



Fredrik Naumann / Panos Pictures. AFGHANISTAN.

## PART II

# THE SHRINKING COSTS OF WAR

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Part II examines the startling decline in the deadliness of warfare over the last 60 years and provides a critical review of the assertion that some 5.4 million people died as a result of the war in the Democratic Republic of the Congo between 1998 and 2007.

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## PART II

# THE SHRINKING COSTS OF WAR

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## INTRODUCTION

**Part II of this *Report* examines the human costs of war in the post-World War II period—not just the direct deaths from bombs and bullets, but the larger toll from indirect deaths from war-exacerbated disease and malnutrition.**

Chapter 5 reviews the ways in which indirect deaths can be estimated and explores the various factors that drive them.

Chapter 6 presents our most counterintuitive finding—namely that nationwide mortality rates have actually declined during the overwhelming majority of high-intensity armed conflicts since the 1970s. Paradoxical though this finding seems, the facts are indisputable. Well over 100 surveys indicate that under-five mortality rates (U5MRs) declined during periods of warfare in some 90 percent of country-years in war between 1970 and 2008.

A major World Bank study published in 2008 suggests that these findings are not limited to U5MRs. The World Bank's researchers found that median adult and infant mortality rates also decline in wartime.

Common sense suggests that because wars kill people, the extra deaths should cause national mortality rates to increase, not decrease. In fact, today's armed conflicts rarely generate enough fatalities to reverse the long-term downward trend in peacetime mortality that has become the norm for most of the developing world. Three interrelated developments account for this contrarian trend.

First, more than three decades of highly successful international efforts to promote public health in developing countries have led to a steady reduction in peacetime mortality rates. The enduring effects of these efforts have led to another—mostly unnoticed—change, namely the saving of large numbers of lives in wartime. International efforts to increase immunization coverage, which have saved millions of lives worldwide over the past two decades, have sharply reduced child mortality rates—in times of war, as well as times of peace.

Second, wars generate far fewer deaths on average today than they did in the past, largely because the nature of warfare has changed. In contrast to the Cold War years, relatively few of today's conflicts involve interventions by major powers, or prolonged engagements between huge armies equipped with heavy conventional weapons. The low-intensity conflicts of the post-Cold War era are almost always fought within, not between, states. Rebel armies are typically small, mostly equipped with small arms and light weapons, and are rarely keen to engage in major battles. As a consequence, death tolls are generally low.

Third, there has been a substantial increase in the level and scope of humanitarian assistance since the end of the Cold War. Aid per displaced person in war-affected countries has increased more than threefold over the past two decades. It has also become more cost-effective, benefiting in many cases from peacetime developments in public health programs.

The Human Security Report Project's (HSRP's) finding that mortality rates decline in most wars stands in sharp contrast to the survey-derived claim by the well-regarded International Rescue Committee (IRC) in 2008 that an astonishing 5.4 million people have died as a consequence of the fighting in the Democratic Republic of the Congo.

In what is the most comprehensive analysis to date of the IRC's findings, Chapter 7 of this *Report* challenges the IRC's 5.4-million estimate, arguing that it is far too high.<sup>1</sup>

Given that the practice of estimating the number of excess war deaths—or total war deaths—via retrospective mortality surveys is so prone to error, and given that the effects of some of these errors become greater the longer wars last, Chapter 8 makes a strong case for seeking alternative approaches to estimating the human costs of war.

However, the caution against using surveys for the specific purpose of estimating nationwide excess deaths is emphatically not an argument against the utility of nationwide population surveys more generally. These remain a critically important instrument for creating an evidence base for needs assessments for UN and non-UN peace operations, for monitoring, and for impact evaluation. Estimates of nationwide excess mortality tolls are not needed for any of these purposes.

Chapter 9, the final chapter in Part II, examines the World Health Organization-affiliated Health as a Bridge for Peace program, whose proponents argue that health professionals have a role to play in conflict prevention via education, in seeking to stop ongoing wars via what the UN calls "peacemaking," and in post-conflict peacebuilding, where the key security goal is to prevent wars that have stopped from starting again.





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## CHAPTER 5

### Deadly Connections: Wartime Violence and Indirect Deaths

Over the past decade, humanitarian organizations and conflict researchers have paid increasing attention to the phenomenon of *indirect deaths*—those fatalities from war-exacerbated disease and malnutrition that would not have occurred had there been no war.<sup>2</sup>

There is general agreement in the research community that the violence that generates deaths on the battlefield is an important driver of indirect deaths, and that the latter are significantly greater in number than the former. But despite the growing interest and a handful of nationwide mortality surveys undertaken to determine excess war death tolls in Iraq, the Democratic Republic of the Congo (DRC), Kosovo, and elsewhere, the number of indirect deaths generated by today's wars remains mostly unmeasured—and thus unknown.

Data for global, regional, and national direct—or violent—death tolls caused by combat are available, however, and some scholars have suggested there is a consistent ratio between direct death tolls from violent injuries and those from war-exacerbated disease and malnutrition, implying that, if we have data for the former, we will be able to calculate the latter.

A much-cited article in the *British Medical Journal* noted in 2002, for example, that “for at least a decade, the ratio of indirect to direct conflict deaths has been quoted as 9:1.”<sup>3</sup> But the article went on to point out that this figure had never been

supported by any reported empirical data. Nor could it have been—no such data existed.

In a study of Africa's wars published in 1994, Reginald Green claimed that “lack of food and of medical services, combined with the physical stress of flight, kill about twenty times as many human beings as do bombs, bullets and cold steel.”<sup>4</sup> This, too, was a claim for which there was a complete lack of compelling evidence.

More recently, the wide-ranging *Global Burden of Armed Violence* report, published by the Geneva Declaration Secretariat, argued that for every person who died violently in wars around the world between 2004 and 2007, another four died from war-exacerbated disease and malnutrition.<sup>5</sup> The report did not claim there was a consistent ratio between the two, simply that on average, the indirect-to-direct war death ratio was 4:1. This ratio is certainly not implausible, but the evidence base used to calculate it is far too narrow and uncertain to engender any confidence in its accuracy.

Moreover, even if an average ratio between indirect and direct deaths could be accurately determined, this would tell us nothing about individual countries. There are, in fact, huge variations in the indirect/direct death ratios between countries afflicted by conflict.<sup>6</sup> In wars in relatively developed countries, for example, there are remarkably few indirect deaths; in poor-country wars, by contrast, they greatly outnumber direct deaths.

Yet, while the extent of indirect death tolls in warfare remains largely unknown, humanitarian organizations know a great deal about the relationship between war and the

vulnerability of war-affected poor-country populations to malnutrition and deadly disease.

Data from hundreds of small needs-assessment surveys carried out by humanitarian agencies and NGOs (nongovernmental organizations) in refugee and internally displaced person (IDP) camps indicate that just four “killer diseases”—acute respiratory infections (ARIs); malaria; diarrheal diseases; and measles—are responsible for most indirect deaths in conflict zones (see The Four Killer Diseases in this chapter). Malnutrition increases the susceptibility of individuals—particularly children—to these diseases and is an important cause of death in its own right.

### The Drivers of Disease in Wartime

War-affected populations are far more susceptible to disease than those in peacetime. This is not surprising.

As the *Human Security Report 2005* noted:

Wars destroy property, disrupt economic activity, divert resources from health care... Crowded into camps, susceptible refugees fall ill from infectious diseases and contribute to the further spread of these diseases...

Wars increase exposure to conditions that, in turn, increase the risk of disease, injury and death. Prolonged and bloody civil wars usually displace large populations—either internally or across borders...

Bad food, contaminated water, poor sanitation and inadequate shelter can combine to transform camps into vectors for infectious disease—measles, respiratory disease and acute diarrhoea—while malnutrition and stress compromise people’s immune systems. Diseases rampant in refugee camps easily spread to wider populations...

Prevention and treatment programs, already weakened by the wartime destruction of health care infrastructure, simply cannot cope with new threats posed by mass population displacements...

Civil wars also deplete the human and fixed capital of the health care system. Heavy fighting often destroys clinics, hospitals and laboratories, as well as water treatment and electrical systems.<sup>7</sup>

This extract from the first *Human Security Report* accurately describes how major wars can drive up indirect death tolls. But most conflicts that have been waged since the

end of the Cold War have been relatively minor and have killed far fewer people than the major wars of the Cold War period. Their impact on population health has been much less extensive and severe than the impression created in the literature—including the above passage.

There is broad consensus within the humanitarian and research communities about the factors that affect—positively or negatively—the risk of death from disease and malnutrition. These include the following:

- The geographical scope and intensity of the fighting—the latter being measured by the number of violent deaths, the former often by the percentage of the national territory afflicted by serious violence.
- The number of individuals displaced who become either refugees or—more commonly—IDPs.<sup>8</sup>
- Increased stress and exposure to new strains of disease, both of which are associated with displacement.
- Reduced access to health services as a consequence of conflict.
- Loss of livelihoods.
- Access to potable water, sanitation, and shelter.
- Timely humanitarian assistance.
- The preconflict health status of the war-affected population.
- The physical and psychological resilience of populations in war-affected areas.

The impact of these factors on population health differs markedly from conflict to conflict. And as we argue in Chapter 6, there are good reasons to believe that a combination of low-cost but highly effective pre-war health interventions, less-deadly wars, and increased humanitarian assistance to war-affected populations has considerably reduced the ratio of indirect to direct death tolls in today’s wars compared with those of the Cold War era.

### Measuring Indirect War Deaths

As noted earlier, warfare generates two related but quite different death tolls. Direct deaths, as the term suggests, are those that result directly from injuries caused by military operations. They include not only combatants but civilians caught in the crossfire. Indirect deaths are those that result from war-exacerbated disease and malnutrition. Excess deaths are the total number of deaths—both direct and indirect—that would not have occurred had there been no war.

Measuring direct deaths is quite straightforward in theory, though often challenging in practice. Direct death data have been collected for *state-based conflicts*, i.e., those in which

## THE FOUR KILLER DISEASES

The deadliest disease clusters associated with wars in poor countries are malaria, diarrheal diseases, acute respiratory infections (ARIs), and measles. Widespread in many developing countries in peacetime, these diseases are notable not only for their deadly impact but also because they can be treated simply and at a remarkably low cost.

Fatalities from communicable diseases typically increase during periods of political violence, sometimes dramatically, with children, refugees, and internally displaced persons (IDPs) being particularly vulnerable.

An analysis of 46 retrospective mortality surveys undertaken for the Human Security Report Project by the Paris-based research centre Epicentre found that, overall, malaria was the disease that caused the most deaths in conflict and post-conflict zones, followed by diarrheal disease, ARIs, and measles.<sup>9</sup> The incidence of particular diseases varied significantly from one conflict to another, however.

### *Malaria*

The deadliest killers in many war zones are malaria-carrying anopheles mosquitoes. Endemic in much of the developing world, malaria causes fever, headaches, chills, and vomiting. Without prompt treatment it is often fatal, particularly among children under five. Displaced populations, often stressed, malnourished, and frequently sleeping in the open, are particularly vulnerable to infection.

Although low-cost treatment options have shrunk in recent years due to the growing resistance of malarial parasites to traditional antimalarial drugs, the costs of the new therapies remain affordable for most humanitarian agencies.

### *Diarrheal Diseases*

Diarrhea is often the first deadly disease to strike war-affected populations. In locations that lack access to safe drinking water, are overcrowded, and have poor sanitation, cholera, dysentery, and other intestinal infections can spread rapidly and with devastating effect. Mortality rates from diarrheal diseases tend to be highest at the onset of complex emergencies before adequate humanitarian assistance becomes available. In the wake of the genocide in Rwanda, an estimated 50,000 Rwandan refugees in eastern Zaire (now the Democratic Republic of the Congo) died in July 1994 following outbreaks of cholera and shigellosis.<sup>10</sup> The crude mortality rate was one of the highest ever recorded among refugees or IDPs.<sup>11</sup>

Oral rehydration salts or intravenous solutions are used to rehydrate those afflicted by diarrhea, while antibiotics are used to treat cases of cholera and shigellosis.<sup>12</sup>

### *ARIs*

Pneumonia, influenza, and tuberculosis, which are caused by airborne bacteria and viruses, spread easily in crowded living conditions, and people suffering from malnutrition and increased levels of stress are particularly susceptible to infection.

Treatment and prevention of ARIs vary according to the disease. Low-cost antibiotics are usually effective against the bacterial infections associated with pneumonia.<sup>13</sup> Vaccination is the primary preventive measure against influenza and can reduce flu mortality by up to 80 percent, and sometimes even more depending on the risk level of the group in question.<sup>14</sup>

Treating tuberculosis during complex emergencies is challenging, in part because some strains of the disease become resistant to antibiotics if treatment is interrupted.<sup>15</sup> However, timely and appropriate treatment can lead to an 85 percent cure rate.<sup>16</sup>

### *Measles*

Despite the recent reductions in global mortality rates from measles, the disease remains a major cause of death in the developing world. In war zones, where displaced persons are often stressed and initially gathered in overcrowded camps, a significant proportion of the population can become infected, with children once again at the greatest risk of dying. In the Gode District of Ethiopia during the conflict and drought in 1999 and 2000, for example, measles was a major cause of death among children under 14 years old.<sup>17</sup>

Preventing measles via vaccination is easier and cheaper than treating it, and vaccination programs are now routine in refugee and IDP camps, where crowding would otherwise greatly increase the risk of contagion. The average cost of the measles vaccine for a child is USD 0.60–1.00.<sup>18</sup> Immunization programs have been extraordinarily effective. Between 2000 and 2007, the global measles mortality toll dropped by 74 percent.<sup>19</sup>

The central message of nearly two decades of research on the four disease clusters that put war-affected populations at greatest risk is that they are all treatable—and that the cost of saving countless lives is very small indeed.



a government is one of the warring parties, since 1946. Estimating indirect deaths poses a far greater challenge.

When soldiers are killed in combat and civilians are caught in the crossfire, their deaths are—in principle at least—both easy to count and unambiguously attributable to the wartime violence. A combatant shot on the battlefield is clearly a victim of war and can be reported as such. But individuals who succumb to malaria during the course of the same conflict are not necessarily victims of the war because they might well have died of the same disease had there been no fighting.

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## Mortality rates are the most important measure of population health.

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It is rarely possible to determine whether or not a particular individual who dies of disease in wartime perished because of factors associated with the war. It is hypothetically possible, however, to determine statistically how the overall mortality rate has increased during the war relative to the pre-war period. The difference between the peacetime and wartime rate—the *excess* mortality rate—can be used to determine the excess death toll provided that the population size and population growth rate are known. When the causes of death—violence versus disease and malnutrition—are also known, it is then possible to distinguish the direct from indirect death tolls.

### Measuring Indirect Death Tolls with Surveys

In poor countries affected by war, effective health surveillance systems rarely exist and estimates of mortality rates from disease and malnutrition are usually derived from health surveys. Such surveys have become the standard means for humanitarian agencies and NGOs to assess humanitarian needs and track the health status of populations receiving assistance in war-affected communities.

Among other things, these surveys typically measure adult and/or child mortality rates and the causes of death—non-violent, as well as violent. Mortality rates are the single most important measure of population health in regions affected by warfare; in these regions, survey data usually reveal rates that are many times higher than in peacetime.

The information these local surveys provide is critically important for the assessment of humanitarian needs but cannot be used to determine the impact of war-driven disease and malnutrition on mortality levels nationwide. This is because conditions in refugee and IDP camps—where most

surveys are carried out—are not representative of the nation as a whole. Indeed, they are usually highly unrepresentative.

When initially established, camps may not be able to provide adequate services for the displaced persons who crowd into them. For this reason, camp mortality rates are often considerably higher initially than the national average. But once camps become properly established and displaced populations gain access to adequate nutrition, life-saving health services, clean water, and basic sanitation, mortality rates drop rapidly, often to below the nationwide pre-war rate.

To determine national mortality rates—and hence death tolls—researchers can employ nationwide retrospective mortality surveys. Only a few such surveys—in Iraq, Kosovo, East Timor, the DRC, and elsewhere—have been carried out with the specific intent of estimating excess death numbers.

The procedure that researchers follow in order to estimate the excess death toll is relatively straightforward:

- *Select* a sample population to be interviewed that is sufficiently large and representative of the population of the country as a whole.
- *Ask* respondents if any members of their household died during the war—and if so, how. The responses provide a record of the number of deaths in the sample population and their cause, e.g., whether from violence or disease.
- *Determine* the mortality rate for the sample population—usually measured in terms of deaths per 1,000 persons surveyed per month, or deaths per 10,000 persons per day.
- *Assume* the mortality rate for the national population will be approximately the same as that of the sample—though all extrapolations have a margin of error.
- *Estimate* the national pre-war mortality rate—usually referred to as the *baseline* mortality rate. (Note: This is the most challenging part of the process.)
- *Determine* the excess mortality rate from the direct and indirect effects of wartime violence by subtracting the pre-war mortality rate from the survey-derived wartime rate.
- *Estimate* the excess death toll. This is relatively simple to calculate provided the excess mortality rate, the size of the national population, and the population growth rate for the period covered by the survey are all known.
- *Assess* the causes of death. When survey respondents are asked about the cause of death, the data can be disaggregated to reveal what percentage of deaths were from violent versus nonviolent causes.

However, what is straightforward in principle can be extremely challenging in practice. Confidence in the accuracy of nationwide death toll estimates is reduced by different

forms of bias that impact all such surveys, and by the often significant uncertainties with respect to pre-war mortality rates, population size, and growth rates.<sup>20</sup>

In Chapter 7 we show how inappropriate estimates of baseline mortality rates can lead to a dramatic exaggeration of excess death tolls.

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### Nationwide mortality rates mostly decline during periods of war.

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In Chapter 8 we argue that the conventional treatment of the baseline mortality rate (i.e., the assumption that had there been no war it would have remained constant) is highly problematic and can be a further source of major error in estimating excess death tolls.

## Conclusion

This chapter has examined some of the challenges that confront efforts to estimate the number of indirect deaths from war-exacerbated disease and malnutrition. We noted the widespread agreement within the humanitarian community that, in wars in poor countries, i.e., the majority of wars today, indirect death tolls are far greater than tolls from war-related violence. But we also noted there is no consensus as to the extent of these deaths, nor indeed as to what the average ratio of indirect to direct deaths might be. As a consequence, indirect deaths around the world remain uncounted and—except in a few high-profile conflicts as in Darfur and the DRC—largely unnoticed.

In Chapter 6 we turn to a critically important, deeply counterintuitive, and largely unrecognized phenomenon—namely that nationwide mortality rates mostly decline during periods of war.



Uriel Sinai / Getty Images. DEMOCRATIC REPUBLIC OF THE CONGO.

## CHAPTER 6

### The Paradox of Mortality Rates that Decline in Wartime

In this chapter we examine a seemingly paradoxical finding that has attracted virtually no attention in either the conflict research or humanitarian communities, let alone the media—namely that since 1970, nationwide mortality rates in most countries have actually declined during periods of war.

The data reviewed here—which take into account indirect deaths from war-exacerbated disease and malnutrition, as well as deaths from injuries caused by violence—suggest that the human costs of warfare may not be as great as many people believe—and much of the literature suggests.

The prepublication version of *The Shrinking Costs of War* contained a review of trends in under-five mortality rates (U5MRs) in conflict-affected countries in sub-Saharan Africa. Here, we review the U5MR trend data for all countries that experienced war during the period from 1970 to 2008.<sup>21</sup> In the overwhelming majority of cases, mortality rates declined during wartime.

The explanation for this apparent paradox turns out to be relatively straightforward. First, the long-term forces that have been driving mortality rates down in the developing world in peacetime continue to have an impact in wartime. Second, the relatively small and geographically concentrated armed conflicts that are typical of the current era rarely lead to enough excess deaths to reverse the long-term downward trend in peacetime mortality. Third, increased and increasingly

effective humanitarian assistance has had remarkable success in driving down mortality rates—especially from disease and malnutrition—in wartime.

### Mortality Rates in War

There is comparatively little reliable information collected on trends in adult mortality in the developing world, where most wars take place; by contrast, there is a great deal of information on the (related) trends in child mortality.

As noted in Chapter 5, only a handful of retrospective mortality surveys have been carried out expressly to measure death tolls (for adults, as well as children) due to warfare. But national population health surveys that collect data on child mortality are regularly undertaken throughout the developing world by US Demographic and Health Surveys (DHS), UNICEF (United Nations Children’s Fund), and, most recently, WHO (World Health Organization). The surveys from all three organizations cover periods of warfare, but they do not estimate excess war death tolls.

The U5MR is a particularly sensitive indicator of the indirect costs of war. In humanitarian emergencies, children tend to die earlier and—proportionate to their share of the national population—in larger numbers than adults. They are sometimes described as the “canaries in the coal mine” of conflict mortality.<sup>22</sup>

Given that the U5MR is a highly sensitive indicator of the extent of indirect war deaths, and given that no one doubts that organized violence in poor countries drives up the

incidence of malnutrition and deadly diseases to which young children are particularly vulnerable, we might expect U5MRs to increase in countries afflicted by war.

Yet nationwide U5MRs, as measured by DHS, UNICEF, and other surveys, mostly decline not only in peacetime but also during periods of high-intensity armed conflict.<sup>23</sup> As we note later, recent research from the World Bank suggests that this pattern also holds for adult and infant mortality.

In reporting these counterintuitive findings, we stress that we do not for a moment dispute the overwhelming evidence that conflict-exacerbated disease and malnutrition lead to sharply increased death tolls in war zones and among conflict-displaced populations. But for most—not all—countries, war zones encompass only a relatively small part of the national territory, and warfare directly affects only part of the population.

### Trends in Under-Five Mortality in War

The Human Security Report Project (HSRP) examined the trend in under-five mortality for the period from 1970 to 2008 in every country that experienced 1,000 or more battle deaths from state-based armed conflict in a given year. What we found is there were extraordinarily few instances in which national mortality rates increased during war.

Table 6.1 presents the data on the number of country-years in war in which the U5MR increased between 1970 and 2008. A *country-year in war* is defined as a calendar year in which a country experienced 1,000 or more battle deaths. We record an increase in the U5MR when the rate for a country is higher than it was in the preceding year.

It is very clear from Table 6.1 that over the past four decades, remarkably few wars were accompanied by increases in under-five mortality. In fact, the U5MR increased in only 25 of the 477—or 5 percent—of country-years in war.<sup>24</sup>

In Table 6.2 the focus is on countries rather than country-years. Here, the data show that worldwide, just eight countries (15 percent) experienced increases in U5MRs in wartime.

Six out of these eight countries were in sub-Saharan Africa (Mozambique, Republic of the Congo, Rwanda, Sudan, Uganda, and Zimbabwe); one was in East and Southeast Asia (Vietnam); while the other was in Europe (Russia). The six sub-Saharan African countries accounted for 88 percent of the country-years in war in which under-five mortality increased.

Tables 6.1 and 6.2 demonstrate unequivocally that for some four decades, armed conflict has very rarely been deadly enough to reverse the near-universal downward trend in nationwide U5MRs.

**Table 6.1 Increases in the Under-Five Mortality Rate (U5MR) by Country-Year in War, 1970–2008**

Region	Number of Country-Years in War	Number of Country-Years in War in which the U5MR Increased	Percentage of Country-Years in War in which the U5MR Increased
Sub-Saharan Africa	155	22	14.19
Americas	65	0	0.00
Central & South Asia	96	0	0.00
East & Southeast Asia & Oceania	76	1	1.32
Europe	13	2	15.38
Middle East & North Africa	72	0	0.00
<b>Global</b>	<b>477</b>	<b>25</b>	<b>5.24</b>

*Data Sources: PRIO; UCDP/HSRP Dataset; IACMEG.*<sup>25</sup>

*A country-year in war is a year in which a country experienced 1,000 or more battle deaths from state-based armed conflict.*

*An increase in the U5MR is recorded when the best estimate of the U5MR for a country is higher than it was in the preceding year.*

Over the last four decades, surprisingly few countries have experienced increases in the nationwide U5MR during war. Indeed, the U5MR increased in only 5 percent of country-years in war. In three regions of the world—the Americas, Central and South Asia, and the Middle East and North Africa—no war generated enough deaths to cause the U5MR to increase. Even in sub-Saharan Africa, the most war-prone region, and the region with the highest U5MRs, only 14 percent of country-years in war witnessed increases in the U5MR.

**Table 6.2 Increases in the Under-Five Mortality Rate (U5MR) during War by Country, 1970–2008**

Region	Number of Countries that Experienced at Least One Year of War	Number of Countries that Experienced an Increase in the U5MR during War	Percentage of War-Affected Countries with an Increase in the U5MR during War
Sub-Saharan Africa	14	6	42.86
Americas	8	0	0.00
Central & South Asia	9	0	0.00
East & Southeast Asia & Oceania	6	1	16.67
Europe	4	1	25.00
Middle East & North Africa	11	0	0.00
<b>Global</b>	<b>52</b>	<b>8</b>	<b>15.38</b>

Data Sources: PRIO; UCDP/HSRP Dataset; IACMEG.<sup>26</sup>

A country that experienced war is a country that had 1,000 or more battle deaths from state-based armed conflict in a given year.

An increase in the U5MR is recorded when the best estimate of the U5MR for a country is higher than it was in the preceding year.

Here, the focus is on countries rather than country-years in war. But the pattern is similar. Very few countries experienced increases in U5MR during wartime between 1970 and 2008. Sub-Saharan Africa has the highest percentage of countries in which warfare is associated with an increase in the U5MR. But even here, less than half of the countries in question saw increases. Worldwide, just 15 percent of war-affected countries experienced increases in U5MR rates in wartime.

Figure 6.1 shows the trends in U5MRs in a number of countries around the world. The under-five mortality trend data are taken from the consensus estimates of the Inter-Agency Child Mortality Estimation Group (IACMEG), which are, in turn, compiled from data drawn from DHS, UNICEF, other surveys, and census data. The conflict data are from the Uppsala Conflict Data Program (UCDP), as well as the International Peace Research Institute, Oslo (PRIO).

Figure 6.1 is not representative of most countries in conflict—three out of seven of the countries show increases in U5MRs during war. The most dramatic example is Rwanda where the genocide killed an estimated 8 to 9 percent of the population in just a few months. This was the deadliest period of organized violence experienced by any country since the end of World War II.<sup>27</sup> In Russia, another country that experienced an increase in under-five mortality, the increase predated the war and was related to a general increase in mortality throughout the country.

However, what Figure 6.1 reveals is that in some high-intensity and long-duration wars, like those in Afghanistan, Colombia, and Ethiopia, U5MRs continue to decline.

These findings are so counterintuitive that they inevitably give rise to questions about the reliability of the data used to generate them. There is, in fact, little reason to doubt that the

overall trends are correct, although it is quite true that the “best fit” trend lines are made up of survey (and sometimes census) data that often have wide confidence intervals—that is, they are subject to a considerable degree of uncertainty.<sup>28</sup> We cannot therefore be confident that any particular mortality measure on the best fit trend line will be accurate. But the data are accurate enough to confirm the average trend in child mortality—i.e., that rates almost always decline in periods of warfare.

### The Human Costs of War in Global Perspective

In addition to the survey data, there have been a small number of studies that have sought to measure the *global* impact of war on population health. Most of these studies use WHO’s Disability-Adjusted Life Year (DALY)—an indicator of the number of healthy years of life lost—rather than simply mortality rates to measure the health impact of war. The key findings of this research are reviewed later in this chapter (see Political Science Estimates of the Human Costs of War).

In 2008 the *World Bank Economic Review* published a major study by Siyan Chen, Norman Loayza, and Marta Reynal-Querol on the worldwide impact of warfare on a range of economic, political, and social variables in war-affected countries.<sup>29</sup>



Part of the study was devoted to examining the impact of war on adult male and female mortality, and infant mortality, rather than under-five mortality. The authors counted only those conflicts in which there were at least 1,000 battle deaths in a given year, and they used World Bank mortality rates as their main indicator of population health. The article compares median adult and infant mortality trends for the war-affected countries for a seven-year period before the fighting broke out, and for seven years after a conflict had ended.

The authors found that both median adult and infant mortality declined before, after, and during periods of warfare—the same trend revealed in the under-five mortality data reviewed earlier.<sup>30</sup>

The World Bank article reveals that war-affected countries have far higher pre-war mortality rates than regional control countries that are not affected by war, though in both cases median mortality rates decline at similar rates. This suggests that factors other than war—notably levels of poverty-related disease and malnutrition—remain important drivers of mortality in times of war as well as peace.

Data on adult mortality rates in poor countries are often derived from the under-five mortality data for the country in question. Where this is the case, the adult mortality rate will clearly track the child mortality rate quite closely. However, a new study from the Institute for Health Metrics and Evaluation (IHME) at the University of Washington suggests that, contrary to what has commonly been assumed, adult mortality rates may in some cases diverge from child mortality rates. The IHME findings, which are based in part on new data taken from sibling survival surveys, indicate that adult male mortality rates sometimes increase in wartime even when child mortality rates are falling. These findings are based on a relatively small sample of countries, and are subject to considerable uncertainty, but they pose a challenge to the findings of the World Bank study.<sup>31</sup>

### Why Mortality Rates Decline in Wartime

Armed conflict not only causes violent deaths but also population displacement, stress, malnutrition, and loss of access to health services, all of which greatly increase the susceptibility of individuals to fatal diseases. This raises an obvious question: Why do nationwide mortality rates decrease rather than increase during periods of warfare—particularly with respect to the most vulnerable members of society—children under five?

In fact, mortality rates, from disease as well as violence, do increase—often dramatically—in and around war zones, as literally hundreds of epidemiological surveys demonstrate.

But if this is the case, why do these fatalities appear to have so little impact on nationwide mortality trends?

The answer is twofold. First, the enduring impact of what UNICEF calls the “revolution in child survival” has been driving down peacetime U5MRs in developing countries for more than three decades. Second, the impact of war deaths on national mortality rates is much less than was the case with the major wars of the Cold War years, and less than is assumed in much of the literature. This is in part because today’s armed conflicts generate far fewer deaths on average than those of the past, and because they are more geographically concentrated—the latter being a function of smaller armies with limited power projection capacities. In short, the impact of war deaths has not been great enough to reverse the long-term decline in nationwide mortality rates—except in a very small minority of cases.

The extent of the improvement in health outcomes in the developing world—of adults as well as children—over the past 50-plus years has been extraordinary. As a 2007 report from the Center for Global Development noted, “one of the greatest human accomplishments has been the spectacular improvement in health since 1950, particularly in developing countries.”<sup>32</sup>

The 2008 *World Bank Economic Review* study cited earlier argues that conflict-affected countries “have been able to participate in international progress, despite the war. This is arguably a testament to the beneficial impact of medical innovations... and the international campaigns to promote them.”<sup>33</sup>

### The “Revolution in Child Survival”

In most conflict-affected countries, child mortality due to war-exacerbated disease and malnutrition—by far the greatest cause of child deaths in wartime—has been substantially reduced by the enduring impact of a range of low-cost, nationwide, public health interventions in peacetime.

These interventions are part of long-term global campaigns waged by WHO and UNICEF to reduce child mortality that have been directed in large part against infectious and parasitical diseases. Critical elements in these campaigns have been the Expanded Programme on Immunization, launched by WHO in 1974, and UNICEF’s “revolution in child survival” initiative launched in 1982.

According to UNICEF:

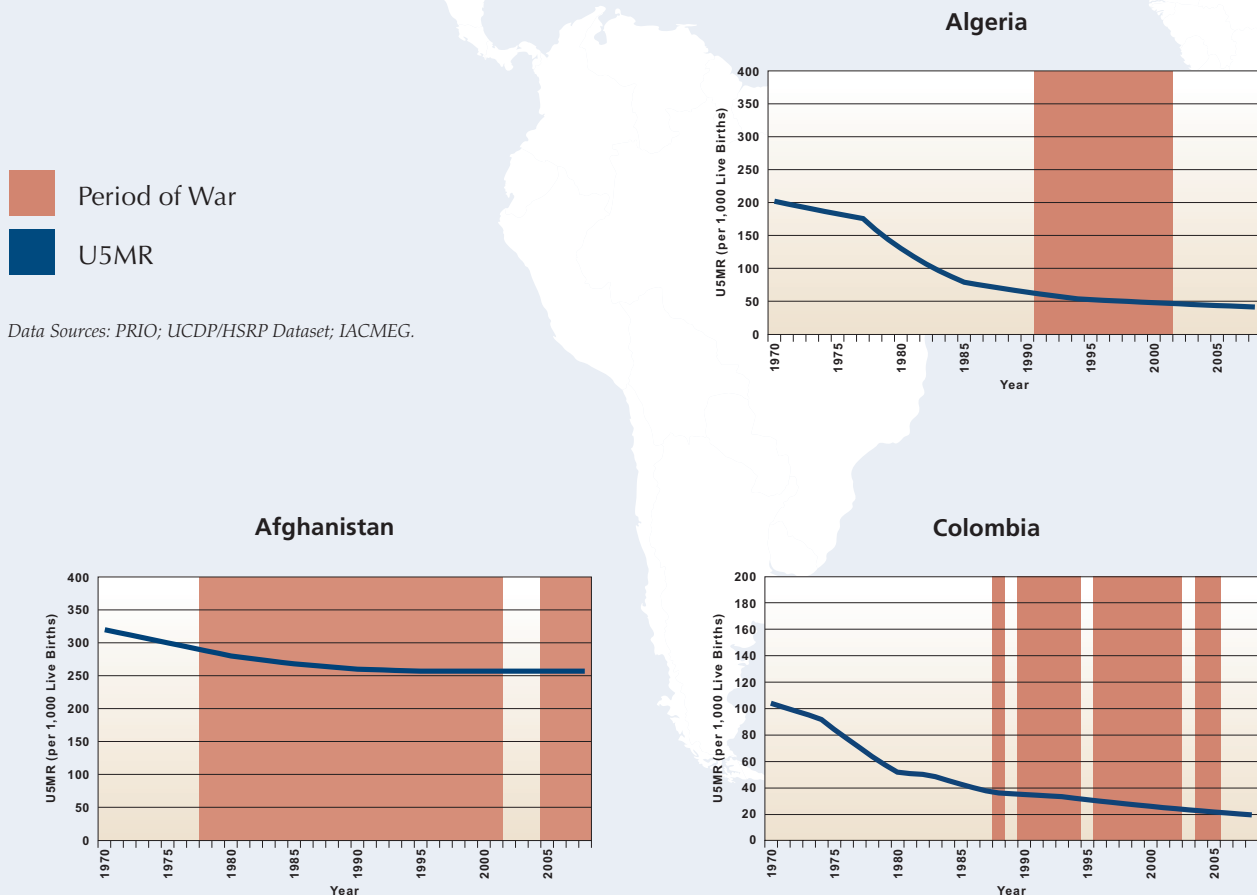
Immunization coverage of infants for the six major vaccine-preventable diseases—diphtheria, measles, pertussis, polio, tetanus and tuberculosis—rose from less than five per cent in 1974 to more than 75 per cent in 2006.<sup>34</sup>

## FIGURE 6.1

### Periods of War and Under-Five Mortality Rates (U5MRs), 1970–2008

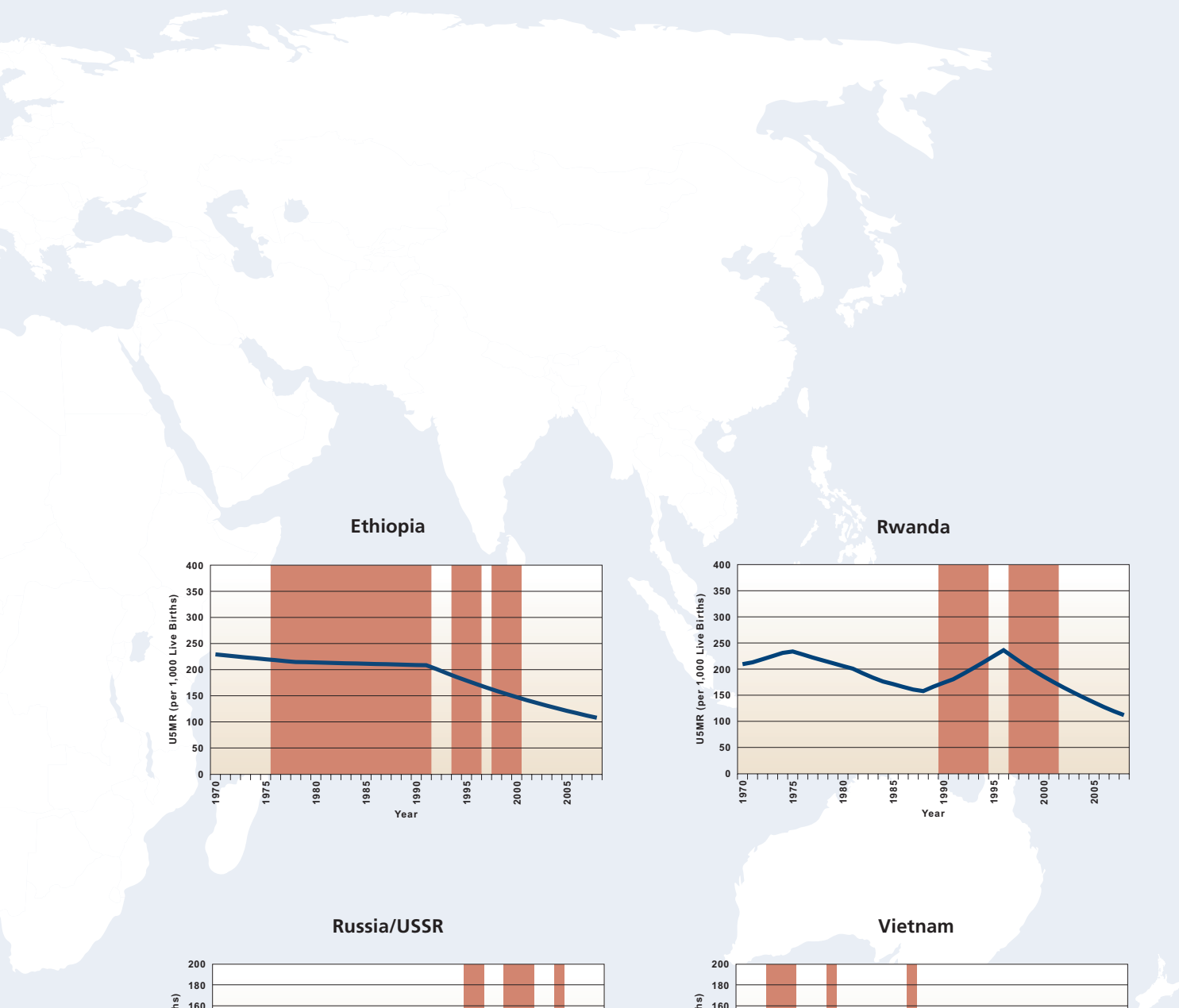
With few exceptions, U5MRs in countries around the world have declined during periods of war. This finding holds even in long and high-intensity wars—such as those in Afghanistan, Colombia, and Ethiopia.

Periods of intense violence in countries with relatively small populations, such as that in Rwanda in the mid-1990s, are sometimes associated with increases in U5MRs. Increases in mortality can also predate a period of war, as was the case in Russia in the early 1990s.

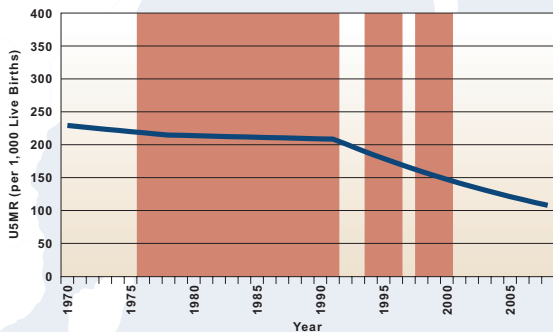


Data Sources: PRIO; UCDP/HSRP Dataset; IACMEG.

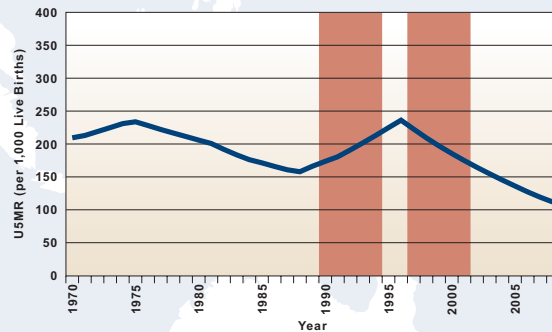
A period of war is a year, or series of years, in which a country experienced state-based armed conflict that resulted in 1,000 or more battle deaths per annum.



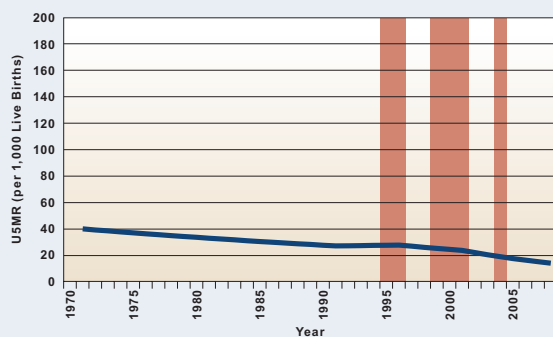
**Ethiopia**



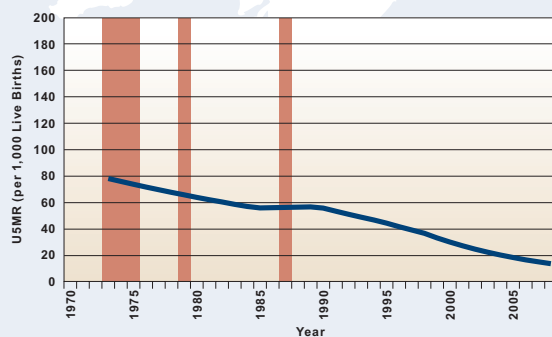
**Rwanda**



**Russia/USSR**



**Vietnam**



## THE REVOLUTION IN CHILD SURVIVAL

The “revolution in child survival” had its genesis some 30 years ago when the then executive director of UNICEF (United Nations Children’s Fund), James P. Grant, launched a new initiative to cut child mortality rates.

UNICEF’s main targets were the infectious diseases that posed the greatest threat to children under five.<sup>35</sup> The new strategy stressed prevention—notably immunization against preventable diseases—as well as low-cost treatment.<sup>36</sup>

The key policy elements in the campaign were summarized in the acronym “GOBI”:

Growth monitoring to keep track of child well-being in a regular and systematic manner.

Oral rehydration therapy to combat diarrhea.

Breastfeeding to provide essential nutrients in the child’s early stages of development.

Immunization against tuberculosis, diphtheria, whooping cough, tetanus, polio, and measles.

Subsequently, three more components were added to the GOBI strategy: food supplementation, family spacing, and female education—“GOBI” then became “GOBI-FFF.”<sup>37</sup>

Working with the World Health Organization and a broad coalition of nongovernmental organizations, UNICEF’s campaign has had a dramatic impact—child mortality rates in the developing world have declined by more than half since 1960.<sup>38</sup> In 1960, the earliest year for which global data on child deaths are available, an estimated 20 million children died; by 2008, the figure was under 9 million. The revolution in child survival, in other words, has helped save millions of lives.

Poverty does not necessarily prevent countries from sharply reducing the rate at which their children die. In almost a third of the 50 least developed countries, mortality rates declined by 40 percent or more between 1990 and 2006.<sup>39</sup>

In sub-Saharan Africa, progress has been considerably slower than in other regions.<sup>40</sup> According to a 2003 study published in the UK journal *The Lancet*, 41 percent of the estimated 10.8 million child deaths worldwide in 2000 were in sub-Saharan Africa.<sup>41</sup> African children continue to die merely because they lack access to simple, inexpensive, and proven life-saving prevention and treatment programs.

The authors of a subsequent *Lancet* study in the same series focused on the 42 countries that generate 90 percent

of child deaths—almost 10 million in 2000—and estimated that with universal coverage of basic health interventions, this toll could be reduced by two-thirds.<sup>42</sup> Thus, notwithstanding the successes to date, it is clear there is great scope for further progress.

It is also clear that in most countries that have made major progress in driving down child mortality, national governments, often under pressure from local communities, have played a critical role.

The ongoing revolution in child survival helps explain the apparent paradox of child—and by implication, adult—mortality rates that decline in wartime.

It does so in several ways.

First, children who are healthy and well nourished immediately prior to a war are likely to be more resistant to disease and malnutrition in wartime than those who are not.

Second, as noted elsewhere in this chapter, peacetime health campaigns—for mass immunization, for example—often continue to have a beneficial and enduring impact even in periods of conflict.

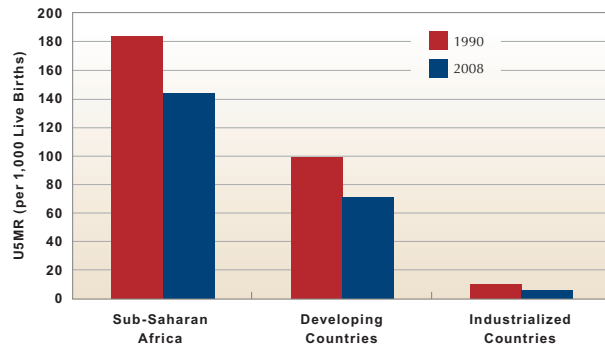
Third, much of the research on improving child health in poor countries in peacetime has helped improve the efficacy of humanitarian assistance in war zones and in post-conflict situations. This, in turn, has helped reduce wartime and post-conflict mortality rates.

Fourth, in most of today’s conflicts, warfare has a serious direct impact only on a relatively small part of the national territory. In territory unaffected by serious violence, basic health services will often still be provided.

Fifth, in a substantial number of wars, it has been possible for so-called Days of Tranquility to be negotiated with rebel groups. These temporary truces permit health workers to carry out mass immunization programs on children in conflict zones.

Last, the promotion of child health, even in war-affected countries, has widespread support both at home and among donors and international agencies. It is relatively inexpensive, enhances the legitimacy of national governments, and is popular with the citizens whose needs it meets.

**Figure 6.2 Under-Five Mortality Rates (U5MRs): Sub-Saharan Africa, Developing Countries, and Industrialized Countries, 1990 and 2008**



Data Sources: UNICEF.<sup>43</sup>

Although U5MRs remain significantly higher in sub-Saharan Africa than the developing world average, even here there have been marked improvements over the last two decades.

By some estimates, immunization alone has saved up to 1 million lives a year on average over the past two decades.<sup>44</sup>

The worldwide impact of the revolution in child survival is clearly evident in the declines in under-five mortality revealed in Figure 6.2. The graph shows that while sub-Saharan Africa's U5MRs are much higher than the developing country average, they have still declined appreciably since 1990. (The decline has, in fact, been underway at least since child mortality estimates first became available in the 1960s.)

The discussion in this section has focused thus far on declines in child mortality. But it is important to note that the available data on adult mortality rates in poor countries, though less reliable, suggest that these too have generally followed a similar downward trend.

According to one leading demographer:

Adult mortality appears to have been falling throughout the developing world from the 1960s to the 1990s, on average by about one percent per annum for males and two percent per annum for females, though the HIV/AIDS epidemic undoubtedly will reverse these gains in countries that are substantially affected.<sup>45</sup>

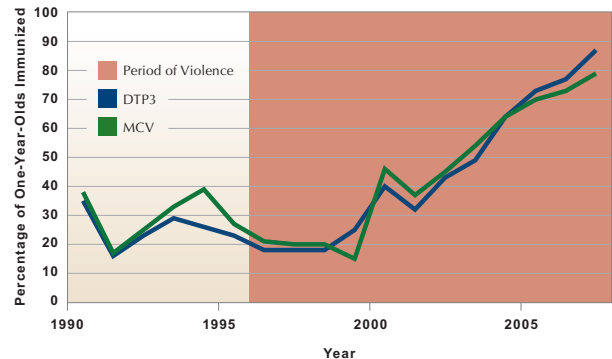
Mortality rates decline during periods of warfare in part because immunization in peacetime saves lives in wartime. War's impacts increase the susceptibility of children to infectious diseases, but the long-lasting protection provided by immunization programs in peacetime significantly reduces

the risk of succumbing to infection once the violence starts. Immunization against measles, for example, provides lifetime protection against contracting the disease, though other vaccines require booster shots to provide continued full protection.

Changes in nonmedical health practices in peacetime can also save lives in wartime. In sub-Saharan Africa, exclusive breastfeeding rates more than doubled between 1990 and 2004—from 15 to 32 percent, in part as a consequence of international and national advocacy campaigns.<sup>46</sup> This is important because breastfeeding infants strengthens their immune systems and reduces the risk that they will die from diarrhea and acute respiratory infections (ARIs). Both diseases are major killers of children in wartime.<sup>47</sup>

This changing practice has also reduced wartime mortality because, as WHO has pointed out, "Infants aged 0-5 months who are not breastfed have seven-fold and five-fold increased risks of death from diarrhoea and pneumonia, respectively, compared with infants who are exclusively breastfed."<sup>48</sup>

**Figure 6.3 Organized Violence and Immunization Coverage in the Democratic Republic of the Congo (DRC), 1990–2007**



Data Sources: PRIO; UCDP/HSRP Dataset; WHO Statistical Information System.<sup>49</sup>

In the DRC, immunization coverage increased dramatically between 1996 and 2007, despite the ongoing violence.

### *The Impact of Immunization Campaigns*

Coverage of the critically important immunization programs can even increase in countries experiencing armed conflict. As Figure 6.3 shows, in the Democratic Republic of the Congo (DRC) immunization coverage in 1990, according to WHO, was 35 percent for diphtheria, tetanus, and pertussis (DTP3) and 38 percent for measles (MCV). By 2007 the coverage had increased to 87 and 79 percent, respectively.<sup>50</sup> The critical point



to note here is that immunization coverage grew steadily throughout the most intense periods of warfare. In 1998 and 1999, the conflict in the DRC was the deadliest in Africa. This remarkable change may help explain why, according to the 2007 DHS survey, U5MRs have not risen since the war started.

In some countries, immunization in war zones is enabled by negotiated ceasefires—sometimes known as Days of Tranquility—that permit health workers access to children deep in rebel territory who would otherwise not have been treated. Humanitarian ceasefires have been successfully negotiated in Afghanistan, Angola, the DRC, El Salvador, Guinea-Bissau, Iraq, Lebanon, the Philippines, Sierra Leone, Sri Lanka, Sudan, and Tajikistan.<sup>51</sup>

Some of the international initiatives to save the lives of children in conflict zones have been extraordinarily ambitious. For example, in Somalia, a country not only wracked by organized violence but without a functioning central government for many years, UNICEF and WHO embarked in late 2008 on a massive campaign in partnership with local authorities and NGOs to provide every Somali child under five with “immunization against measles, diphtheria, whooping cough, tetanus and polio; Vitamin A supplementation; nutritional assessments; de-worming; ... oral rehydration salts and water purification tablets.”<sup>52</sup>

There have been relatively few population health surveys conducted in Somalia, but even in this largely ungoverned and violence-afflicted country, some progress has been made in improving child health. Data from the most recent individual surveys on the IACMEG website, childmortality.org, show an uneven downward trend in the U5MR.<sup>53</sup>

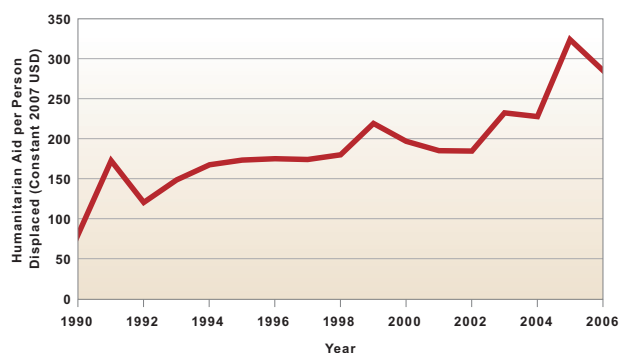
All such estimates are affected by substantial uncertainty, with the potential for error likely to be greatest in conflict-affected countries, so the extent of the decline in mortality in Somalia is certainly debatable. But unless the population health surveys that have been undertaken are all fundamentally flawed, the evidence suggests that even here the overall trend in child mortality has been downwards.

While the efforts of UNICEF, WHO, and other international agencies, donors, and NGOs have played a critically important role in the revolution in child survival, the decline in child mortality throughout the developing world also owes a great deal to the parallel efforts of national governments to promote life-saving advances in health care; to the more general diffusion of child-saving knowledge among populations in developing countries—the promotion of breastfeeding, for example—and to general improvements in living standards.

## The Impact of Humanitarian Assistance

The “beneficial impact of medical innovations” on wartime mortality, to which the *World Bank Economic Review* article noted earlier refers, is evident not only in the long-term effect of improved access to basic health services in developing countries in peacetime but also in the shorter-term impact of humanitarian action in reducing death tolls from war-exacerbated disease and malnutrition.

**Figure 6.4 Humanitarian Aid per Person Displaced, 1990–2006**



Data Sources: Phil Orchard; Global Humanitarian Assistance.<sup>54</sup>

**Humanitarian assistance per displaced person more than tripled between 1990 and 2006, contributing significantly to the reduction in wartime mortality.**

The impact of humanitarian assistance on wartime mortality has increased for two reasons. First, the level of assistance has risen dramatically. As Figure 6.4 shows, the dollar value of humanitarian aid per displaced person has more than tripled since the end of the Cold War.

But humanitarian assistance is not simply better funded today, it is also more effective.

Writing in *The Lancet* in 2004, Peter Salama and colleagues noted that:

Major advances have been made during the past decade in the way the international community responds to the health and nutrition consequences of complex emergencies. The public health and clinical response to diseases of acute epidemic potential has improved, especially in camps. Case-fatality rates for severely malnourished children have plummeted because of better protocols and products.<sup>55</sup>

Epidemiological surveys taken in refugee and internally displaced person camps reveal that mortality rates among

displaced people who have access to basic humanitarian assistance—health services, nutrition, shelter, and access to clean water and sanitation—can decline very rapidly,<sup>56</sup> often falling to the pre-war rate or even lower within four to six months. Sometimes the reduction in mortality is even

more rapid. In 1997, for example, the death rate of Rwandan refugees in the Ndjoundou refugee camp in the Republic of the Congo dropped from almost 11 deaths per 10,000 per day to 0.5 deaths per 10,000 per day in some seven weeks.<sup>57</sup> This huge decline saved many lives.

### POLITICAL SCIENCE ESTIMATES OF THE HUMAN COSTS OF WAR

In 2003 the *American Political Science Review* published the first-ever quantitative estimate of the global impact of civil wars on population health. Hazem Adam Ghobarah, Paul Huth, and Bruce Russett's influential article, "Civil Wars Kill and Maim People—Long after the Shooting Stops," reviewed the manifold ways in which intrastate warfare exposed civilian populations to increased risks from a range of killer diseases while reducing access to health services at precisely the time they are most needed.<sup>58</sup>

The World Health Organization's Disability-Adjusted Life Year (DALY), which measures years of healthy life lost, was used as their indicator of population health. The authors' statistical analysis of data from 177 countries controlled for the effects of health expenditure, income inequality, and other factors likely to impact health outcomes.

The authors collated battle death data from some 51 civil wars being waged around the world between 1991 and 1997. To exemplify the "hidden costs" of conflict, they sought to calculate the delayed impact of the civil war deaths in terms of DALYs in 1999.

The key finding of the study was that countries experiencing civil wars between 1991 and 1997 incurred an additional burden of disease and disability in 1999 from the indirect and lingering effects of the earlier conflicts.

In a subsequent article published in 2004 that used more refined data, the authors estimated that some 12 million years of healthy life were lost in 1999 by the citizens of the countries who had been afflicted by war between 1991 and 1997. These are years of healthy life that would not have been lost had there been no wars.<sup>59</sup>

These estimates are subject to considerable uncertainty because most wars take place in countries where health data are poor to nonexistent—the DALY estimates reflect this uncertainty.

Two subsequent macro-quantitative studies published in 2005 and 2006 provided support for these findings. In 2005 Quan Li and Wen Ming reported that intrastate conflict had "a very large immediate effect on both male and female mortality rates," but added, "it does not have strong or robust lingering effects for both genders."<sup>60</sup>

But early in 2009 Matthew Hoddie and Jason Smith presented findings that arrived at a rather different conclusion. In a study published in *International Studies Quarterly*,<sup>61</sup> the authors relied on a very similar statistical methodology to determine the human costs of war to that used by Ghobarah and his colleagues, but they employed different battle death datasets.

Running regressions with the widely used data recorded by the International Peace Research Institute, Oslo (PRIO), the authors found that war did *not* have the expected negative impact on population health. Indeed, half of their findings indicated that war was associated with *improving* health outcomes—although it is important to note that almost none of these findings were statistically significant.

When they ran their regressions with mortality data from a second dataset—this time that of the Political Instability Task Force—they again found that "the magnitude of battle deaths does not appear to be a strong determinant of a country's post-conflict public health performance."<sup>62</sup> In fact, their statistical analysis showed that in nine of the 10 age/gender categories, health outcomes had *improved* in the aftermath of war. This result is in line with our finding that child mortality rates improve nationwide in wartime.

None of these latter findings were statistically significant, however, which means that we cannot assume that, *in fact*, health outcomes improved—the reported improvements could have occurred by chance. Equally important, the study found no evidence that, on average, health outcomes *worsened* as a long-term consequence of warfare—which is what most of the literature on indirect deaths assumes.

Humanitarian assistance, in other words, has been an important factor in reducing the incidence of indirect war deaths, which, in turn, reduces the impact of war on nationwide mortality rates.

### The Changing Nature of Warfare

As we noted earlier, two long-term changes in the global system help explain the apparent paradox of mortality rates that decline in wartime. The first is the decades-long reduction in mortality rates in peacetime. The second is the dramatic, though highly uneven, fifty-plus-year reduction in mortality rates in wartime.

The first part of this chapter noted how low-cost, but highly effective, health interventions have driven down child mortality rates in peacetime and have had a major impact in wartime as well. We now turn to the impact of changes in the nature of warfare that have driven down overall mortality rates—from both direct and indirect deaths—in wartime.

The major armed conflicts of the Cold War years—the Chinese civil war, the Korean War, the French and American wars in Indochina, the Iran-Iraq War, and the Soviet war in Afghanistan—all generated massive annual death tolls. These wars typically involved military intervention by the great powers and were mostly fought with very large armies, with at least one side deploying heavy conventional weapons. Long-range bombardment of cities from the air, or by artillery, was common and resulted in huge numbers of deaths and injuries. Mobile warfare tactics, plus the fact that one or both sides usually had effective long-range power-projection capabilities, meant that the fighting typically ranged over very large areas of the national territory causing immense disruption in the process.

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### Changes in the nature of warfare have driven down mortality rates from both direct and indirect deaths in wartime.

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The poor-country wars of the post-Cold War era by contrast are typically fought with small arms and light weapons and by relatively small rebel armies that tend to avoid major engagements. In many cases insurgent groups seek protection by operating from remote, underpopulated, mountainous regions, or in dense forests. As such they pose little threat to government forces which, for this reason, have few incentives to engage them militarily.

Warring parties on both sides often resort to indiscriminate violence and sometimes target civilians rather than their ostensible enemies. But the size of rebel armed forces, their disinclination—or inability—to engage in prolonged high-level combat, or to project power over long distances, as well as the lack of incentive for governments to mount large-scale campaigns against them, mean that such conflicts generally kill far fewer people than the major wars of the Cold War era. The Rwandan genocide remains the horrific exception to this rule.<sup>63</sup>

The changing nature of warfare has also reduced the geographical extent of wartime violence. In the predominantly low-intensity conflicts that characterize the post-Cold War era, insurgents rarely have the technical capability—aircraft and medium-range missiles—to project military power over long distances, or sufficiently large armies to conduct nationwide military operations. As a consequence, the area directly impacted by fighting is relatively small in most conflict-affected countries. In fact, a recent review of 11 conflicts in sub-Saharan Africa, conducted by the Armed Conflict Location and Event Data (ACLED) project, found that, on average, only 12 percent of the national territory of war-affected countries is impacted by serious violence.<sup>64</sup>

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### Fighting in one region of a country may have no impact on livelihoods in other regions.

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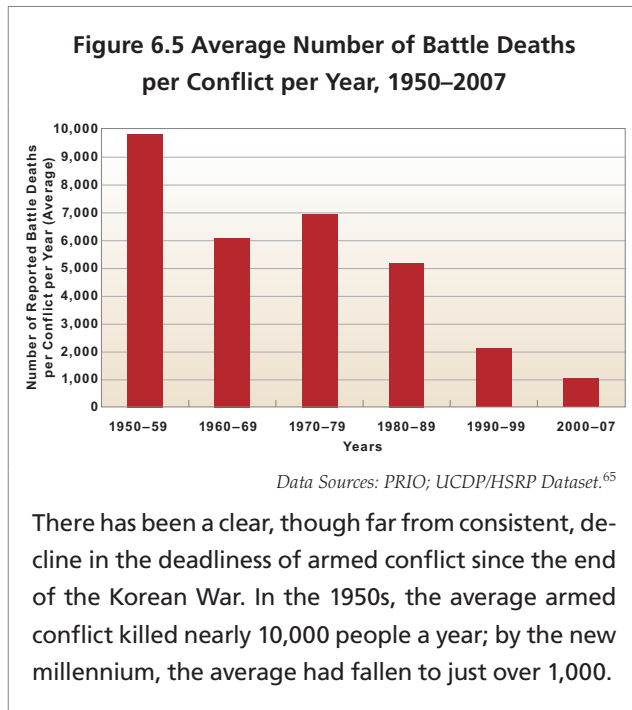
In Uganda, for example, the conflict involving the Lord's Resistance Army has been in the poor and relatively underpopulated north, while the south of the country has remained unaffected. In Sudan's two civil wars, the violence has been concentrated in the south and in the west (Darfur) of the country. In the DRC, the fighting has been mostly in the eastern provinces. Similar patterns are evident in wars in the rest of the developing world.

Given that the economies in these mostly poor, war-affected countries are often based on subsistence agriculture, organized violence in one region of a country may well have little or no impact on livelihoods—which are important determinants of mortality—in other regions. So, while mortality rates from disease and malnutrition may be very high in the areas directly affected by violence, the impact of these deaths on nationwide mortality rates will often be relatively small—and frequently within the margin of error of attempts to measure them.

## The Worldwide Decline in Battle Deaths

The decline in the deadliness of warfare is very clear in the trend data on the number of battle deaths per conflict per year by decade—a key indicator of the deadliness of armed conflicts. The data indicate that in the new millennium, the average conflict killed 90 percent less people each year than did the average conflict in the 1950s. Figure 6.5 shows the trends.

A more fine-grained measure of the deadliness of warfare over time is the average number of battle deaths per million of the world's population per year. Figure 6.6 illustrates the annual trend data.

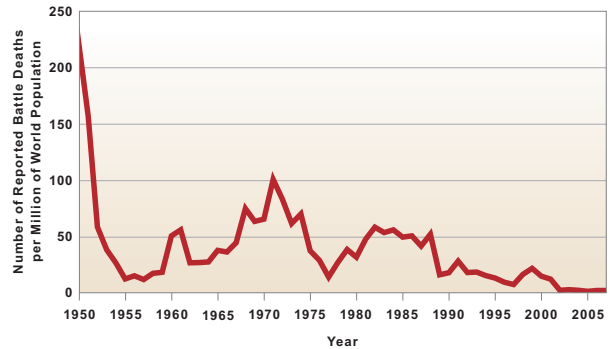


## Indirect Death Tolls Have Also Declined

The large and highly destructive wars of the Cold War era not only generated very high battle-death tolls but also displaced large numbers of people, disrupted health services, destroyed housing, reduced access to potable water, and massively disrupted livelihoods. These changes, in turn, increased indirect death tolls from war-driven disease and malnutrition.

For much of the Cold War period there were few countervailing forces reducing indirect death rates. Immunization rates were very low in most war-affected populations during this period, and humanitarian assistance was minimal. The situation today is very different. Conflict-affected populations in the post-Cold War period have benefitted from both peacetime health interventions and increased and increasingly effective humanitarian assistance.

**Figure 6.6 Battle Deaths per Year per Million of World Population, 1950–2007**



The trend in battle deaths per million of the world's population per year provides a more detailed picture of how the deadliness of war has changed over time. Unlike Figure 6.5, this graph takes into account the large increase in population over the past 50-plus years.

The impact of these changes on battle-death tolls and indirect death tolls is well illustrated by comparing the human costs of the Korean War, the deadliest war during the Cold War, with that of the deadliest conflict in Africa in the 1990s—the war in the DRC that started in 1998.

In the Korean War, an estimated 1.7 percent of the combined population of the two Koreas died from wartime violence in 1950. In the DRC, the death toll was somewhere between less than one-tenth of 1 percent to roughly one-fifth of 1 percent of the population.<sup>67</sup> The most violent year of the Korean War, in other words, was proportionately eight to over 20 times more deadly than that in the DRC in terms of battle deaths.

The two Koreas also suffered a much greater indirect death toll relative to their combined population than did the DRC. According to one report, some 5 to 6 million people died from starvation during the course of the Korean War.<sup>68</sup> Over four years this would amount to some 4 to 4.5 percent of the population per year on average—an extraordinary toll. The IRC claims there have been some 5 million indirect deaths in the DRC between 1998 and 2007.<sup>69</sup> This estimate is almost certainly too high, as we demonstrate in Chapter 7, but even if it were true, it would amount to an average annual death rate of approximately 1 percent of the DRC's population for the period. This suggests that, in terms of indirect deaths, the

Korean conflict was some four to four and a half times deadlier than that in the DRC.

The exact number of indirect deaths in the Korean War and the DRC conflict can certainly be contested, but there can be no doubt that the war in Korea was far more deadly than that in the DRC.

## Conclusion

As noted earlier, the apparent paradox of mortality rates that decline in wartime is easily resolved. Mortality rates in poor countries mostly decline in peacetime, and, since 1970, wars have rarely been deadly enough to reverse the downward trend. Warfare is less deadly in large part because wars today are fought with smaller armies, fewer engagements, and lesser weapons systems, and so kill far fewer people on the battlefield and generate far less societal destruction than those of the Cold War era.

Changes in the nature of warfare also mean that there are fewer deaths from war-induced disease and malnutrition—smaller wars mean lower levels of displacement, societal disruption, and stress that increase the vulnerability of war-affected populations to disease. But additional factors help explain the decline in indirect war death tolls. These include improvements in population health in peacetime that help

reduce the vulnerability of children to disease in wartime, and the dramatic increase in the level and effectiveness of humanitarian assistance to war-affected countries.

Although there are no global trend data on the extent of deaths from war-exacerbated disease and malnutrition around the world, a compelling case can be made that they have declined to an even greater degree than battle deaths.

For more than three decades dramatic increases in immunization coverage and nonmedical interventions, such as the campaigns to increase breastfeeding, have provided enduring protection for hundreds of thousands of children in wartime who would likely otherwise have succumbed to disease.

But none of these life-saving interventions have any real impact on death rates from war-related injuries. This means that, contrary to the views of some scholars, death rates from disease have very likely declined more than death rates from injury.

In the next chapter, we review the most comprehensive analysis ever undertaken on the human costs of a contemporary armed conflict—the IRC's survey-based investigation of excess deaths in the DRC. The extraordinary findings of this much-publicized study present a sharply different picture of the human costs of war to that presented in this chapter.





Chris Keulen / Panos Pictures. DEMOCRATIC REPUBLIC OF THE CONGO.

## CHAPTER 7

### The Death Toll in the Democratic Republic of the Congo

Claims that national mortality rates decline during periods of warfare are not only deeply counterintuitive but they also stand in sharp contrast to the findings of the largest, most widely cited, and most influential research project ever undertaken on the human costs of war.

In 2008, after carrying out and analyzing five retrospective mortality surveys in the Democratic Republic of the Congo (DRC), researchers at the International Rescue Committee (IRC) concluded that some 5.4 million people died between 1998 and 2007 who would not have died had there been no war.<sup>70</sup> The IRC estimated that more than 90 percent of the victims perished from war-exacerbated disease and malnutrition, or other nonviolent causes. Indeed, the IRC's findings suggest that by 2007, less than 1 percent of war-related fatalities were due to violence.

This huge death toll arises, according to the IRC, because the mortality rate in the DRC increased dramatically after the war started in 1998. They note that it dropped in 2001 but has remained significantly higher than the IRC's assumed pre-war—"baseline"—mortality rate of 1.5 deaths per 1,000 per month ever since.

While no one doubts the death rate in the DRC is tragically high, the analysis of the IRC's data and methodology presented in this chapter indicates that a number of key assumptions made by the organization's researchers are highly questionable

and that the claim that 5.4 million Congolese have died as a result of the war cannot be sustained.

The IRC is a New York-based humanitarian organization with operations in many parts of the developing world and a long history of engagement in the DRC. In its three nationwide surveys carried out in 2002, 2004, and 2007, IRC researchers used standard survey methodology, selected large samples, and reported appropriate confidence intervals for their mortality estimates. The US Centers for Disease Control and, subsequently, the Burnet Institute at the University of Melbourne, Australia, were consulted on the methodology used to undertake the surveys.

The surveys in 2000 and 2001, were, however, compromised by questionable methodological assumptions. And, while they clearly reveal very high levels of mortality in parts of the eastern region of the DRC, we argue that the excess death estimates they produced should be rejected.

The IRC's findings on mortality in the DRC have become widely known and accepted and have attracted none of the public controversy that has surrounded war death estimates for Iraq and Darfur. They have been published in the influential UK journal *The Lancet*, and have been cited in other peer-reviewed journals, as well as by governments, international agencies, the media, and many NGOs (nongovernmental organizations).<sup>71</sup>

The IRC's reputation, and the publicity that has attended the launches of its reports on the situation in the DRC, have ensured that its findings have gained widespread media attention for a humanitarian crisis that had long been neglected. Its

research has also helped increase public understanding of the indirect impact of wartime violence on population health.

Moreover, there is no doubt the IRC's tireless and effective advocacy has helped focus the attention of the US government and other major donors, as well as the UN (United Nations) Security Council, on the violence in the DRC. "Following the release of the 2000 survey results, total humanitarian aid increased by over 500% between 2000 and 2001. The United States' contribution alone increased by a factor of almost 26."<sup>72</sup>

The number of peacekeepers in the country has also increased substantially. Indeed, with a force of 20,255 uniformed personnel on the ground, the DRC is now host to the UN's biggest peacekeeping force.<sup>73</sup>

The IRC's research-informed advocacy has, in other words, had a considerable impact not only in the global media but also on donors and international agencies.

## Two Challenges to the IRC's Findings

Although the extraordinary figure of 5.4 million excess deaths has attracted little public controversy, two recent reports in the public domain, both released in French, have produced mortality estimates that are sharply at odds with those of the IRC. Neither has received much media attention in the English-speaking world.

In October 2008 two Belgian demographers, André Lambert and Louis Lohlé-Tart, published a critique of the IRC's findings that drew on demographic data collected between July 2005 and February 2006 for the voter registration process in the DRC, together with data from the national census in 1984 and a demographic survey taken in 1956.<sup>74</sup> Their estimate of the excess death toll between 1998 and 2004 was some 200,000—just one-twentieth of the IRC's 3.9 million excess death estimate for the same period.<sup>75</sup>

Both the Belgian study and the IRC assume very high mortality levels in the DRC from 1998 to 2004, but the critical difference is the IRC assumes a dramatic jump in the mortality rate after the war starts. Indeed, it is this sudden increase from a very low—we believe too low—baseline mortality rate that creates the IRC's huge cumulative excess death toll. By contrast, the Belgian study assumes that mortality rates are high before, as well as during and after, the war.

The Belgian study has, in turn, been criticized by other demographers both on methodological grounds and because there was insufficient information provided in the paper to permit independent replication of its findings. The publication of the paper triggered a review of its methodology and that of the IRC by the World Health Organization-affiliated Health

and Nutrition Tracking Service (HNTS).<sup>76</sup> HNTS reviewers were critical of some of the methodological assumptions and the lack of information provided in the Belgian study, but they also criticized the IRC's methodology.<sup>77</sup>

The second challenge to the IRC's estimates comes from a survey undertaken in the DRC in 2007 by the authoritative Demographic and Health Surveys (DHS).<sup>78</sup> The DHS data indicate that the DRC's under-five mortality rate (U5MR)—the most sensitive indicator of the indirect costs of war—is dramatically lower than that reported by the IRC for the same period.<sup>79</sup> Since the IRC found that children made up 47 percent of all excess deaths in the DRC during the final survey period, the child mortality rate is clearly an important factor in the overall mortality estimate.

For the 2006 to 2007 period, the IRC's survey data indicate that the nationwide child mortality rate is 5.00 under-five deaths per 1,000 per month. The DHS estimate for this period is 148 deaths per 1,000 live births over a five-year span.<sup>80</sup> This translates into 2.63 deaths per 1,000 children per month—a little over half the IRC's estimate.<sup>81</sup> Both estimates cannot be correct.

However, as with the earlier discussion of the Belgian study, our point here is not to determine which of the estimates is correct. It is simply to note that the IRC's fatality estimates, while not publicly controversial, have not only been challenged but are much higher than those of the other studies.

## Questioning the IRC's Methodology

The analysis that follows reviews the methodology used in all five of the IRC's surveys. It argues that key assumptions used by the researchers to estimate excess death tolls are incorrect, and that these errors had the effect of unwarrantedly increasing the excess death toll estimates.

The first and second surveys covered only the war-affected eastern part of the DRC—the three subsequent surveys were nationwide.

The first survey was conducted in 2000 and covered a 22-month period from the beginning of the most intense episode of fighting in August 1998.<sup>82</sup> It found that some 1.7 million people who had died in the eastern part of the country would not have died had there been no war. However, as we explain below, the methodology used to arrive at this estimate is highly problematic because the areas to be surveyed were not chosen appropriately.

The second survey was carried out in March and April 2001. It had a recall period of some 15 months from January 2000 to March 2001. Its findings—along with interpolated excess death estimates from the nonsurveyed period covering

April 2000 to December 2000—boosted the cumulative excess death toll estimate for the two survey periods to 2.5 million, of which 350,000 were violent deaths. As with the first survey, the findings of the second survey were compromised because the areas to be surveyed were not chosen in a way that ensured that they were representative of the region as a whole.

The primary problem with the three nationwide surveys that were conducted in 2002, 2004, and 2007 was the IRC's reliance on a baseline mortality rate that was too low.

In reaching its cumulative nationwide excess death estimate of 5.4 million for the period covered by all five surveys, the IRC added the excess death tolls from the first two surveys to those of the subsequent three surveys.

Readers may wonder how the IRC could calculate nationwide excess war death toll estimates for 1998 to 2001, given the two surveys taken in this period only provided fatality data for the war-affected eastern part of the country.

The short answer is the IRC assumed the violence was concentrated in the east and there were no excess war deaths in the west of the country over this period.<sup>83</sup> From this it follows that the excess war death toll for the east of the country in this period will also be the nationwide excess death toll.

In the analysis that follows, we focus on the IRC's own estimates, as well as the methodology and assumptions that underpin them.

### **In All the Surveys the Baseline Mortality Rate Is Too Low**

In determining the excess death toll, the baseline mortality rate is critically important. If it is too low, the excess death toll will be too high.

The IRC uses the sub-Saharan average of 1.5 deaths per 1,000 per month as its baseline mortality rate for all but the very last survey when the sub-Saharan average drops to 1.4.<sup>84</sup> Using the sub-Saharan African average mortality rate as a comparator—to indicate how high death rates were in the east of the DRC compared with the rest of sub-Saharan Africa, for example—would have been both instructive and appropriate. Using it as a measure of the pre-war mortality rate in the DRC itself makes little sense.

The IRC argues that the sub-Saharan African average mortality rate is a conservative choice for pre-war DRC—i.e., it is higher than previous estimates drawn from data from the 1984 census and two UNICEF (United Nations Children's Fund) surveys that covered periods before the war started. But, the IRC never explains why it believes that the sub-Saharan African average is an appropriate measure of the

pre-war mortality rate for a country that is far from average in sub-Saharan Africa.

The DRC languishes at the bottom of most development indicators for sub-Saharan Africa. It suffered a devastating 20-year economic decline from the mid-1970s that reduced its GDP (gross domestic product) per capita from more than USD 300 to just a third of that figure by 1998. Foreign aid was withdrawn almost completely in the early 1990s, and Mobutu Sese Seko's hopelessly inept and corrupt government had collapsed in total disarray by 1997.

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**If the baseline mortality rate is too low,  
the excess death toll will be too high.**

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The experts who reviewed the IRC's DRC research for the HNTS have all expressed skepticism about the choice of the sub-Saharan African average as an appropriate baseline mortality rate. Harvard University's Kenneth Hill, for example, notes, "the IRC counterfactual is not appropriate. [The] DRC almost certainly has had above average mortality by SSA [sub-Saharan African] standards for decades."<sup>85</sup>

Later in this chapter we argue that 2.0 deaths per 1,000 per month is a more plausible baseline mortality rate for the DRC and show how using this rate sharply reduces the estimated excess death toll attributable to the war throughout the entire period, with the decreases being greatest for the three most recent surveys.

### **The 2000 Survey: Survey Locations Inappropriately Selected**

The most serious problem with the IRC's first survey is that the survey locations were inappropriately selected for the purpose of estimating excess mortality in the war-affected eastern region of the country. (This was also the case with the second survey.) In addition, too few areas were surveyed to allow much confidence in the results even if the locations had been selected appropriately.

The IRC's May 2000 report on the first survey notes: "While the 1.2 million people within the sampling universe of the five IRC studies *are not representative of the approximately 20 million people in eastern DRC*, these surveys probably represent the best broad-based data available."<sup>86</sup>

While the latter part of the above statement is very likely true, the fact remains that extrapolating from a small convenience sample of five nonrandomly selected populations

## WHY THE NUMBERS MATTER

Since no one doubts that mortality levels in the Democratic Republic of the Congo (DRC) are tragically high, does getting it wrong about excess death toll estimates really matter? The country remains trapped in a major humanitarian crisis, and preventing further deaths and alleviating suffering remains a critically important task whatever the excess death toll.

And even if the International Rescue Committee's (IRC's) estimates are too high, they have drawn the world's attention to the previously ignored plight of the Congolese and have helped successfully pressure the international community into providing more humanitarian assistance and increasing the number of peacekeeping forces. This has made a real difference to the lives of millions.

All of this is true. But getting it wrong about excess mortality tolls, nevertheless, matters a great deal.

Take the case of Darfur. In the fall of 2006, the high-profile Save Darfur Coalition, a US-based advocacy group, claimed that since the fighting in Darfur had started some three years earlier, "400,000 innocent men, women and children have been killed."<sup>87</sup>

This figure was at least double that of most expert estimates at the time and the reference to innocents being "killed" was wholly misleading. The overwhelming majority of deaths in Darfur in this period were not the result of a government-instigated "slaughter"—as Save Darfur had claimed—but of disease and malnutrition, which were already major killers before the war. Determining what percentage of these deaths could be attributed to the impact of wartime violence rather than pre-existing conditions of abject poverty and malnutrition is extraordinarily difficult, if not impossible.

Getting mortality estimates wrong can have real-world consequences, and the Save Darfur campaign's claims have been sharply criticized by humanitarian groups and area specialists. As one critic noted, "Exaggerated death tolls... make it difficult for relief organizations to deliver their services. Khartoum considers the inflated numbers to be evidence that all groups that deliver aid to Darfur are actually adjuncts of the activist groups that the regime considers its enemies, and thus finds justification for delaying visas, refusing to allow shipments of supplies and otherwise putting obstacles in the way of aid delivery."<sup>88</sup>

Humanitarian agencies and NGOs (nongovernmental organizations), as well as human rights advocacy groups, actively publicize the plight of the war-affected populations they seek to assist—and often use excess mortality tolls to make a case for more aid. There are compelling reasons for

doing this, as the IRC's Rick Brennan and Anna Husarska pointed out in an article in *The Washington Post* on July 16, 2006: "When there is media coverage, aid increases. Large donors may be more inclined to press for a greater presence of international peacekeeping forces to protect civilians and humanitarian assistance teams. And the presence of peacekeepers makes it easier for the media to report."<sup>89</sup>

If these factors come together, they accomplish the goal of every humanitarian response: saving lives.

Saving lives is, of course, the *raison d'être* of humanitarian organizations.

However, a potential conflict of interest arises here because the institutional survival of humanitarian NGOs is dependent on donor funding. But the level of funding they receive is directly related to assessments of humanitarian need—assessments they themselves are usually responsible for generating.

Some critics believe that individual NGOs deliberately exaggerate death tolls in order to secure more funding, while others argue that lack of experience in survey design and implementation is the problem.<sup>90</sup>

There is also disagreement within the expert community about how to estimate excess war deaths. In Iraq, for example, a series of nationwide mortality surveys—two undertaken for United Nations agencies and two by independent researchers (whose findings were published in the UK medical journal *The Lancet*)—have produced sharply divergent excess death estimates over the same time periods. The difference between the estimates is being driven primarily by the widely divergent estimates of the violent death toll. There is no consensus as to the causes of the differences.<sup>91</sup>

The challenges to the IRC's findings in the DRC noted in this report and others will almost certainly generate more controversy about the value of using retrospective mortality surveys to measure excess deaths.<sup>92</sup>

This is cause for concern because whatever the reason for the controversies, the effect has been the same—mutual suspicion between donors, NGOs, and humanitarian agencies, and an increased risk that survey methods as a whole—which remain critically important in this field—will be discredited.



to the region's entire population is a serious violation of basic statistical principles. Furthermore, there are no indications of any attempt to implement alternative selection criteria for the survey sites that would have ensured that, even if not randomly chosen, they were nevertheless representative of the population of the eastern DRC.

It is theoretically possible that the nonrandomly chosen survey areas could by chance have been representative of the population as a whole, but the IRC's selection procedure minimized this possibility.

Three of the five areas the IRC selected were those in which it was operating—or intended to operate—humanitarian assistance missions. Since there would be little point in setting up humanitarian operations in areas where the war had had little or no impact, the IRC's selection of Kisangani, Kabare, and Katana as areas to be surveyed meant that parts of the eastern DRC that had low mortality rates had little chance of being chosen. Had the selection of locations been random, low-mortality areas could well have been selected, in which case the surveys would have revealed a lower excess death toll.

It is not clear what criteria were used to select the other two areas out of the five surveyed. But whatever the reason for the choice, both areas had extremely high mortality rates.

The information obtained from the raw survey data may well have been useful for humanitarian purposes, and it certainly indicated that parts of the eastern region of the DRC were suffering dramatically high levels of mortality, but the statistically inappropriate selection of the survey areas means that the findings should never have been used to generate excess death estimates for the eastern region as a whole.

### **The 2000 Survey: Estimation Methods Challenged**

Even if the inappropriate selection procedure is ignored, the IRC's methodology remains highly problematic. In the first survey, the IRC's researchers use three separate estimation methods to determine the excess death toll. Each of these methods is different, but all three produce similarly large death tolls—ranging from 1.6 million to 1.8 million. The IRC takes the fact that very different estimation methods all produce comparably high death tolls as evidence for the robustness of their findings. It turns out, however, that each of the estimation methods is based on questionable methodology and/or assumptions.

The first estimation method takes the arithmetic mean of the mortality rates of the five individual areas surveyed and assumes this figure is the average mortality rate for the entire population of the conflict-afflicted eastern region of the country.

The average regional mortality rate thus estimated is 5.2 deaths per 1,000 per month. The IRC's baseline mortality rate of 1.5 per 1,000 per month is then subtracted from this figure to arrive at the excess mortality rate of 3.7 deaths per 1,000 per month for the five areas surveyed. This rate, in turn, is applied to the estimated population of some 20 million in the eastern region of the DRC for the period covered by the surveys—22 months. This estimation method yields an excess death toll of some 1.6 million.

The problem with this approach is that it biases the total estimate upwards by giving too much weight to high death rates in survey areas with small populations. Because the population sizes, as well as the death rates, of the surveyed areas are very different, the appropriate procedure would have been to take a population-weighted average of the mortality estimates.

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**These findings should never have been used to generate excess death estimates.**

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This is easy to calculate and the weighted average turns out to be 3.55 deaths per 1,000 per month, not the 5.2 rate produced by the IRC's calculations. If the weighted average mortality rate is used to determine the excess death toll, the excess death rate shrinks from 3.7 to 2.05 and the IRC's estimate of 1.6 million excess deaths is almost halved—to 897,500.

But this revised estimate uses the baseline mortality figure that we have argued is too low. Recalculating the excess death toll using the corrected crude mortality rate (CMR) estimate of 3.55 deaths per 1,000 per month for the five areas surveyed, and the more appropriate baseline mortality rate of 2.0 deaths per 1,000 per month, reduces the total excess mortality toll by some 60 percent—down from the IRC's original figure of 1.6 million to 678,600.

The second and third estimation methods the IRC uses to calculate excess deaths for the survey in 2000 are also problematic. In the survey carried out in Moba in Katanga province, the average mortality rate was 11.4 per 1,000 per month—the highest recorded in any of the IRC's DRC surveys from the earliest to the most recent. In its second and third estimation methods, the IRC extrapolates the Moba death rate to the entire population of Katanga.<sup>93</sup>

What is happening here is that a single survey area with an extremely high death toll and a relatively small population is being treated as typical of an entire province. Since Moba's death rate is so high, and since Katanga province has the



largest population of those in which the five surveys were carried out, the impact of this single survey location on the excess death rate for the entire region is very large.

In the second estimation method, Katanga accounts for 1.4 of the estimated 1.8 million deaths (or 77 percent) for the region as a whole; in the third “conservative” estimate, it accounts for 0.9 out of 1.7 million deaths (or 54 percent). In other words, the death toll from the single Moba survey—which we have no compelling reason to assume is representative of Katanga as a whole—is driving most of the death toll estimate for the entire eastern region.

The IRC provides no argument to support its assumption that it is appropriate to extrapolate the Moba mortality rate to Katanga as a whole. In fact, it is highly improbable that the Moba rate—or indeed any other rate from a single survey in Katanga—would be equal to the Katangan provincial average. This is because, as subsequent surveys have demonstrated, there is a high degree of intraprovincial variation in death rates throughout the country, including the eastern provinces.

There are, in other words, no good reasons to accept the excess mortality estimates that derive from the IRC’s second and third estimation methods. But the biases generated by the IRC’s procedures are then compounded by the decision to sum the provincial totals in order to provide an excess death estimate for the eastern region as a whole. The more statistically appropriate way to provide a region-wide estimate would have been to use all five surveys together—as was done (though without the appropriate population-weighting) in the first estimation method.

To reiterate, the methodological problems with the IRC’s first survey are that:

- The five areas surveyed were not chosen randomly and were in any case too few to obtain reliable projections.
- The excess mortality estimation methods:
  - i) failed to weight the mortality rates from the five surveyed areas by population (in the first estimation method); or
  - ii) inappropriately generalized from a single survey to a province, and then—equally inappropriately—summed the excess death tolls calculated for each province to arrive at a regional total for the eastern part of the country (in the second and third estimation methods).

All three estimation approaches applied an inappropriately low baseline mortality rate. However, the error generated by the use of the inappropriately low baseline had a much greater impact on mortality estimates in the final three surveys than in the first two.

## The 2001 Survey: Survey Locations Inappropriately Selected

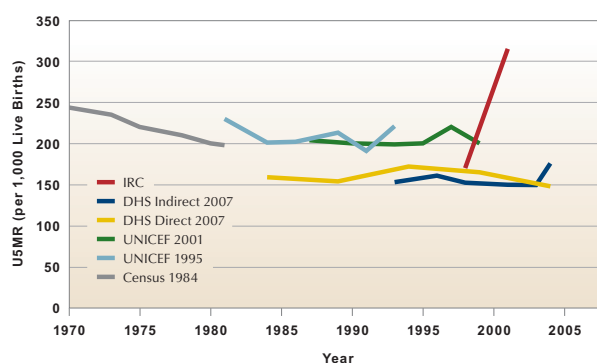
The second survey, whose results were published in 2001, surveyed five additional areas, but again without random sampling and using the same inappropriately low baseline mortality estimate. However, the significant bias generated by the excessive reliance on the death toll in Moba in the first survey was not an issue in the second survey. In the 2001 report, the IRC used the results of all five surveys taken in 2000, plus the five taken in 2001, as well as a single survey taken in 1999, when estimating the cumulative death toll.<sup>94</sup>

Although the second survey is not as problematic as the first, we believe the inappropriate selection of the areas to be surveyed means the IRC’s excess death toll estimates for the eastern region of the DRC, as derived from the second survey, should also be rejected.

## The Impact of the IRC’s Flawed Methodology

According to the IRC’s data, the nationwide U5MR in the DRC increased at an unprecedented rate between the outbreak of the war in August 1998 and 2001. The radical nature of the IRC’s claim becomes evident when we compare the IRC’s estimate with the under-five mortality trend data for the DRC from 1970 to 2005 provided by the Inter-Agency Child Mortality Estimation Group (IACMEG) dataset.<sup>95</sup>

**Figure 7.1 Under-Five Mortality Rate (U5MR)  
Estimates for the Democratic  
Republic of the Congo (DRC), 1970–2004**



Data Sources: IACMEG; IRC.<sup>96</sup>

Census data and data from DHS and UNICEF surveys show that child mortality rates in the DRC, while very high, have been trending downwards for more than 30 years. By contrast, the International Rescue Committee’s estimate of the U5MR in the DRC for the period 1998–2001 shows a very dramatic increase.

The under-five mortality trend data shown in Figure 7.1 track projections from the 1984 census, two UNICEF surveys, and a DHS survey that provided both “direct” and “indirect” estimates of under-five mortality and covered the same period as the IRC’s survey.<sup>97</sup> According to these data, U5MRs, while very high, have been trending downwards in the DRC for more than 30 years—in wartime as well as peacetime.

The anomalous red line in Figure 7.1 is from the IRC survey data. It reveals a dramatic increase in mortality over a relatively short period of time—a change that is greater than any other credible increase in the child mortality rate in wartime in any country, since 1970, in the IACMEG child mortality dataset.

The DHS mortality data, which cover the same period as data from the IRC’s first two surveys, show no real increase. Unless the DHS data are hugely wrong—which no one has suggested—it is inconceivable that a jump in mortality as sudden and dramatic as that recorded by the IRC could have gone undetected in the DHS survey.

It is, of course, theoretically possible the IRC’s data are correct and those of the DHS are wrong. But the DHS data were collected using standard survey methodology; the IRC’s data were not—as the IRC has admitted. Therefore, we conclude it is highly unlikely the huge increase in mortality that the IRC records ever took place—a conclusion shared by other critics.

As Jon Pedersen of Norway’s FAFO Institute notes in his review of the IRC’s methodology for the HNTS, “the use of the sub-Saharan baseline CDR [crude death rate] for estimating excess deaths is problematic, as is the implicit assumption of a very rapid increase at the outbreak of the war.”<sup>98</sup>

Pierre Salignon, project director of the HNTS, makes essentially the same point when he notes, “It is unlikely that the war led to a sudden increase [in the mortality rate].”<sup>99</sup>

Unless the trend in the DHS child mortality data and the conclusions of the two reviewers of the IRC’s methodology are completely wrong, it follows that the true death toll in the DRC for the period of the first two surveys is far lower than the 2.5 million deaths claimed by the IRC.

### The 2002, 2004, and 2007 Surveys: The Impact of the Inappropriate Baseline Mortality Rate

This section demonstrates how the IRC’s inappropriately low baseline mortality rate generates unwarrantedly high excess death estimates.

The methodology the IRC relied on in the three nationwide surveys (i.e., the 2002, 2004, and 2007 surveys) does not suffer from the same flaws as the first two. The areas to be

surveyed were selected appropriately, and the mortality rate for the country as a whole was based on a large number of surveyed areas, which increases confidence in the accuracy of the estimates. The mortality estimates are, however, subject to a number of sources of uncertainty. These include:

- Very wide confidence intervals for some mortality estimates, particularly in the case of the first of the three nationwide surveys, which was carried out in 2002.
- Uncertainties arising from design effects—especially with the survey in 2002. In 2002 the design effect was huge, which increased the magnitude of the standard errors, in turn, increasing the range of uncertainty of the excess death toll estimates.
- Lack of reliable data on population size and growth rates—which can impact excess mortality estimates.
- Absence of survey-based mortality data for the between-survey periods in 2001 and 2004 to 2005.<sup>100</sup>

### An Alternative Baseline Mortality Estimate

The IRC’s best estimate of the excess death toll calculated from the 2002, 2004, and 2007 surveys is 2.83 million. However, this does not mean the IRC believes that figure is necessarily the correct one. In fact, the very wide confidence intervals associated with the 2.83 million fatality estimate indicate the IRC’s researchers are 95 percent confident that the cumulative death toll for the most recent three surveys lies somewhere between 1.34 and 4.54 million. The 2.83 million figure is simply the one that has the highest probability of being correct.<sup>101</sup>

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It is highly unlikely the huge increase  
in mortality ever took place.

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But the high level of uncertainty surrounding the 2.83 million death toll estimate is not our reason for rejecting it. The problem lies with the baseline mortality rate.

We have argued that the IRC’s estimated baseline mortality rate of 1.5 deaths per 1,000 per month is too low and have suggested that a more plausible baseline mortality rate is 2.0 deaths per 1,000 per month. The rationale for this claim is based on a number of logical inferences from the IRC’s own data.

The survey-derived overall mortality rate recorded by the IRC in what it describes as the “nonconflict” western region of the DRC in its third survey was 2.0 deaths per 1,000 per month. During this period, the IRC recorded neither violent deaths nor any other excess deaths for this region.

The IRC's data also suggest there were no excess deaths in the west of the country for the period of the first two surveys. We can infer this from the following:

- First, the IRC recorded zero excess deaths in the west for the period of the first two surveys in the chart on page 13 of its final report.<sup>102</sup>
- Second, the IRC's estimate of 5.4 million excess deaths in the DRC between 1998 and 2007 is obtained by adding the 2.5 million estimated excess deaths for the eastern region during the first two surveys to the nationwide estimate for the periods covered by the final three surveys. Given that this nationwide excess death toll estimate does not include an estimate for excess deaths in the west of the country during the period of the first two surveys, we conclude the IRC assumes there were no excess deaths in the west during those periods.

We have no idea whether the IRC's assumptions about excess mortality in the west during the period of the first two surveys are correct, but they are not implausible. They are consistent with what we know about the patterns of violence in the DRC and the lack of connectedness between the east and the west of the country. From the start of the war in August 1998, the violence was concentrated in the eastern region. Much of the western region, which was controlled by the government, is half a continent away from the war-stricken east. Communication between east and west is minimal and livelihoods throughout the region are based mostly on subsistence agriculture. As such, they are less likely to be disrupted by distant armed violence—with the attendant risk of increased mortality—than would have been the case in a more economically interdependent country.

Given that, according to the IRC's findings, there were no excess deaths in the west during the periods of the first, second, or third surveys, then, other things being equal, we can infer that the average mortality rate for the region during the period of the first two surveys should be the same as that recorded in the third survey—i.e., 2.0 deaths per 1,000 per month.

Finally, other things again being equal, the mortality rate for the whole of the DRC immediately prior to the war should be the same as for the west of the country which was not affected by conflict during the period of the first two surveys. It follows that the 2.0 deaths per 1,000 per month is a plausible pre-war mortality rate for the DRC.

Like all baseline mortality estimates for the DRC, this figure is open to challenge, but HSRP is not alone in believing the 2.0 deaths per 1,000 per month is appropriate. WHO's

Francesco Checchi notes in his review of the IRC's research for the HNTS that his approach to the baseline issue would be "to use the east to west CMR [crude mortality rate] rate ratio, which in practice (though not in theory) means adopting the CMR in the west as the baseline for the entire country."<sup>103</sup>

We also note that in its sensitivity analysis for its report on the third survey, the IRC uses the 2.0 deaths per 1,000 per month rate to demonstrate the effect of changing the baseline mortality rate. From this we assume that, while the IRC's preferred baseline rate is 1.5, it believes the 2.0 rate is not implausible.

## Recalculating the Excess Death Estimate

When the IRC's excess death figures for the period of May 2001 to April 2007 are recalculated using the revised baseline rate, the result is startling. There is a massive reduction in the excess death toll. As Table 7.1 illustrates, the best estimate of the excess death toll shrinks to less than one-third of the IRC's original figure—from 2.83 million to 0.86 million.<sup>104</sup>

The point of this exercise was not to produce a "correct" estimate—indeed, we do not believe the data are reliable enough to permit this. Rather, it was to show how a modest, but plausible, increase in a highly questionable baseline mortality rate can lead to a radically lower excess death toll.

To make the point even clearer, we asked a hypothetical question: What would the excess death toll be in 2017, under several different, but equally plausible, conditions?

- First, assume the average mortality rate in the DRC for the period 2007 to 2017 is the same as it was for the 2006 to 2007 period (i.e., 2.2 deaths per 1,000 per month). Using a baseline mortality rate of 1.4 deaths per 1,000 per month—which is the rate the IRC used in its final survey—there would be an additional 6.6 million excess deaths by 2017.
- Second, assume the average mortality rate for the period 2007 to 2017 declined to 2.0 per 1,000 per month, which is plausible given the mortality rate in the DRC had been trending downwards since 2002.<sup>105</sup> Assume also that the baseline mortality rate remained at 1.4 per 1,000 per month. There would now be an additional 5.0 million excess war deaths by 2017.
- Third, assume an average mortality rate for the period 2007 to 2017 is 2.2 deaths per 1,000 per month, and the baseline mortality rate is 2.0 per 1,000 per month—the rate suggested by HSRP and Francesco Checchi. There would be an additional 1.7 million excess deaths by 2017.
- Finally, assume the average mortality rate for the period 2007 to 2017 declined to 2.0 deaths per 1,000 per month.

**Table 7.1 Excess Deaths in the Democratic Republic of the Congo (DRC), 2001–2007: International Rescue Committee (IRC) and Human Security Report Project (HSRP) Estimates**

Period	IRC (Best)	HSRP (Best)	IRC (Low)	HSRP (Low)	IRC (High)	HSRP (High)
May 2001–December 2001	418,400	209,200	180,800	29,800	654,500	402,300
January 2002–December 2002	343,200	257,400	120,100	34,300	583,400	497,600
January 2003–April 2004	607,000	101,200	101,200	-404,700	1,112,900	607,000
May 2004–December 2005	735,000	136,600	419,300	-179,700	1,138,100	539,100
January 2006–April 2007	727,000	158,600	522,000	-31,800	1,050,000	371,300
May 2001–April 2007	2,830,600	863,000	1,343,400	-552,100	4,538,900	2,417,300

*Data Sources: IRC and HSRP.<sup>106</sup>*

The IRC’s “best estimate” of excess deaths in the DRC for the period May 2001 to April 2007 is 2.83 million. Using the IRC’s survey data, but a more realistic baseline mortality rate, HSRP’s “best estimate” of the excess death toll for this period is 0.86 million. In both cases the margin of probable error is large, as indicated by the wide confidence intervals.

With a baseline mortality rate of 2.0 deaths per 1,000 per month, there would now be zero excess deaths over the 10-year period.

Again, the point of this exercise is not to determine a correct excess death toll, but rather to show how modest, but plausible, changes in the average mortality rate and/or the baseline mortality rate produce radically different excess death estimates.

## Conclusion

In this analysis, we argued the IRC’s inappropriate selection procedures for the areas surveyed in 2000 and 2001 mean that for this period the organization’s excess death estimates are statistically invalid. The survey data leave no doubt that mortality levels in much of the eastern part of the DRC are very high. But, because the IRC failed to choose the areas it surveyed in a way that ensured they were representative of the population of the eastern region as a whole, they should not have been used to generate excess death estimates. In addition, we noted that even if this problem was ignored, other methodological errors had the effect of increasing the excess death toll estimate significantly and unwarrantedly. For these reasons, we argued the findings of both the 2000 and 2001 surveys should be rejected.

We also demonstrated how, for the May 2001 to April 2007 period, the inappropriately low baseline mortality rate

used by the IRC grossly inflated the excess death toll. Using a more appropriate baseline derived from the IRC’s own data, the “best estimate” of the excess death toll for this period declines from the IRC’s 2.83 million figure to just over 0.86 million.

Our revision of the IRC’s estimates reduces the excess death toll dramatically, but the revised data still show a large number of excess deaths (direct as well as indirect), which, given the deadliness of the conflict measured in terms of battle deaths, is not surprising.

The accuracy of our revised estimate, which still relies on the IRC’s survey data for overall mortality rates, is, however, impossible to determine.

The primary reason for concern is that the IRC’s estimate of the U5MR following the onset of the war in 1998 shows an unprecedented increase, while the DHS data covering the same period show no increase at all. The IRC’s U5MR for the 2006 to 2007 period is almost twice that of the 2007 DHS for the same period.

In the next chapter, we discuss a major, but generally overlooked, source of potential error that arises when retrospective mortality surveys are used to estimate excess death tolls. We demonstrate that this source of error is rarely possible to correct and, as a consequence, we argue that the goal of accurately estimating excess death tolls using surveys is effectively unachievable, except in very short wars.



Martin Adler / Panos Pictures. SRI LANKA.

## CHAPTER 8

### Can Retrospective Mortality Surveys Be Used to Determine Excess Death Tolls?

We now turn to a problem that has been ignored in the literature on conflict epidemiology but challenges the very idea that surveys are useful instruments for estimating excess death tolls.

We demonstrate why retrospective mortality surveys that use point estimates of the pre-war mortality as a baseline, and assume they do not change over time, will tend to produce erroneous excess death estimates, except in the case of very short wars. The longer the war lasts, the greater will be the extent of the error.

We also argue that, since war deaths are not the only factor that determine overall mortality, attributing increases (or decreases) in mortality to wartime violence may sometimes be highly inaccurate.

Finally, we point out that retrospective mortality surveys are simply too crude an instrument to detect the impact of most wars on nationwide mortality rates.

The discussion that follows is in no sense intended as a critique of nationwide retrospective mortality surveys. On the contrary, as we argue elsewhere in this chapter, such surveys are critically important sources of data for war-affected countries where there are rarely any reliable governmental statistics.

Nor do we question the utility of the local health surveys that humanitarian organizations carry out in internally displaced person and refugee camps that provide vital

needs-assessment information for humanitarian missions. Our focus is rather on the use of retrospective mortality surveys for the particular purpose of measuring nationwide excess war death tolls.

The nationwide population health surveys undertaken by Demographic and Health Surveys (DHS), UNICEF (United Nations Children's Fund), and WHO (World Health Organization)<sup>107</sup> are not used by these organizations to produce such estimates—we believe with good reason.

We further argue that not only is it rarely possible to calculate accurate estimates of excess war deaths but that such estimates are of little practical utility for humanitarian policy on the ground. Excess death estimates may well be useful for advocacy purposes, and are of obvious interest to historians and conflict researchers, but their utility even for these latter purposes is very limited given their accuracy is so dubious.

### The Elusive Quest for Baseline Mortality Data

In Chapter 5 we described how nationwide surveys can be used to estimate the overall mortality rate for a war-affected population. We noted that, provided the pre-war mortality rate is known, researchers can easily determine the excess mortality rate—the difference between the wartime rate and the pre-war rate—and thence, the excess death toll.<sup>108</sup>

The first part of this process—using survey-derived data to estimate the overall mortality rate—is subject to many sources of uncertainty and possible error—such as sampling error, reporting bias, response bias, recall bias, and survival



bias. But, these challenges, which are all well described in the literature, can be taken into account and are not the focus of this discussion.

The more problematic, and much less analyzed, step involves the estimation of the baseline mortality rate. This is critically important. Without reliable baseline data, it is impossible to determine the excess mortality rate or the excess death toll. Moreover, as we saw in Chapter 7, an inappropriate choice of the baseline mortality rate can have a dramatic impact on the excess death toll estimate.

When there are no reliable official data to permit the baseline mortality to be determined directly—as there almost never are in war-affected poor countries—researchers have a number of different ways to obtain the data they need. All are error-prone.

The options include the following:

- Using the mortality rate for a neighbouring country that has similar characteristics to the country being surveyed, but which is at peace. Here, the problem is the neighbour's mortality rate can be quite different from that of the war-affected country—even where the characteristics of the two countries appear similar.
- Using the regional average mortality rate, as the International Rescue Committee (IRC) did for its surveys in the Democratic Republic of the Congo (DRC). Since all regions encompass countries with very different peacetime mortality rates, the probability that any one country in a region will have the same mortality rate as the regional average is low.
- Relying on the survey data. Here, there are two choices:
  - i) Respondents can be asked if anyone died, and if so, from what causes, for a period before the war started. A major challenge with this method is recall bias—the probability that respondents will make mistakes in recalling past events.<sup>109</sup>
  - ii) The survey-derived wartime mortality rate for the part of the country that has not been impacted by wartime violence can be used as the baseline. The assumption here is the mortality rate in an area that has not been affected by the fighting should be the same as the peacetime mortality rate for the whole country in the immediate pre-war period.<sup>110</sup> This is the approach that was adopted in Chapter 7 to re-estimate excess war deaths in the DRC.

## The Real Challenge: Determining What Would Have Happened Had There Been No War

The challenges involved in determining pre-war mortality rates are daunting. But, even if the difficulties involved in obtaining an accurate estimate of the mortality rate immediately prior to the start of a conflict can be overcome, a more challenging problem remains to be addressed.

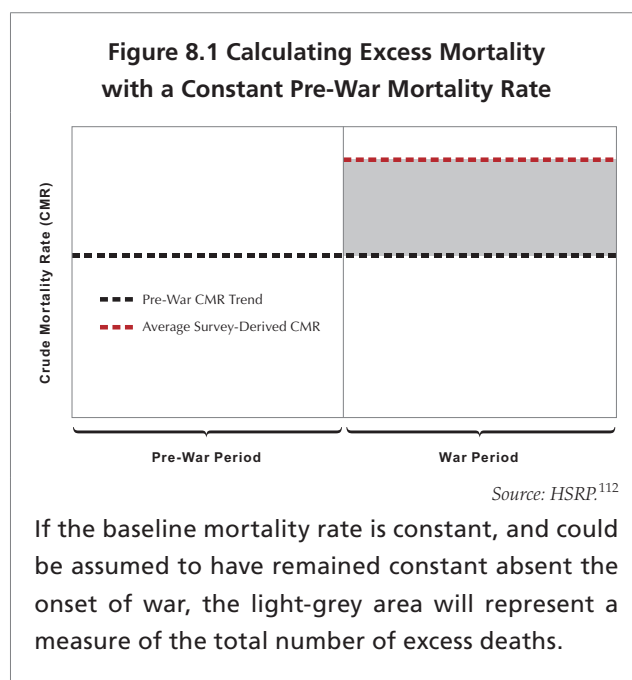
To determine the excess death rate, researchers must try and imagine what would have happened to mortality rates in the absence of war. In practice, they usually do this by making a simplifying assumption that is rarely correct, namely that the mortality rate immediately before the war would have stayed the same had there been no war.<sup>111</sup>

In the following section, we demonstrate how using a single point estimate of the pre-war mortality rate can lead to either an under- or overestimation of the excess death toll.

## Calculating Excess Mortality with a Constant Pre-War Mortality Rate

Figure 8.1 depicts a situation in which the pre-war mortality rate does in fact remain constant. In this case, the excess death rate is measured correctly.

In the graph, the red-dashed line represents the average nationwide mortality rate for the war period that is derived from the survey. This rate takes into account the excess war deaths (direct as well as indirect), in addition to deaths from all other causes. The baseline mortality is represented by the black-dashed line.

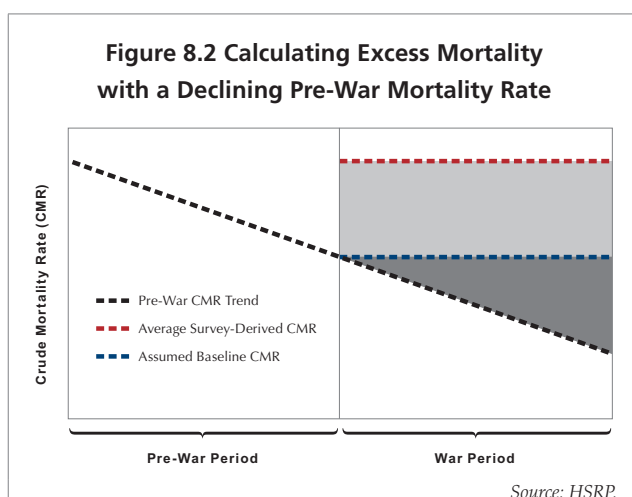


The excess mortality rate is determined by subtracting the baseline mortality rate from the survey-derived mortality rate. The grey-shaded area, which is a function of the time period over which the war has been waged, as well as the average excess death rate, thus becomes a measure of the extent of excess deaths.<sup>113</sup>

### Calculating Excess Mortality with a Declining Pre-War Mortality Rate

We now turn to a situation that represents the norm in the developing world, namely one in which mortality rates are declining in peacetime and could reasonably be expected to have continued to decline had there been no war. We can immediately see from Figure 8.2 that the excess mortality rate, which is measured from the slope—i.e., the vertical distance between the black- and red-dashed lines—increases over time.

The light- and dark-grey areas taken together constitute a measure of the extent of excess mortality.



If the mortality rate had been declining in the pre-war period, and could be assumed to have continued to decline absent the onset of war, the light-grey and dark-grey areas taken together will represent a measure of the total number of excess deaths. If the mortality rate immediately preceding the onset of the war is assumed to have remained constant, the measure of excess deaths will be underestimated to the extent shown by the dark-grey area.

It is clear from Figure 8.2 that the excess death toll will be underestimated if researchers fail to take into account the declining pre-war mortality trend and instead assume the mortality rate immediately before the war will remain

unchanged. The longer the period of war, the greater will be the underestimation.

Figure 8.2 represents a purely hypothetical situation. But, we can get some idea of how a declining pre-war mortality rate might impact excess mortality estimates in the real world by revisiting the IRC's excess death estimates in the DRC for the period covered by the surveys that were carried out between 2001 and 2007.

This is not a simple exercise, and it is far from precise. But the evidence from the DHS on under-five mortality and the WHO data on adult mortality suggest that the overall mortality rate in the DRC in the pre-war period was declining at a rate of approximately 1.76 percent a year. If we assume that in the absence of the war this decline would have continued through to 2007 (the last year for which there are data), and if we take this into account when calculating the excess death toll, then our previous estimate of the excess death toll of 0.86 million rises to 1.50 million—an increase of 74 percent.<sup>114</sup> This is approximately half the IRC's best estimate of 2.83 million excess deaths.

### Taking pre-war mortality trends into account can have a significant impact on estimates of excess death tolls.

Without taking the decline in pre-war mortality into account, our original estimate indicated the IRC's excess death toll for its final three surveys was too high by a factor of three. When the declining pre-war mortality rate is taken into account, it appears the IRC's estimate was too high by a factor of two.

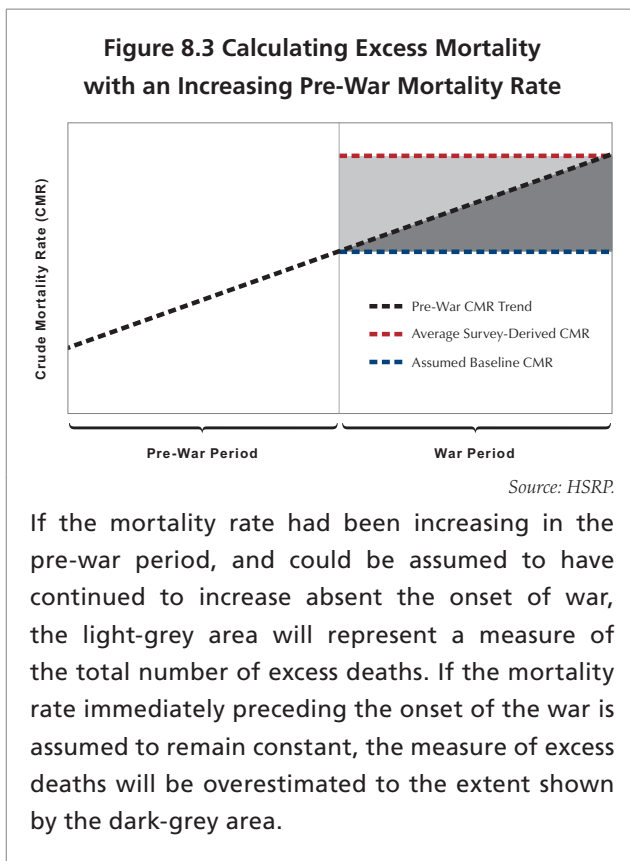
Because of the many uncertainties, no confidence should be placed in the actual estimates noted above. But this exercise nevertheless demonstrates that taking pre-war mortality trends into account can have a significant impact on the magnitude of estimates of excess death tolls.

### Calculating Excess Mortality with an Increasing Pre-War Mortality Rate

Assuming that mortality rates would have remained unchanged had there been no war usually results in an underestimation of excess death tolls, but it can also result in an overestimation on occasion. A small number of southern African countries have seen overall mortality rates increase as a consequence of the HIV/AIDS death toll.

In Figure 8.2 the assumption that the mortality rate at the beginning of the war did not change results in an underestimation of the excess death toll. In Figure 8.3, however, the same assumption results in the excess death toll being overestimated.

The extent of the overestimation is represented by the dark-grey area. When the appropriate procedure of measuring from the slope is followed, the light-grey area provides a measure of the extent of excess mortality. As Figure 8.3 shows, this declines over the period of the conflict.



### Additional Methodological Challenges

In the highly schematic graphics in Figures 8.2 and 8.3, excess mortality can be determined by measuring from a changing baseline mortality rate. In the real world, things are not so simple and this is rarely possible.

Getting an accurate point estimate for the baseline mortality rate at the start of wars is, as we have already noted, extremely challenging, particularly in poor countries engulfed in, or emerging from, violent conflict. Getting accurate pre-war trend data on national mortality rates is even more difficult. But there are additional problems that are equally if not more challenging.

First, determining the cause of increased mortality during periods of conflict is difficult, if not impossible. Mortality rates can go up during peacetime. In our review of under-five mortality rates (U5MRs) discussed in Chapter 7, we found that 25 percent of countries that were conflict-free between 1970 and 2008 experienced increases in the U5MR.<sup>115</sup> So, clearly, as mentioned previously, political violence is not the only cause of changing mortality rates during periods of conflict.

Mortality surveys in conflict-afflicted countries measure the effect not just of war but of all factors that impact mortality rates. Some nonwar factors—a major drought taking place during a period of fighting, for example—also push mortality rates upwards; others may cause them to decline. The problem is the mortality data cannot be disaggregated to determine the impact of these different factors. In fact, there is no way of determining the extent to which changes in wartime mortality rates revealed by surveys are caused by war or other exogenous factors.

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Getting accurate pre-war trend data on national mortality rates is extremely difficult.

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Second, survey-derived mortality rates often have quite wide confidence intervals. For example, the IRC's "best estimate" of the nationwide mortality rate in the DRC for the 2003 to 2004 period was 2.1 deaths per 1,000 per month. But the IRC's researchers could not be certain that this was the correct figure. Their methodology indicated they were 95 percent confident the actual rate lay between 1.6 and 2.6 deaths per 1,000 per month.

Any measurement of baseline mortality is likely to have a wider confidence interval than the survey-derived mortality rate for the war period—in part because pre-war trend data are often made up of widely divergent survey and census data.

What this means in practice is that excess death tolls from low-intensity conflicts may well be undetectable. If the real excess death toll is less than the uncertainties in wartime and pre-war mortality trend data, then the impact of war deaths may be hidden by the imprecision of the very instruments that are being used to try and detect them.

The clear implication of this analysis is that retrospective mortality surveys are rarely appropriate instruments for measuring excess death tolls in wars in poor countries, except in relatively rare circumstances—namely, very short wars.<sup>116</sup>

## WHY NATIONWIDE POPULATION SURVEYS ARE NEEDED IN WAR-AFFECTED COUNTRIES

The evidence presented in this chapter suggests that nationwide mortality surveys are of little utility for the specific task of estimating excess war death tolls. The problem, we have argued, lies with the near-insurmountable challenges associated with establishing reliable baseline mortality trend data in the poor countries where most wars take place.

However, none of the criticisms presented in this chapter, or in Chapter 7, should be taken as suggesting nationwide population surveys are of little value for humanitarian and post-conflict peacebuilding programs. On the contrary, in the absence of reliable government statistics, such surveys could play a valuable role—for beneficiaries as well as donors—in creating a broad evidence base, both for humanitarian policies and post-conflict peacebuilding programs.

Currently, national governments, donors, international agencies, and nongovernmental organizations that confront the multiple challenges posed by complex emergencies rarely have the data needed to measure progress—or the lack thereof.

The challenges of creating a reliable evidence base for policy planning and impact evaluation for humanitarian and peacebuilding programs would be addressed in large part if the UN (United Nations) Security Council were to include in the mandate of each new peace operation a requirement to undertake a nationwide population survey of immediate post-war health, socio-economic, and security conditions. Similar surveys could be carried out in post-conflict countries where non-UN peace and stability operations were being implemented.

The widely respected Demographic and Health Surveys (DHS) offer one possible model for such an initiative. DHS surveys collect considerably more information than do mortality surveys of the type the International Rescue Committee carried out in the Democratic Republic of the Congo. They have a strong focus on maternal and child health, but they also collect data on income, livelihoods, and education.

National governments have a major responsibility for the actual implementation of the DHS, and this official buy-in has avoided the sort of public controversies encountered by other major population health surveys in Iraq and elsewhere.

Technical assistance in carrying out DHS surveys is provided at all stages by Macro International, a US corporation that has worked for many years with USAID (United States Agency for International Development) on issues related to survey design and implementation. Macro International is also responsible for collating and analyzing the data collected in the surveys.

Since Macro International is a private corporation and already contracts with UN agencies, there would be no reason in principle why it should not work with the UN and post-conflict governments to create what is a much-needed instrument to evaluate the impact of relief, recovery, and peacebuilding programs.

Unlike other approaches to impact evaluation, such surveys would provide information for national governments, not just donors and international agencies—a further advantage of official buy-in and ownership.

DHS-type surveys would not replace the surveys that humanitarian organizations carry out in and around conflict zones for needs-assessment and monitoring purposes. However, they would provide data that would not only be nationwide but would also cover a far greater range of issues relevant to relief and recovery.

DHS surveys cost up to USD 2 million each, and if the primary purpose of a Security Council-mandated survey was to provide an evidence base to evaluate the broad impact of humanitarian and post-conflict reconstruction/peacebuilding programs, follow-up surveys would obviously be required—perhaps every two years. However, relative to the USD 8 billion a year currently being spent on UN peace operations alone, these costs are minimal.

A commitment by the Security Council to conduct a DHS-type nationwide survey at the outset of every new peace operation, with follow-up surveys to measure progress, would provide national governments and donors with a unique source of data to evaluate the impact of humanitarian and post-conflict peacebuilding policies. Currently, no such evidence base exists.

## Conclusion

Given that the practice of estimating excess death tolls via retrospective mortality surveys is so prone to errors, and given that some of these errors become greater the longer the war lasts, a strong case can be made for choosing an alternative approach to measuring the human costs of war.

There are, moreover, more appropriate ways for advocates to communicate the deadliness of warfare than publicizing the nationwide excess death toll—a measure that, even when accurate, takes no account of population size.<sup>117</sup>

The issue of reliability aside, excess death toll estimates are of little practical utility to humanitarians working on the ground. The data humanitarian workers require come from the surveys that are routinely carried out at the local level in conflict-affected areas by humanitarian agencies and non-governmental organizations. These surveys typically estimate local mortality rates (not excess mortality rates) and provide information on the proximate causes of death.

Mortality rates are the metric most used by humanitarians. But, for nonexperts, the fact that there were, for example, 15 deaths per 1,000 of war-affected population per month—

actually a very high death rate—will be largely meaningless and therefore of little use for advocacy purposes.

Perhaps the best approach—one that conveys the deadliness of wars in a way that is both meaningful and accessible to nonexperts—is to compare the mortality rate in war zones with that of the regional average. Saying that the death rate in the war-affected eastern DRC is now 10 times the sub-African average will make far more sense to nonexperts than the (equally true) statement to the effect that the crude mortality rate in the eastern DRC is 15 deaths per 1,000 of the population per month.

Finally, we reiterate a point already made in this and earlier chapters; namely, that if the controversies associated with survey-based estimates of excess deaths continue, they threaten to discredit the entire survey approach—one that remains critically important to the creation of evidence-based humanitarian and peacebuilding policies.

In Chapter 9 the focus shifts from humanitarian policy and the measurement of war deaths to the broader debate about the nexus between health and security, and in particular the program WHO calls Health as a Bridge for Peace.





Giacomo Pirozzi / Panos Pictures. SUDAN.

## CHAPTER 9

### Armed Conflict and Health Policy

The discussion thus far has focused on the indirect impact of armed conflict on population health. In the past three decades health professionals, particularly those in the humanitarian community, have played a key role in seeking more effective ways to reduce the death toll from war-exacerbated disease and malnutrition.

But for some health professionals, the idea that the medical profession should focus primarily on reducing the human costs of wars has not been enough. Proponents of Health as a Bridge for Peace (HBP) argue that health professionals also have a role to play in conflict prevention via education, in seeking to stop ongoing wars—“peacemaking” in UN-speak—and in post-conflict peacebuilding, where the key security goal is to prevent wars that have stopped from starting again.<sup>118</sup>

The WHO’s (World Health Organization’s) HBP program started in August 1997 and was accepted by the 51st World Health Assembly in May 1998. The various initiatives associated with the program are predicated on the assumption that health policy can help to create a more secure world in a number of different, but complementary, ways.

Three policy approaches associated with the HBP concept are discussed here. They are often pursued by NGOs (nongovernmental organizations) rather than international agencies like WHO and UNICEF (United Nations Children’s Fund), and some predate WHO’s HBP program.

First are the advocacy and education programs that seek to inform publics and governments about the true human costs of war. Enhancing public knowledge about warfare is seen as contributing to conflict prevention.

Second is the idea that trust generated by negotiating health interventions in conflict zones—typically to immunize children—can create enough confidence among enemies to jump-start negotiations that can eventually lead to peace settlements. From this perspective, interventions by health professionals can become stepping stones to peace.

Third is the belief that where government policy improves the health outcomes of ordinary citizens in post-conflict settings, it will enhance the legitimacy of the governments concerned and thus decrease the risks of wars restarting. Here, health policy is seen as contributing to post-conflict peacebuilding—although this, as we will see, is a controversial issue.

### Health Education and Conflict Prevention

Advocacy programs designed to educate publics about the true costs of war are based on the assumption that if publics, and indeed governments, understand that the true costs of conflict are far greater than commonly believed, the incentive for going to war will be reduced, while the incentives for conflict prevention, peacemaking, and effective post-conflict peacebuilding will be increased.

In the 1980s, physicians’ organizations, including the Nobel Prize-winning International Physicians to Prevent Nuclear War, waged a high-profile public campaign to persuade publics



and policy-makers that the true costs of nuclear war, which included the possibility of a consequent “nuclear winter,” were far more devastating than generally realized. Some analysts have argued that such campaigns helped create a “nuclear taboo” and that, as a consequence, nuclear war has become literally “unthinkable”—and thus less likely.<sup>119</sup>

The advocacy programs pursued by the International Rescue Committee in the Democratic Republic of the Congo (DRC), and those of literally hundreds of NGOs in other conflicts, are other cases in point. Advocacy is focused primarily on generating pressure to provide more resources to reduce the human costs of war via the provision of humanitarian assistance. But, few health professionals believe humanitarian assistance is enough—many support the broader security goals of conflict prevention, peacemaking, and post-conflict peacebuilding.

Focusing international attention on the human costs of war could, in principle, help further these latter goals. Indeed, there is little doubt that efforts by NGOs and international agencies to publicize the huge death tolls from war-exacerbated disease and malnutrition in the DRC, Darfur, and elsewhere have made donors and attentive publics far more aware of the hidden costs of war. Nor is there any doubt that for more than a decade, donors and international organizations have been committing far more resources to humanitarian assistance, conflict prevention, peacemaking, and post-conflict peacebuilding. Humanitarian advocacy campaigns have surely been one of the factors driving these changes.

## Health Interventions and Peacemaking

In a paper prepared for the 1995 World Summit for Social Development, WHO argued:

Health is valued by everyone. It provides a basis for bringing people together to analyze, to discuss and to arrive at a consensus acceptable to all. The potential for using health as a mechanism for dialogue, and even peace, has been demonstrated in situations of conflict.<sup>120</sup>

HBP advocates believe that because health, particularly children’s health, is valued by all parties, and because medical professionals who have a humanitarian mandate are traditionally seen as neutral, it may be possible for them to facilitate dialogue between the warring parties where other attempts have failed. The dialogue will initially be technical with a completely apolitical goal—to gain access to children in war zones in order to deliver very basic life-saving health

interventions. But, health advocates believe the degree of trust generated by negotiating humanitarian access can be built on and used to build a process of conflict mediation and, ultimately, resolution.

As Paula Gutlove puts it, health professionals “can create a bridge of peace between conflicting communities, whereby delivery of health care can become a common objective and a binding commitment for continued cooperation.”<sup>121</sup>

Humanitarian ceasefires, often called Days of Tranquility, have been implemented in many conflict zones and are held up as examples of the utility of the HBP approach in practice. Here, a temporary truce is negotiated between the government and rebels that permits health workers to enter conflict zones in order to immunize children against a variety of infectious diseases, or deliver food or other humanitarian assistance. As mentioned previously, humanitarian ceasefires of this type have been implemented in many conflict situations in, for example, Afghanistan, Cambodia, El Salvador, Lebanon, the Philippines, Sudan, and Uganda.<sup>122</sup>

Sometimes the truce can be extended for considerable periods of time. In 1994, for example:

WHO-Afghanistan and the Afghan Ministry of Public Health brokered a cease-fire... during which children throughout the country could be immunized. The two weeks of tranquility became a two-month cease-fire during which an intensive “Mass Immunization Campaign” was carried out.<sup>123</sup>

These health interventions, which are most frequently referred to as HBP initiatives in the literature, have undoubtedly saved lives, but there is little evidence they have contributed in any major way to bringing wars to an end.

The claimed causal relationships in the literature between humanitarian health interventions and peace are problematic in a number of ways.<sup>124</sup> First, they are asserted rather than demonstrated—and they invariably ignore the possibility that Days of Tranquility initiatives might be an effect of improved relations, rather than their cause.

Second, the HBP literature is almost certainly subject to publication bias—that is, there is a higher probability that articles on successful, rather than unsuccessful, initiatives will get published in academic journals. The fact that many individuals writing in this field are advocates, who may have little interest in publicizing unsuccessful cases, does nothing to reduce the risk of bias.

Third, even where there is a clear association between HBP initiatives and peace settlements, it does not necessarily

indicate any causal relationship. Many of the conflicts that have witnessed Days of Tranquility have indeed ended, but it is far from clear whether the health interventions played even a minor role in bringing them to an end.

Successes in what the UN calls “peacemaking” and “post-conflict peacebuilding” have many causes. An editorial in the *British Medical Journal* may have been overstating things when it noted in 2001 that there were few examples of successful peace through health initiatives, adding, “it is ideology that is driving the movement at present.”<sup>125</sup> Yet, some eight years later, there has still been no systematic evaluation of the effectiveness of humanitarian interventions in driving subsequent peace negotiations.

Moreover, there is little recognition in the literature of the risks that HBP initiatives may involve. The assumption that cooperation is possible because people on both sides of a conflict value good health does not mean that rebel groups will in fact choose to cooperate. Rebel leaders may perceive state-supported initiatives to deliver humanitarian assistance into war zones as tactics intended to generate support for the government, and reject them for precisely this reason.

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### Humanitarian organizations are aware that aid can have perverse effects.

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Moreover, humanitarian assistance, as is now widely recognized, can have profoundly negative consequences in certain circumstances. As Mary Anderson demonstrated more than a decade ago, the food and medicine provided by international agencies and NGOs can have the perverse effect of fuelling the very wars whose human costs they seek to reduce.<sup>126</sup> Rebels often steal aid shipments, or impose a “tax” on their delivery and use the resources thus acquired to support their war effort. Rebel groups can also use Days of Tranquility to redeploy their forces to greater strategic advantage without fear of attack.

Humanitarian organizations today are well aware that aid can have perverse effects, however, and most now seek—though not always successfully—to ensure their operations “do no harm.”

Finally, while health professionals may aspire to leverage the trust generated in negotiating access to war zones to promote peace negotiations, few have the depth of knowledge of the political issues at stake, or the necessary experience mediating in such situations, to facilitate a negotiated settlement.

## Health Policy and Peacebuilding

In post-conflict situations, governments that gain legitimacy in the eyes of their citizens are less likely to succumb to renewed rebel violence. As one review of the HBP literature noted:

Through the provision of health and other public services to their populations, governments have the opportunity to (re)establish their legitimacy, reduce alienation from society and, crucially, to visibly demonstrate that they are upholding their side of the social contract.<sup>127</sup>

An important source of what is sometimes called “performance legitimacy” is a government’s ability to provide goods and services that are desired by its citizens. And, the reliable provision of accessible health care is a critical determinant of performance legitimacy, even in poor countries where health services are often minimal. In 2007, for example, a survey of 18 African nations by Afrobarometer found that respondents’ satisfaction with their government was associated with their satisfaction with the delivery of social services such as health and education, as well as its political and economic performance.<sup>128</sup> Factors influencing satisfaction with health care were, in order of importance: perceived ease of access, the respondent’s level of poverty, perceived absence of corruption, and affordable fees for medical treatment.<sup>129</sup>

However, if, as is often the case, it is NGOs, rather than the government, that are providing most of the health care in post-conflict situations, the government is less likely to gain legitimacy than if its own health workers were providing the services.

As Margaret Kruk has noted, effective and equitable delivery of health care can influence citizens’ perceptions of the legitimacy of oppositions, as well as governments.<sup>130</sup> In southern Lebanon, where the national government has long underinvested in health care services, the militant Hezbollah organization has provided generous health insurance and efficient, accessible, and reliable health services to the local Shia population. In 2005, for example, some 50 hospitals in the country were being run by the organization, which also provides life and disability insurance, as well as other social services.<sup>131</sup> In the wake of the August 2006 war with Israel, Hezbollah’s rapid provision of health care and reconstruction aid appears to have only strengthened its legitimacy in the south.<sup>132</sup>

A major multi-country study by the RAND Corporation published in 2006 provided considerable support for the thesis that effective delivery of health services can enhance the legitimacy of governments in post-conflict settings.<sup>133</sup> In evaluating the impact of the provision of health services

in rebuilding Germany and Japan after World War II, and in Somalia, Haiti, Kosovo, Iraq, and Afghanistan, the authors concluded that “health can have an important independent impact on nation-building and... on security by helping to ‘win hearts and minds.’”<sup>134</sup>

## Humanitarian Assistance and Counterinsurgency

But while the provision of health services in post-conflict settings does not sound controversial, it can pose real risks for humanitarian health professionals in those situations where armed resistance remains. The “win hearts and minds” approach that the RAND Corporation report refers to is, of course, a critically important element in contemporary counterinsurgency strategy. And it is perceived as such by forces opposed to governments in Afghanistan and elsewhere. For example, the Taliban attacks health facilities in the Afghan countryside because it has a direct interest in preventing the government in Kabul from winning hearts and minds, and thus gaining legitimacy.

Some humanitarian organizations, most notably the International Committee of the Red Cross (ICRC) and Médecins Sans Frontières (MSF), strongly repudiate any association between humanitarian actors and military campaigns in part for this reason. As the head of MSF’s Afghanistan mission noted in 2004:

The deliberate linking of humanitarian aid with military objectives destroys the meaning of humanitarianism. It will result, in the end, in the neediest Afghans not getting badly needed aid—and those providing aid being targeted.<sup>135</sup>

The ICRC and MSF have also refused to join the UN’s integrated missions initiative, which is intended to improve the effectiveness of post-conflict reconstruction efforts via a greater degree of coordination and integration between the organizations that undertake different mission responsibilities. Integrated missions are problematic for the ICRC and MSF because in post-conflict situations, where there is still considerable armed resistance directed against a government, humanitarian organizations that join an integrated mission cease to be neutral and impartial. They become, according to Jacques Forster, ICRC vice-president, part of “a political and military strategy to defeat the enemy. In other words, the subordination of humanitarian activities to political goals, using aid as a tool for local or foreign policy.”<sup>136</sup>

Where humanitarian assistance is no longer perceived as being neutral, health workers and clinics may be targeted by

rebel movements for precisely this reason. This, in turn, will have a negative impact on population health in the areas affected.

The risk is real. Attacks against aid workers worldwide in 2008 were the highest in 12 years and have increased appreciably since 2006. They have also become increasingly politically motivated, “reflecting a broad targeting of the aid enterprise as a whole.”<sup>137</sup>

If threats to aid workers mean service provision is reduced, then health outcomes will not improve, and any legitimacy gains that governments seek to achieve from enhancing health outcomes will not be realized.

However, while there is no doubt the incidence of violent assaults against aid workers has increased worldwide, the violence has not been uniformly distributed. Indeed, some 60 percent of these violent assaults in 2008 took place in just three countries—Afghanistan, Sudan (Darfur), and Somalia.<sup>138</sup> All three countries were experiencing ongoing conflicts, and both Afghanistan and Somalia have Islamist movements strongly opposed to what they see as Western political agendas. The risks to aid workers are minimal in countries where there are major peacebuilding missions underway and no active rebel movements.

## Conclusion

WHO’s HBP program is less actively promoted today than even five years ago. The HBP page is still active on WHO’s website, but the links are now very dated. A recent UK review of the program suggests the declining interest may be in part because the effectiveness of HBP policies has been more asserted than demonstrated. The review, by Colin McInnes and colleagues, noted that:

Critically, the evidentiary base appears slim and overly reliant on anecdotal evidence rather than rigorous and systematic empirical work. Moreover, there has been little conceptual work done on key questions including: what works and why? What conditions are susceptible to such an approach? What level and form of health investment is required? When might it backfire and allow a conflict to continue? Can it be used to assist in ending conflicts, or just in post-conflict reconstruction? And can it be used to prevent conflict?<sup>139</sup>

None of this means HBP initiatives—like the Days of Tranquility immunization programs for children in conflict zones—are not worthwhile from a health perspective. Rather, it simply means their security benefits have yet to be compellingly demonstrated.

## PART II

# ENDNOTES

### INTRODUCTION

1. The release of the first draft of Part II, *The Shrinking Costs of War*, generated considerable controversy. The resulting debate is reviewed on HSRP's website. See the 14 April 2010 posting on the Latest News section of HSRP's website, <http://www.hsrgroup.org/press-room/latest-news/latest-news-view.aspx> (accessed 6 December 2010).

### CHAPTER 5

2. The terms *indirect* and *excess* deaths are sometimes—incorrectly—used interchangeably. They are not the same: indirect deaths are those resulting from war-exacerbated disease and malnutrition, while excess deaths include all deaths—direct and indirect—that would not have occurred in the absence of war.
3. Christopher Murray et al., "Armed Conflict as a Public Health Problem," *British Medical Journal* 324 (2002), <http://gking.harvard.edu/files/armedph.pdf> (accessed 19 November 2009).
4. Cited in Hugo Slim, *Killing Civilians: Method, Madness, and Morality in War* (New York: Columbia University Press, 2008), 91.
5. See Geneva Declaration Secretariat, *Global Burden of Armed Violence*, 2008, <http://www.genevadeclaration.org/fileadmin/docs/Global-Burden-of-Armed-Violence-full-report.pdf> (accessed 19 November 2009).
6. See Figure 4.1 in the *Human Security Report 2005*. Human Security Centre, *Human Security Report 2005: War and Peace in the 21st Century* (New York: Oxford University Press, 2005).
7. See Human Security Centre, *Human Security Report 2005*, 129–130.
8. Some may be able to avoid the worst consequences of displacement by finding refuge with friends and relatives in more secure parts of the country.
9. Malnutrition was responsible for almost as many deaths as diarrheal disease, while almost 30 percent of deaths were attributed to "other causes." Loretxu Pinoges and Evelyn Depoortere, "Analysis of Excess Mortality in Recent Crises" (Paris: Epicentre, 2004).
10. Goma Epidemiology Group, "Public Health Impact of Rwandan Refugee Crisis: What Happened in Goma, Zaire, in July 1994?" *The Lancet* 345, no. 8946 (11 February 1995): 341.
11. Peter Salama et al., "Lessons Learned from Complex Emergencies over Past Decade," *The Lancet* 364, no. 9447 (13 November 2004): 1804.
12. WHO (World Health Organization) Global Task Force on Cholera Control, "First Steps for Managing an Outbreak of Acute Diarrhoea," 2004, [http://www.who.int/topics/cholera/publications/en/first\\_steps.pdf](http://www.who.int/topics/cholera/publications/en/first_steps.pdf) (accessed 5 November 2009).
13. United Nations Children's Fund, *The State of the World's Children 2008: Women and Children—Child Survival*, 2007, [http://www.unicef.org/publications/files/The\\_State\\_of\\_the\\_Worlds\\_Children\\_2008.pdf](http://www.unicef.org/publications/files/The_State_of_the_Worlds_Children_2008.pdf) (accessed 5 November 2009).
14. WHO, "Fact Sheet No. 211: Influenza," April 2009, <http://www.who.int/mediacentre/factsheets/fs211/en/> (accessed 5 November 2009).
15. Salama et al., "Lessons Learned," 1809.
16. M. Biot, D. Chandramohan, and J. D. H. Porter, "Tuberculosis Treatment in Complex Emergencies," *Tropical Medicine & International Health* 8, no. 3 (March 2003): 212.
17. Centers for Disease Control and Prevention, "Mortality During a Famine—Gode District, Ethiopia, July 2000," *MMWR Morbidity and Mortality Weekly Report* 50, no. 15 (20 April 2001), <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5015a2.htm> (accessed 5 November 2009).
18. Peter Salama, Jeff McFarland, and Kim Mulholland, "Reaching the Unreached with Measles Vaccination," *The Lancet* 366, no. 9488 (3 September 2005): 787.

19. WHO, "Ten Facts on Immunization," October 2009, <http://www.who.int/features/factfiles/immunization/en/index.html> (accessed 5 November 2009).
20. *Recall bias* arises when respondents forget events or get the dates wrong. This can have the effect of either increasing or decreasing the mortality rate. *Survivor bias* arises when whole families get wiped out, so that no family member is available to report deaths to interviewers. This form of bias has the effect of reducing the excess mortality rate.

## CHAPTER 6

21. These estimates are for armed conflicts in which a state is one of the warring parties. Conflicts between non-state armed groups and the deliberate killing of defenseless civilians are not included because there are no data on these forms of violence for the full period covered. However, since these forms of violence mostly kill fewer people than "state-based" violence, their exclusion is unlikely to affect the findings.
22. Moreover, child mortality rates are often used as proxies for adult mortality rates, which are far less commonly measured. Indeed, in Africa, the UN Population Division and WHO use child mortality rates in their estimates of adult mortality and life expectancy in the countries of the region. See Debbie Bradshaw and Ian M. Timaeus, "Levels and Trends of Adult Mortality," in *Disease and Mortality in Sub-Saharan Africa*, 2nd ed., ed. Dean T. Jamison et al. (Washington, DC: World Bank, 2006), <http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=dmssa&part=A206> (accessed 24 November 2009).
23. The DHS is sometimes criticized for underestimating child mortality rates—in part, it is claimed, because, unlike humanitarian NGOs (nongovernmental organizations) and agencies, they do not conduct surveys in areas affected by conflict. In fact, the DHS does survey conflict-affected areas, but they do so retrospectively. Moreover, the child mortality trend data available online at <http://www.childmortality.org> do not indicate that DHS mortality estimates are consistently lower than those of UNICEF or other survey data—or indeed census data where available.
24. Under-five mortality rates declined in some 90 percent of country-years in war. In the remaining 5 percent of cases, under-five mortality rates remained constant.
25. Center for the Study of Civil War, International Peace Research Institute, Oslo, (PRIO), Battle Deaths Dataset 3.0, <http://www.prio.no/CSCW/Datasets/Armed-Conflict/Battle-Deaths/The-Battle-Deaths-Dataset-version-30/> (accessed 17 February 2010), updated from Bethany Lacina and Nils Petter Gleditsch, "Monitoring Trends in Global Combat: A New Dataset of Battle Deaths," *European Journal of Population* 21, no. 2–3 (2005): 145–166; Uppsala Conflict Data Program (UCDP)/Human Security Report Project (HSRP); Inter-Agency Child Mortality Estimation Group (IACMEG), "Child Mortality Estimates Info," 20 November 2009, <http://www.childmortality.org> (accessed 17 February 2010).

The UCDP and PRIO datasets code battle deaths by conflict rather than by country. In the absence of additional information on the location of battle deaths, HSRP divided annual death tolls in interstate conflicts by the number of parties involved.

Five countries were excluded from the analysis due to data limitations: The IACMEG had no data for Kosovo; Montenegro is not counted as a separate country because the IACMEG had data entries for Montenegro, as well as Serbia and Montenegro, and HSRP could not determine whether the data overlap. East Timor, Eritrea, and Namibia were excluded because all three fought successful wars of independence during the period under review and it was unclear whether the IACMEG data for these three countries overlap with the entries for the "parent countries."

Because the battle deaths from the wars of independence in East Timor, Eritrea, and Namibia took place in the territories that later became independent countries, the tolls were subtracted from the tolls of Indonesia, Ethiopia, and South Africa, respectively.

Battle deaths from the conflict over the Golan Heights were excluded from the analysis as it is unclear whether the IACMEG includes the disputed area in Israel or Syria.



26. Kosovo, Montenegro, East Timor, Eritrea, and Namibia were excluded from the analysis for the same reasons they were excluded from Table 6.1.

An additional five countries were excluded from the analysis in Table 6.2: Angola, Cambodia, Chad, Cyprus, and Guinea-Bissau. The five were excluded because the IACMEG did not have under-five mortality rate (U5MR) data for all the periods of war experienced by these countries. Assuming that all five excluded countries experienced an increase in the U5MR during the periods of war for which U5MR data are not available, the percentage of countries that experienced an increase in the U5MR during war would be 25 percent (as opposed to 15). This hypothetical scenario still strongly supports the finding that the vast majority of countries saw no increase in the nationwide U5MR during war.

27. PRIO's best estimate of the number of battle deaths in Rwanda in 1994 falls below the 1,000 threshold. However, for the purposes of Figure 6.1, HSRP has coded 1994 as a year in conflict because of the extraordinarily high number of deaths from one-sided violence.
28. In some countries, the survey data that go into making up the best fit trend line will cluster very close to the line; in others there may be quite large differences in the survey results. The IACMEG's website, <http://www.childmortality.org>, reveals the degree of uncertainty associated with different estimates via a shaded band on either side of the best fit trend line.
29. Siyan Chen, Norman V. Loayza, and Marta Reynal-Querol, "The Aftermath of Civil War," *World Bank Economic Review* 22, no. 1 (2008): 63–85.
30. Ibid., 73.
31. Julie Knoll Rajaratnam et al., "Worldwide Mortality in Men and Women Aged 15–59 Years from 1970 to 2010: A Systematic Analysis," 30 April 2010, <http://www.thelancet.com> (accessed 22 July 2010).
32. Ruth Levine, *Case Studies in Global Health: Millions Saved* (Sudbury, MA: Jones and Bartlett, 2007), <http://www.jbpub.com/catalog/0763746207>, xxviii (accessed 25 November 2009).
33. Chen, Loayza, and Reynal-Querol, "The Aftermath of Civil War," 82.
34. UNICEF, "Immunization Fact Sheet," [http://www.unicef.org/media/media\\_46851.html](http://www.unicef.org/media/media_46851.html) (accessed 25 November 2009).
35. UNICEF, "The 1980s: Campaign for Child Survival," in *The State of the World's Children 1996—Children in War*, 1995, <http://www.unicef.org/sowc96/1980s.htm> (accessed 1 December 2009).
36. Ibid.
37. UNICEF, *The State of the World's Children 2008: Women and Children—Child Survival*, 2007, <http://www.unicef.org/sowc08/docs/sowc08.pdf> (accessed 1 December 2009).
38. See David Oot, "Coalition Launches the Second Child Survival Revolution," *International Health* (Spring 2005), <http://www.apha.org/membergroups/newsletters/sectionnewsletters/interna/spring05/1670.htm> (accessed 21 December 2009); and Kofi A. Annan, *We the Children: Meeting the Promises of the World Summit for Children*, 2001, [http://www.unicef.org/specialsession/about/sgreport-pdf/sgreport\\_adapted\\_eng.pdf](http://www.unicef.org/specialsession/about/sgreport-pdf/sgreport_adapted_eng.pdf) (accessed 9 December 2009).
39. UNICEF India, "Global Data Sheet: SOWC—Key Statistics," 2008, [http://www.unicef.org/india/media\\_3896.htm](http://www.unicef.org/india/media_3896.htm) (accessed 1 December 2009).
40. UNICEF, *The State of the World's Children 2008* (accessed 12 January 2009).
41. Robert E. Black, Saul S. Morris, and Jennifer Bryce, "Where and Why Are 10 Million Children Dying Every Year?" *The Lancet* 361, no. 9376 (28 June 2003): 2226.
42. Gareth Jones et al., "How Many Child Deaths Can We Prevent this Year?" *The Lancet* 362, no. 9377 (5 July 2003): 65.
43. UNICEF, "Statistics by Area/Child Survival and Health," <http://www.childinfo.org/mortality.html> (accessed 16 November 2009).



44. Ibid.
45. Kenneth Hill, "Adult Mortality in the Developing World; What We Know and How We Know It" (paper presented at the UN Population Division Training Workshop on HIV/AIDS and Adult Mortality in Developing Countries, New York City, 8-13 September 2003), 13, [http://www.un.org/esa/population/publications/adultmort/HILL\\_Paper1.pdf](http://www.un.org/esa/population/publications/adultmort/HILL_Paper1.pdf), 13 (accessed 9 December 2009).
46. UNICEF, "Nutrition Indicators: Exclusive Breastfeeding," *Progress for Children*, May 2006, [http://www.unicef.org/progressforchildren/2006n4/index\\_breastfeeding.html](http://www.unicef.org/progressforchildren/2006n4/index_breastfeeding.html) (accessed 25 November 2009).
47. UNICEF, "Infant and Young Child Feeding," *Nutrition*, [http://www.unicef.org/nutrition/index\\_breastfeeding.html](http://www.unicef.org/nutrition/index_breastfeeding.html) (accessed 25 November 2009). See also, Stanley Ip et al., "Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries," *Evidence Report/Technology Assessment*, no. 153 (April 2007), <http://www.ahrq.gov/downloads/pub/evidence/pdf/brfout/brfout.pdf> (accessed 25 November 2009).
48. WHO: Western Pacific Region, "Key Strategies for Promotion of Breastfeeding," <http://www.unicef.org/eapro/factsheet.pdf> (accessed 25 November 2009).
49. WHO Statistical Information System, Geneva, Switzerland, <http://apps.who.int/whosis/data/Search.jsp> (accessed 7 October 2009).

"Period of violence" refers to medium- to high-intensity state-based armed conflict, non-state armed conflict, and one-sided violence.

DTP3 immunization coverage is the percentage of one-year-olds who have received three doses of the combined diphtheria, tetanus toxoid, and pertussis vaccination in a year.

MCV is measles-containing vaccine.
50. See WHO Statistical Information System, <http://apps.who.int/whosis/data/Search.jsp> (accessed 25 November 2009).
51. WHO, "Health as a Bridge for Peace—Humanitarian Cease-Fires, Project (HCFP)," May 2001 [http://www.who.int/hac/techguidance/hbp/cease\\_fires/en/index.html](http://www.who.int/hac/techguidance/hbp/cease_fires/en/index.html) (accessed 25 November 2009).
52. The campaign also offered health assistance to women of child-bearing age, including "breastfeeding promotion; and tetanus toxoid vaccination of girls and women aged 15–49." See UNICEF, "Largest Ever, Life Saving Campaign to Reach 1.5 Million Somali Children," 29 December 2008, [http://www.unicef.org/infobycountry/media\\_46968.html](http://www.unicef.org/infobycountry/media_46968.html) (accessed 25 November 2009).
53. The latest update of the childmortality.org website now shows the "best fit" line for Somalia running parallel to the horizontal axis for the entire period, essentially ignoring the survey data that show a clear decline. Previously, using the same data, the best fit line showed a decline. The straight line is not in fact a best fit line. Rather, it represents an unexplained lack of agreement among experts about what conclusions to draw from the data. The data from the most recent individual surveys for Somalia continue to show a decline, however, and there would have to be massive error in these survey data for some decline not to have taken place.
54. Data from various sources collated by Phil Orchard, University of British Columbia, 2007; Global Humanitarian Assistance, <http://www.globalhumanitarianassistance.org/data-space/excel-data/total-humanitarian-assistance-0> (accessed 28 September 2009).

The data exclude United Nations Relief and Works Agency-mandated refugees.
55. Peter Salama et al., "Lessons Learned from Complex Emergencies Over Past Decade," *The Lancet* 364, no. 9447 (13 November 2004): 1801–1813.

56. Charles B. Keely, Holly E. Reed, and Ronald J. Waldman point out that while there is considerable variation, usually caused by political factors, "the general pattern is one of elevated mortality, followed by rapid declines with the arrival of assistance and a modicum of stable and safe living conditions." See Keely, Reed, and Waldman, "Understanding Mortality Patterns in Complex Humanitarian Emergencies," in *Forced Migration and Mortality*, eds. Holly E. Reed and Charles B. Keely (Washington, DC: National Academies Press, 2001), 12, [http://books.nap.edu/openbook.php?record\\_id=10086&page=12](http://books.nap.edu/openbook.php?record_id=10086&page=12) (accessed 25 November 2009).
57. Dominique Legros, Christophe Paquet, and Pierre Nabeth, "The Evolution of Mortality Among Rwandan Refugees in Zaire between 1994 and 1997," in *Forced Migration and Mortality*, eds. Holly E. Reed and Charles B. Keely (Washington, DC: National Academies Press, 2001), 61, [http://books.nap.edu/openbook.php?record\\_id=10086&page=61](http://books.nap.edu/openbook.php?record_id=10086&page=61) (accessed 25 November 2009).
58. Hazem Adam Ghobarah, Paul Huth, and Bruce Russett, "Civil Wars Kill and Maim People—Long after the Shooting Stops," *American Political Science Review* 97, no. 2 (2003): 189–202.
59. Hazem Adam Ghobarah, Paul Huth, and Bruce Russett, "The Post-War Public Health Effects of Civil Conflict," *Social Science & Medicine* 59 (2004): 881. The authors also calculated the impact of civil wars on neighbouring countries—estimating that these added another 3 million healthy years of life lost worldwide in 1999.
60. See Quan Li and Wen Ming, "Immediate and Lingering Effects of Armed Conflict on Adult Mortality: A Time Series Cross-National Analysis," *Journal of Peace Research* 42, no. 4 (2005): 487. See also, Zaryab Iqbal, "Health and Human Security: The Public Health Impact of Violent Conflict," *International Studies Quarterly* 50, no. 3 (2006): 631–649.
61. Matthew Hoddie and Jason Mathew Smith, "Forms of Civil War Violence and Their Consequences for Future Public Health," *International Studies Quarterly* 53, no. 1 (March 2009): 175–202.
62. *Ibid.*, 185. The authors, however, also show that the distinction between warfare and the more exceptional genocidal events is important when studying the health consequences of organized violence—a finding mirrored in the under-five mortality data in sub-Saharan Africa reviewed elsewhere in this section.
63. In Rwanda 500,000 to 800,000 people were killed in a matter of months with the most basic weapons.
64. Personal communication from Clionadh Raleigh of ACLED to HSRP director, Andrew Mack, 2 March 2009.
65. The data include battle deaths from state-based armed conflict only.
66. United Nations Population Division, "World Population Prospects: The 2008 Revision, Population Database," 11 March 2009, <http://esa.un.org/unpp> (accessed 20 October 2009).  
The data include battle deaths from state-based armed conflict only.
67. The lower estimate for deaths in the DRC is derived from the PRIO dataset and is just under half the estimate derived from the International Rescue Committee's (IRC's) figures. Population data for Korea and the DRC are from the UN Population Division (2009).
68. Bethany Lacina, Nils Petter Gleditsch, and Bruce Russett, "The Declining Risk of Death in Battle," *International Studies Quarterly* 50 (2006): 675.
69. See Benjamin Coghlan et al., *Mortality in the Democratic Republic of Congo: An Ongoing Crisis* (New York: IRC, 2007), 16, [http://www.theirc.org/resources/2007/2006-7\\_congomortalitysurvey.pdf](http://www.theirc.org/resources/2007/2006-7_congomortalitysurvey.pdf) (accessed 20 December 2009). The IRC's data indicate that, on average, well under 10 percent of the deaths were due to violence.

## CHAPTER 7

70. See Benjamin Coghlan et al., *Mortality in the Democratic Republic of Congo: An Ongoing Crisis* (New York: IRC, 2007), [http://www.theirc.org/resources/2007/2006-7\\_congomortalitysurvey.pdf](http://www.theirc.org/resources/2007/2006-7_congomortalitysurvey.pdf) (accessed 20 December 2009). A single survey was also carried out by the IRC in the eastern Congo in 1998–1999.
71. Benjamin Coghlan et al., “Mortality in the Democratic Republic of Congo: A Nationwide Survey,” *The Lancet* 367, no. 9504 (13 January 2006): 44–51.
72. Richard Brennann et al., “Mortality Surveys in the Democratic Republic of Congo: Humanitarian Impact and Lessons Learned,” *Humanitarian Exchange Magazine* 35, November 2006, <http://www.odihpn.org/report.asp?id=2838> (accessed 10 January 2010).
73. UN, “Democratic Republic of the Congo—MONUC—Facts and Figures,” MONUC Fact Sheet, <http://www.un.org/Depts/dpko/missions/monuc/facts.html> (accessed 6 January 2010). Figure on total uniformed personnel as at 30 November 2009.
74. André Lambert and Louis Lohlé-Tart, “La Surmortalité au Congo (RDC) Durant les Troubles de 1998–2004: Une Estimation des Décès en Surnombre, Scientifiquement Fondée à Partir des Méthodes de la Démographie,” ADRASS, October 2008, <http://www.obsac.com/E20090105172451/index.html> (accessed 22 December 2009). Both authors had been invited by the European Commission to assess the voter registration process in 2005 and 2006.
75. Ibid.
76. The Human Security Report Project (HSRP) also commissioned Yale University’s Dr. Beth Daponte to review the Belgian demographers’ findings. Her findings, which are critical, are available on request.
77. The review done for the Health and Nutrition Tracking Service (HNTS) was released into the public domain after this section of the *Report* was completed. See HNTS, “Peer Review Report: Re-examining mortality from the conflict in the Democratic Republic of Congo, 1998–2006,” Geneva, 15 May 2009, [http://www1.icn.ch/HNTS\\_peer\\_review.pdf](http://www1.icn.ch/HNTS_peer_review.pdf) (accessed 22 December 2009).
78. Macro International Inc., “Democratic Republic of the Congo: Demographic and Health Survey 2007 Key Findings,” August 2008, <http://www.measuredhs.com/pubs/pdf/SR141/SR141.pdf> (accessed 20 December 2009). While the main DHS report was published in French, its key statistics were also published in English. Interestingly, the DHS report does not mention the very different IRC findings, let alone challenge them, though it does cite other survey research on the DRC.
79. The IRC does not publish nationwide under-five mortality estimates. However, a nationwide figure can be derived from the under-five mortality rates the IRC reports for its survey areas by making the same assumptions that the IRC employed for its own estimate procedure for excess deaths. A detailed explanation of how HSRP calculated the IRC’s nationwide under-five mortality rate for the period of the first two surveys can be obtained from HSRP by e-mailing a request to [hsrp@sfu.ca](mailto:hsrp@sfu.ca).
80. Macro International Inc., “Democratic Republic of the Congo,” 16 (accessed 20 December 2009).
81. The IRC and DHS calculate child mortality differently. The IRC, like most humanitarian organizations, is interested in determining short-term mortality levels, so it measures child mortality in deaths per 1,000 per month. The DHS focuses its analyses on long-term trends, and its mortality estimates are measured in deaths per 1,000 live births over a five-year period. The different approaches to measuring child mortality are not comparable in some cases—when comparing, for example, countries with markedly different underlying demographic structures. But since there is little difference in the IRC’s child mortality estimates between 2003 and 2007, the two rates are in fact reasonably comparable in this case. Jon Pedersen, in his review of the IRC’s research for the HNTS, notes that the IRC’s estimate of child mortality would translate into 350 to 400 deaths per 1,000 live births over five years. This is well in excess of double the DHS estimate of circa 150 deaths per 1,000 live births over five years in 2006. Pedersen notes, “It is difficult to see how the DHS 2007 could be that wrong without glaring data quality problems.” See HNTS, “Peer Review Report,” 19 (accessed 22 December 2009).

82. The recall period of the first survey only went back to January 1999. The researchers extrapolated backwards in order to cover the first five months of the fighting.
83. More detailed discussion of this issue appears later in the chapter.
84. During the fifth survey, the sub-Saharan average mortality rate was revised downwards, so for part of the period covered by this survey—January 2006 through April 2007—the IRC used the new baseline mortality rate of 1.4 deaths per 1,000 per month. This change had the somewhat bizarre consequence of increasing the IRC's excess death toll estimate for the DRC, regardless of whether or not a single additional Congolese person actually died.
85. Kenneth Hill, "Comments on IRC Estimates of Mortality in the DRC and on Estimates by Lambert and Lohlé-Tart" (undated, unpublished review of IRC research on mortality in the DRC undertaken for the WHO-affiliated HNTS). WHO's Francesco Checchi notes, "It is plausible to assume a higher CMR [crude mortality rate] for DRC than for the rest of Sub-Saharan Africa, even in the absence of a war." And Jon Pedersen from Norway's FAFO writes, "The average Sub-Saharan rate for comparison is also problematic . . . [the] DRC in 1998 was a country that had for many years undergone a profound crisis of governance, which may well have affected mortality patterns." For Checchi's and Pedersen's comments, respectively, see HNTS, "Peer Review Report," 8–9, 30 (accessed 22 December 2009). Note the Checchi paper comes after the paper by Jon Pedersen in this file.

These are not the only grounds for skepticism about the IRC's choice of baseline. The IRC stresses the sub-Saharan African average mortality rate of 1.5 deaths per 1,000 per month is "conservative" because it is higher than UNICEF-reported rates of 1.2 deaths per 1,000 per month in 1996 and 1.25 in 1998. These lower figures are intended to lend credibility to the use of the 1.5 sub-Saharan African figure as a baseline for the DRC at the beginning of the war. But are the figures reported by UNICEF credible? There are certainly reasonable grounds to challenge them. First, they both indicate that the DRC's pre-war mortality rate is *lower* than the sub-Saharan African average rate. This is despite the fact that all reviewers believe the sub-Saharan African average is too low to be used as the baseline rate for the DRC. Second, with reference to these UNICEF-reported rates, the IRC acknowledges the "limitations of such data, including reservations concerning its validity and ability to capture regional differences in a country as vast as DR Congo." See Coghlan et al., "Mortality in the Democratic Republic of Congo: An Ongoing Crisis" (accessed 14 January 2010). This is presumably why the IRC chose not to use either of these figures as its baseline. Third, both of these rates are given as single figures. In fact, there is no way that a mortality rate that is derived from a survey can be determined with the degree of precision that a single figure suggests. The usual way of indicating the extent of uncertainty is with confidence intervals; in this case they would likely have been large. Whether or not a confidence interval was reported in the original data, there would necessarily have been uncertainty around that figure. But the IRC gives no indication that this figure would necessarily have been subject to considerable uncertainty.

86. IRC, *Mortality in Eastern DRC: Results from Five Mortality Surveys* (New York: IRC, May 2000), 12. Emphasis added.
87. Cited in Sam Dealey, "An Atrocity that Needs No Exaggeration," *New York Times*, 12 August 2007, <http://www.nytimes.com/2007/08/12/opinion/12iht-eddealy.1.7088161.html> (accessed 8 December 2009).
88. Ibid.
89. Richard Brennan and Anna Husarska, "Inside Congo, An Unspeakable Toll," *The Washington Post*, 16 July 2006, <http://www.washingtonpost.com/wp-dyn/content/article/2006/07/14/AR2006071401389.html> (accessed 8 December 2009).
90. See Ian Smillie and Larry Minear, *The Charity of Nations: Humanitarian Action in a Calculating World* (Bloomfield, CT: Kumarian Press, 2004) for a detailed discussion on inflated claims by NGOs seeking humanitarian funding.

91. See, for example, J. Bohannon, "Iraqi Death Estimates Called Too High; Methods Faulted," *Science* 314 (20 October 2006): 396–397; J. Bohannon, "Calculating Iraq's Death Toll: WHO Study Backs Lower Estimate," *Science* 319 (18 January 2008): 273; B. O. Daponte, "Wartime Estimates of Iraqi Civilian Casualties," *International Review of the Red Cross* 89, no. 868 (2007): 943–957; J. Giles, "Death Toll in Iraq: Survey Team Takes on Its Critics," *Nature* 446, no. 7131 (2007): 6–7; D. Guha-Sapir and O. Degomme, "Estimating Mortality in Civil Conflicts: Lessons from Iraq: Triangulating Different Types of Mortality Data in Iraq," CRED working paper (June 2007), [http://www1.cedat.be/Documents/Working\\_Papers/CREDWPIraqMortalityJune2007.pdf](http://www1.cedat.be/Documents/Working_Papers/CREDWPIraqMortalityJune2007.pdf) (accessed 8 December 2009).
92. One way to address this challenge would be to make assessments of the health consequences of armed conflicts *independent* of the organizations responsible for on-the-ground implementation of humanitarian assistance. This idea, canvassed by Paul Spiegel of the UNHCR (United Nations High Commissioner for Refugee) among others, would improve the often uneven quality of data from the field, while addressing donor concerns that NGOs may inflate the seriousness of crises to secure more assistance. NGOs, on the other hand, would be able to point to independent assessments when making the case that more assistance is needed.
93. The IRC's third, preferred, estimation method is simply a variation on the second. Here, the IRC assumes in addition that "one-third of the population has escaped Katanga and is somewhere else, having never experienced excess mortality from this war." No reason is given for this latter assumption, which is dropped in the survey that follows. See Les Roberts et al., *Mortality in Eastern DRC: Results from Five Mortality Surveys* (New York: IRC, 2000), 13.
94. See Les Roberts et al., *Mortality in Eastern Democratic Republic of Congo: Results from Eleven Mortality Surveys* (New York: IRC, 2001).
95. See endnote 82.
96. IACMEG, "Child Mortality Estimates Info," 20 November 2009, <http://www.childmortality.org> (accessed 26 February 2010). The IACMEG website includes the UNICEF and the DHS data. The UNICEF data referred to here are from its Multiple Indicator Cluster Surveys (MICS); Roberts et al., *Mortality in Eastern DRC*; Roberts et al., *Mortality in Eastern Democratic Republic of Congo*.

There are two different methods for estimating the under-five mortality rate: direct and indirect. "Direct methods of calculation use data on the date of birth of children, their survival status, and the dates of death or ages at death of deceased children. Indirect methods use information on survival status of children to specific age cohorts of mothers." For more information on direct and indirect estimation methods, see [http://www.measuredhs.com/help/Datasets/Methodology\\_of\\_DHS\\_Mortality\\_Rates\\_Estimation.htm](http://www.measuredhs.com/help/Datasets/Methodology_of_DHS_Mortality_Rates_Estimation.htm) (accessed 22 April 2010).
97. The modest fluctuations in the mortality data in the individual surveys are not unusual and do not mean very much. They are likely the result of sampling and other errors. What matters are not the short-term variations—that may not reflect real changes in mortality—but rather the long-term trend.
98. HNTS, "Peer Review Report," 9 (accessed 22 December 2009).
99. *Ibid.*, 4.
100. Such uncertainty has many other possible causes, including sampling error, reporting bias, response bias, recall bias, and survival bias.
101. When presenting survey results, standard statistical practice is to provide not only the single best estimate but also some measure that indicates the degree of certainty about its accuracy. The conventional approach is to provide "95 percent confidence intervals" for the point estimate. What does this mean? Put simply, it means if one were to sample the same population repeatedly, then the range within which 95 percent of the samples fall would constitute the confidence interval.



102. Benjamin Coghlan et al., *Mortality in the Democratic Republic of Congo: Results from a Nationwide Survey* (New York: IRC, 2004); Benjamin Coghlan et al., "Mortality in the Democratic Republic of Congo: A Nationwide Survey," *The Lancet* 367, no. 9504 (13 January 2006): 44–51; Benjamin Coghlan et al., "Mortality in the Democratic Republic of Congo: An Ongoing Crisis" (New York: IRC, 2007), [http://www.theirc.org/sites/default/files/migrated/resources/2007/2006-7\\_congomortalitysurvey.pdf](http://www.theirc.org/sites/default/files/migrated/resources/2007/2006-7_congomortalitysurvey.pdf) (accessed 14 January 2010); Les Roberts et al., *Mortality in Eastern DRC: Results from Five Mortality Surveys* (New York: IRC, 2000); Les Roberts et al., *Mortality in Eastern Democratic Republic of Congo: Results from Eleven Mortality Surveys* (New York: IRC, 2001); Les Roberts et al., *Mortality in the Democratic Republic of Congo: Results from a Nationwide Survey* (New York: IRC, 2003).

The figures in Table 7.1 have been rounded to the nearest hundred.

103. Coghlan et al., *Mortality in the Democratic Republic of Congo: An Ongoing Crisis* (accessed 14 January 2010).
104. HNTS, "Peer Review Report," 7, 39 (accessed 22 December 2009). Note the Checchi paper comes after the paper by Jon Pedersen in this file.
105. In the following chapter, we challenge the standard assumption that baseline rates remain constant—mostly, they do not.
106. What is the case for assuming an average mortality rate of 2.0 deaths per 1,000 per month for the 10 years following the IRC's last survey in 2007? The nationwide mortality rate has been declining steadily throughout the new millennium, so it is not at all unreasonable to assume that for the 10 years after 2007, the nationwide death rate could continue to decline from 2.2 deaths per 1,000 per month—which is the survey-measured nationwide crude mortality rate in the DRC as of 2007 (Coghlan et al., *Mortality in the Democratic Republic of Congo: An Ongoing Crisis*, ii (accessed 14 January 2010)—to an average of 2.0. Note it is not being argued this figure is correct, simply that it is plausible.

## CHAPTER 8

107. See WHO's relatively new World Health Surveys, WHO, Health Statistics and Health Information Systems, World Health Survey, <http://www.who.int/healthinfo/survey/en/index.html> (accessed 22 July 2010).
108. Such a calculation would obviously require information on the size of the population and the population growth rate.
109. This source of potential error is of sufficient concern among epidemiologists for the Standardized Monitoring and Assessment of Relief and Transitions (SMART) guidelines on survey methodology to state categorically that "recall periods longer than one year should not be used." (See Standardized Monitoring and Assessment of Relief and Transitions (SMART), "Measuring Mortality, Nutritional Status, and Food Security in Crisis Situations: SMART Methodology," 31, [http://www.smartindicators.org/SMART\\_Methodology\\_08-07-2006.pdf](http://www.smartindicators.org/SMART_Methodology_08-07-2006.pdf) (accessed 15 January 2010). The longer the war, the greater the risk that mistakes will be made in remembering the years in which deaths occurred. This risk is growing because wars are getting longer. In the early 1990s, less than 25 percent of conflicts had been active for 20 years or more, but by 2007 this figure had risen to roughly 50 percent.
110. This assumes the mortality rate for part of the country is an appropriate proxy measure for the whole country. It may not be.
111. The IRC changed its baseline mortality rate during the last survey period when the sub-Saharan African rate changed. However, as we have argued, this rate was not the appropriate one to have used in the first place.
112. Human Security Report Project (HSRP).
113. To calculate the excess death toll, the average excess mortality rate in deaths per 1,000 of the population per month (a common way of measuring mortality in retrospective mortality surveys) is multiplied by the number of months the conflict lasts and then by the war-affected population. The resulting figure is then divided by 1,000.

114. In calculating its estimate, HSRP used the annual rate of decline in the child mortality rate from the DHS data at [childmortality.org](http://apps.who.int/whosis/data/Search.jsp?countries=%5bLocation%5d.Members) and the annual rate of decline in the adult mortality rate from the WHO data. See WHO, WHO Statistical Information System, <http://apps.who.int/whosis/data/Search.jsp?countries=%5bLocation%5d.Members> (accessed 30 December 2009), and [childmortality.org](http://www.childmortality.org), “COD\_Demographic and Health Survey\_Direct (5 year)\_2007,” <http://www.childmortality.org> (accessed 11 January 2010). Further information on the methodology and data used in these calculations is available on request from [hsrp@sfu.ca](mailto:hsrp@sfu.ca).
115. We define “conflict-free” countries as those that experienced fewer than 25 battle deaths in a given year. Of the 22 conflict-free countries that experienced increases in the under-five mortality rate between 1970 and 2008, 11 were in Europe (Luxembourg, Norway, Denmark, Iceland, Finland, and Ireland were among the 11). We know that developed countries generally have under-five mortality rates that are both lower and more constant than those in the developing world. This means that relatively slight changes can be enough to result in increases at the national level. However, this finding also suggests that increases in the under-five mortality rate may be more easily detected in developed countries than in developing countries.
116. In very short wars—those that last a year or less—the errors introduced by failing to take into account pre-war mortality trends will be minimal.
117. For example, 100,000 deaths is a more significant toll in a country with a population of 10 million than it is in one with a population of 100 million.

## CHAPTER 9

118. This chapter draws on an unpublished background paper on “Health as a Bridge for Peace” prepared by Dr. Margaret Kruk for the Human Security Report Project (HSRP).
119. See, for example, Nina Tannenwald, *The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons Since 1945* (Cambridge: Cambridge University Press, 2007), <http://www.cambridge.org/catalogue/catalogue.asp?ISBN=9780521524285> (accessed 5 November 2009).
120. WHO Task Force on Health in Development, “Health in Social Development” (WHO position paper prepared for the World Summit for Social Development, Copenhagen, Denmark, March 1995), 19. Cited in Paula Gutlove, “Health as a Bridge for Peace: Briefing Manual,” Institute for Resource and Security Studies, May 2000, <http://www.irss-usa.org/pages/documents/HBPbriefmanual.pdf> (accessed 5 November 2009).
121. Gutlove, “Health as a Bridge for Peace,” 2 (accessed 5 November 2009).
122. A major review of the literature in this field reported the process of negotiating such ceasefires “can have spill-over effects in terms of building trust among conflicting parties”; R. Rodriguez-Garcia, M. Schlessler, and R. Bernstein, “How Can Health Serve as a Bridge for Peace?” *CERTI Crisis and Transition Tool Kit Policy Brief*, May 2001, 9, <http://www.certi.org/publications/policy/gwc-12a-brief.PDF> (accessed 5 November 2009).
123. Gutlove, “Health as a Bridge for Peace,” 3 (accessed 5 November 2009).
124. A. Ciro, C. A. de Quadros, and Daniel Epstein, “Health as a Bridge for Peace: PAHO’s Experience,” *The Lancet* 360, Supplement (2002): 360; (Supplement 1): s25-s26.
125. Alex Vass, “Peace through Health,” *British Medical Journal* 323, no. 7320 (3 November 2001): 1020.
126. See, for example, Anderson’s “Humanitarian NGOs in Conflict Intervention,” in *Managing Global Chaos*, eds. Chester Crocker, Fen Hampson, and Pamela Aall (Washington, DC: United States Institute of Peace Press, 1996), 343–354.

127. Simon Rushton, "Health and Peacebuilding: Resuscitating the Failed State in Sierra Leone," *International Relations* 19, no. 4 (December 2005): 442.
128. Michael Bratton, "Are You Being Served? Popular Satisfaction with Health and Education Services in Africa" (Afrobarometer Working Paper 65, Michigan State University, January 2007), <http://www.afrobarometer.org/papers/AfropaperNo65.pdf> (accessed 22 December 2009).
129. Ibid.
130. Taken from Kruk's background paper on "Health as a Bridge for Peace," prepared for HSRP.
131. Matthew A. Levitt, "Hezbollah: Financing Terror through Criminal Enterprise" (testimony given to the Committee on Homeland Security and Governmental Affairs, Washington, DC, 25 May 2005), <http://www.washingtoninstitute.org/html/pdf/hezbollah-testimony-05252005.pdf> (accessed 21 December 2009); Sabrina Tavernise, "Charity Wins Deep Loyalty for Hezbollah," *New York Times*, 6 August 2006, <http://www.nytimes.com/2006/08/06/world/middleeast/06tyre.html> (accessed 15 January 2010).
132. Richard J. Brennan and Egbert Sondorp, "Humanitarian Aid: Some Political Realities," *British Medical Journal* 333, no. 7573 (21 October 2006), 817–818.
133. Seth G. Jones et al., "Securing Health: Lessons from National Building Missions," Santa Monica, CA: RAND Center for Domestic and International Health Security, 2006, [http://www.rand.org/pubs/monographs/2006/RAND\\_MG321.pdf](http://www.rand.org/pubs/monographs/2006/RAND_MG321.pdf) (accessed 5 November 2009).
134. Ibid., 281.
135. Kenny Gluk, "Coalition Forces Endanger Humanitarian Action in Afghanistan," MSF, 6 May 2004, [http://www.msf.org/msfinternational/invoke.cfm?objectid=409F102D-A77A-4C94-89E0A47D7213B4D5&component=toolkit.article&method=full\\_html&CFID=7677556&CFTOKEN=44236300](http://www.msf.org/msfinternational/invoke.cfm?objectid=409F102D-A77A-4C94-89E0A47D7213B4D5&component=toolkit.article&method=full_html&CFID=7677556&CFTOKEN=44236300) (accessed 5 November 2009).
136. Jacques Forster, "An ICRC Perspective on Integrated Missions" (speech presented at an event hosted by the Norwegian Ministry of Foreign Affairs and the Norwegian Institute of International Affairs, Oslo, Norway, 31 May 2005), <http://www.icrc.org/Web/eng/siteeng0.nsf/html/6DCGRN> (accessed 5 November 2009).
137. Abby Stoddard, Adele Harmer, and Victoria DiDomenico, "Providing Aid in Insecure Environments: 2009 Update," ODI HPG Policy Brief 34, London, UK, April 2009, 1, <http://www.cic.nyu.edu/internationalsecurity/docs/HPG%20Briefing%2034crc.pdf> (accessed 5 November 2009).
138. Ibid.
139. Colin J. McInnes, Kelley Lee, and Egbert Sundorp, "Health, Security and Foreign Policy," *Review of International Studies* 32, no. 1 (January 2006): 18.