356). At least one-half million of these children are in serious need of psychological treatment (Medical Aid for Iraqi Children).

Reproductive/Demographic Costs: If maternal and child health in Iraq is taken into consideration, then the reproductive and demographic consequences of war have been devastating for Iraq. Almost half of Iraq's total population consists of children. UN agencies estimate that one out of every eight children in Iraq dies before the age of five; one-third are malnourished; one-quarter are born underweight; and one-quarter do not have access to safe drinking water (WHO, "Potential Impact of Conflict," 5). These devastating figures reflect the fact that 18 million out of 24.5 million people in Iraq lack secure access to food; thus, child malnutrition rates are now high in a country where malnutrition among children was once rare (before the UN sanction period). Approximately 1 million children under age five suffer from chronic malnutrition, including severe clinical disorders including marasmus (muscle wasting) and kwashiorkor (swelling of the abdomen and limbs) (ibid.). Not surprisingly, given the impact of infectious diseases in war-torn populations, the three major killers of children

in Iraq are pneumonia, infectious diarrheal diseases, and measles (ibid.). Although measles is a vaccine-preventable illness, disruptions in vaccination supplies during the UN sanction period meant that many Iraqi children were never vaccinated and are now dying from measles in unprecedented numbers. Similarly, Iraqi women are dying in childbirth in significant numbers, in part from the breakdown of obstetric care and in part from anemia and nutritional deficiencies that predispose women to obstetric emergencies.

No one knows how many Iraqi women and children have died as a result of malnutrition and infectious disease, but the available evidence suggests that the numbers are in staggering, given widespread poverty, food shortages, and the insecurity of safe passage to hospitals. Such excess maternal and child deaths are likely to lead to the kinds of reproductive disruptions and demographic disturbances that were recently experienced in Lebanon.

Social Structural Costs: Eventually, depopulation through death and emigration may occur in Iraq, just as it did in Lebanon. This will be one of the gravest social structural costs of war in a society where the very social fabric is being torn apart with each passing day. According to many analysts, the US invasion of Iraq has fueled inter-sectarian tension and violence on a level that is totally unprecedented (Diamond 2005). Although it is beyond the scope of this review to examine the effects of an inchoate civil war in Iraq, suffice it to say that such civil conflict will likely lead to the flight of refugees out of the country, the movement of thousands of internally displaced persons within the country, and the increasing impoverishment and immiseration of an entire country.

It is important to note that after the First Gulf War in 1990–91, thousands of Iraqis fled the country, mostly Shi'ite Muslims who were encouraged by the US to revolt against the regime of Saddam Hussein. After existing for months (or even years in many cases) in deplorable living conditions in Saudi Arabian refugee camps, this population of Shi'ite Iraqi refugees was largely resettled in the United States, where they comprise an ethnic enclave population nearly 80,000 strong in metropolitan Detroit, Michigan (Walbridge and Aziz 2000, 321–342). But, the question remains: Will the US take in another 80,000 Iraqis—or even more—who are fleeing the sectarian violence unleashed by the

US invasion of Iraq in 2003? Although we are unable to predict a clear-cut answer to this question, suffice it to say that anti-Arab and anti-immigrant sentiment has grown in the US since September 11, 2001; thus, this would suggest that doors of American political asylum are unlikely to swing open for large numbers of Iraqi refugees in the new millennium.

Infrastructural Costs: Those who have been more successful in fleeing from war-torn Iraq are health care personnel. The progressive loss of qualified and experienced health care workers in the country has led to significant gaps in coverage and quality of health care services, according to WHO ("Potential Impact of Conflict"). In a recent report on the "Potential Impact of Conflict on Health in Iraq," WHO highlights the deterioration in the health care infrastructure over the last two decades, which has impacted health care delivery in numerous ways (ibid.). In the period from 1990–97, the Iraqi government was able to meet only 10–15 percent of the country's medicine needs, requiring non-governmental organizations such as Medical Aid for Iraqi Children (MAIC), a British charity run by Iraqi exiles, to donate medicines and medical equipment to hospitals in the country (Medical Assistance for Iraqi Children).

Today, critical shortages of medicines, medical equipment, and laboratory supplies remain, meaning that hospitals, clinics, and laboratories are unable to function at full capacity (WHO). Furthermore, health care facilities have been deliberately targeted and looted in the post-invasion period. Coupled with power cuts and unreliable clean water supplies, "progress in reconstructing the health service has been slow," according to WHO (Fleck 2004).

Environmental Health Costs: Despite WHO's best efforts to assist in public health reconstruction efforts in Iraq, progress is slow on many fronts, given the inordinate challenges and security risks facing all public health agencies in the country. Furthermore, the WHO is currently mired in the controversy over the US military's use of depleted uranium (DU) in its two Iraq wars.

What is DU? To understand DU, it is first necessary to understand the process of uranium "enrichment," which has proven to be a contentious issue in its own right in the Middle East. Uranium is a naturally occurring heavy metal, which is found in very low concentrations in the earth's soil and oceans. Hence, trace

amounts of natural uranium are found in drinking water and food, and the average daily human intake of uranium is only about 1 microgram per day (Fahey).

Natural uranium is mined and processed to create highly radioactive "enriched" uranium, which is used in nuclear reactors and in nuclear weapons (ibid.). The waste product of the uranium enrichment process is "depleted" uranium, or DU, which is about 60 percent more radioactive than natural uranium. Like lead, nickel, and other heavy metals, DU is chemically toxic to humans (ibid.).

DU has been used since 1959 in the US munitions industry because (1) it is 65 percent denser than lead, (2) it has a high melting point, (3) it has a tensile strength comparable to most steels, and (4) it ignites when it fragments. Thus, the US military has called DU the "silver bullet" for destroying enemy tanks (ibid.). DU is also the "silver shield" to armor US tanks against enemy fire.

Unfortunately, when DU explodes, it creates "a fine, respirable size dust that contaminates an impact site and presents a hazard to combat troops and civilians" (ibid., 4). Furthermore, DU dust in the environment has a radioactive decay chain lasting 4.5 billion years, thereby posing long-term health risks to exposed populations. These health risks are being vociferously debated in the scientific, military, and environmental communities, given documented use of massive amounts of DU munitions in both US wars in Iraq. Indeed,

Depleted uranium first emerged as a social, political, and scientific issue after the 1991 Gulf War. Initially, interest in DU focused on its relationship to the myriad health problems reported by veterans from the United States and United Kingdom, but during the 1990s, the possible effects on civilians in Iraq gained increasing visibility. (ibid., 2)

It is estimated that nearly 900,000 DU rounds (>286,000 kg) were fired in Iraq by US and British troops during the First Gulf War. Between 118,000–136,000 kilograms of DU have been used in Iraq since March 2003. Furthermore, it is estimated that more than 80 percent (by mass and number of rounds) of DU rounds shot in Iraq have missed their target and thus have been deposited relatively intact in the local environment. Such intact rounds may present a long-term hazard as they oxidize and migrate into soil and water (ibid.).

What are the potential health effects of this massive release of DU into the Iraqi environment? Because only a few dozen American Gulf War veterans who are victims of DU "friendly fire" have been studied, evidence of DU's immediate and long-term human health effects is inconclusive. Nonetheless, in laboratory rats, DU causes cancer, kidney damage, central nervous system damage, reproductive effects (including accumulation in the placenta and congenital malformations), and other health problems (ibid.). Although some environmental activists and Gulf War veterans groups have attributed so-called "Gulf War Syndrome" to DU exposure, it is still unclear whether and how DU translates into compromised human health outcomes.

Given documented DU contamination in combat zones in Iraq, long-term environmental and health effects in Iraq are greatly feared. If DU turns out to be as toxic as some claim, then Iraqis will certainly be affected by significant environmental illness. Already, according to WHO, there are reports of increased rates of cancers (including leukemia among children), congenital malformations, and renal diseases among the Iraqi population since the First Gulf War (WHO, "Potential Impact of Conflict"). WHO is currently collaborating with Iraqi health officials and scientists to develop plans for the surveillance of cancers, congenital malformations, and renal diseases, and to investigate the environmental effects of DU. As noted in a recent WHO report, "Epidemiological studies are needed to investigate such increases and explore all possible causal factors ... [However], the plans have yet to be implemented" (ibid., 7).

As with the unknown Iraqi body count, the US Department of Defense has been accused of gross negligence in failing to assess the health and environmental costs of its use of DU in Iraq. As DU analyst Dan Fahey concludes, reflecting on the situation in Iraq,

DU munitions are neither the benign wonder weapons promoted by the Pentagon propagandists nor the instruments of genocide decried by hyperbolic anti-DU activists. While the political effects of using DU munitions are perhaps more apparent than their health and environmental effects, science and common sense dictate it is unwise to use a weapon that distributes large quantities of a toxic waste in areas where people live, work, grow food, or draw water.

5. Conclusion

As should be clear from the examples of both Lebanon and Iraq, when it comes to war, there are no public health victories—only trails of misery that may take generations to overcome. War is bad for human health and well-being on multiple levels, including the six dimensions highlighted in this article. The public health effects of war are immediate and direct (e.g., death in combat). But, even more significantly, the public health effects of war are long-term and indirect (e.g., environmental toxicity), affecting future generations for years to come. As shown for DU in Iraq, many of the long-term effects of war remain unknown and unstudied.

As we enter the new millennium, it is important to bear in mind that current wars and the lingering effects of earlier wars are currently disrupting the lives of millions of people, including citizens of the Middle East. War has been a cause of profound human suffering in both Lebanon and Iraq, the two nations highlighted in this essay. However, violent conflicts and terrorist attacks have taken many innocents in several other Middle Eastern nations in recent years, destabilizing the region as a whole and militating against the well-being of the region's citizenry.

The pursuit of war in the Middle East and beyond precludes the possibility of "Health for All," which was the utopian goal of the Declaration of Alma-Ata. If the achievement of global health is to become a worldwide aspiration in the 21st century, then it behooves us to assess the public health costs—as well as the political costs—of war, and to agitate for peace in the new millennium ■

Table 1.
Lebanon: A Civil War Timeline

1970:	PLO arrives in Lebanon following "Black September" massacre of Palestinians in Jordan
1975:	War officially begins in April between Christian Phalangists and PLO
1976:	Arab League approves 40,000 Syrian troops as peacekeepers in Lebanon
1978:	Israel invades Lebanon and occupies south with aid of Southern Lebanese Army
1982:	Israeli forces invade Beirut and support massacres by Phalangists in Sabra and Shatila Palestinian refugee camps
1983:	Attacks on US and French military garrisons, leading to deaths of 241 US marines and 58 French soldiers
1984:	Assassination of American University of Beirut President Malcolm Kerr by unknown assailants
1985–1989:	Period of intense fighting between shifting Muslim, Christian, and Druze factions
1989:	Taif Agreement signed in Saudi Arabia to end war
1990:	War officially ends, although violence continues in early 1990s
1990–2000:	Ongoing Israeli occupation of Southern Lebanon
2000:	Withdrawal of Israeli troops in May, with liberation of prisons
2003:	US and British invasion of Iraq prompts anti-Western violence in Lebanon
2005:	Assassination of Lebanese Prime Minister Rafik Hariri in February draws international scrutiny and leads Syria to withdraw its troops from Lebanon in April under international pressure

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