Armed conflict as a public health problem
C J L Murray, G King, A D Lopez, N Tomijima, E G Krug

Armed conflict is a major cause of injury and death worldwide, but we need much better methods of quantification before we can accurately assess its effect.

Assessing the public health impact of conflict
The impact of war on populations arises both from the direct effects of combat—namely, battle deaths—and from the indirect consequences of war, which may occur for several years after a conflict ends.1 Indirect effects of conflict on mortality can be formally defined as the number of deaths following a war minus the number of deaths that would have occurred in the same period if the war had not occurred. For most wars, these indirect effects will be positive, indicating an increased mortality for several years after the start of war. In some cases, however, these indirect effects can be negative. For example, a war might cause a sudden increase in both direct and indirect mortality but might result in fewer deaths in the long term if it led to the deposition of a regime whose policies caused high mortality.

The fundamental challenge in quantifying the health impacts of conflict is that health information systems, particularly civil registration systems that record the event and cause of death, often cease to function in populations affected by conflict. For example, Bosnia and Herzegovina reported vital registration data on causes of death to the World Health Organization until 1991 but ceased since the start of conflict. Most conflicts are also highly politicised, so that available information may be intentionally misrepresented. Given the difficulty of measuring the basic phenomenon, it is important to ask how a death or injury due to conflict can be detected.

Methods of measuring direct mortality (battle deaths)
Figure 1 shows the ways that direct deaths from conflict can now be measured. In the absence of functioning civil registration systems, conflict related deaths could be detected through demographic analyses of census data before and after conflicts or through indirect mortality measurements such as survey questions on survival of siblings, parents, or spouses.6-9

Most published analyses of deaths from conflict have relied on press reports of eyewitness accounts and official announcements of combatants.6-9 Many reviews cite figures from other reviews, making estimates of mortality difficult to validate. Exacerbating the problem is a wide range of definitions of conflict used by the databases.10 Table 1 lists the 10 conflicts with the largest number of deaths reported for the 1990s by these sources. The wide range of total war deaths—from 1 440 000 to 7 370 000—illustrates the problem.

Media reports are often far too numerous to read and code accurately, but new computer programs can perform this task as well as or better than humans.13 For example, the VRA Reader program has been applied to all Reuters news reports for the year 200014 and used to calculate conflict intensity in each country (fig 2). The map shows that countries with more conflict are less likely to have working civil registration systems that record conflict related deaths.

For assessing the burden of war and conflict in the World Health Report 2001, the WHO used median assessments of the size of direct mortality, with some modification using available vital registration data.23 Given the severe limitation of estimates based primarily on the qualitative analyses of media reports, conservative estimates have been used for several major conflicts.

Indirect mortality from conflict
For at least a decade, the ratio of indirect to direct conflict deaths has been quoted as 9:1.16 However, when we traced this figure to the original citation we found that...
the empirical basis had not been reported. To assess the indirect effects of conflict, some type of explicit counterfactual assessment is essential, in which the health consequences in the absence of conflict are measured. One statistical assessment, based on a cross sectional analysis, indicates that the total disability adjusted life years lost in 1999 due to the indirect effects of military conflicts occurring between 1991 and 1997 was about the same as the number lost due to the direct effects of all wars in 1999. Alternatively, time series analysis of vital registration may provide a basis for this type of estimation. Considerably more research is needed on this question before the global results on the indirect effects of conflict on mortality can be assessed.

Non-fatal outcomes and conflict
The burden of conflict includes a wide range of non-fatal health injuries. While some variation in disability is to be expected from conflict to conflict, difficulties in measuring the incidence of non-fatal outcomes means there is substantial uncertainty about the true level. In most cases disabilities due to war have been assessed from patients attending health facilities. Even though these sources may underestimate the non-fatal health outcomes, the overall impact of these health effects is likely to be substantial. The reported ratio of people injured to those killed in modern conflicts ranges from 1.9 to 13.0. In 1990 the Global Burden of Disease study estimated that non-fatal outcomes of war resulted in 4.8 million disability adjusted life years worldwide, about the same as fires and more than half that caused by road traffic injuries.

Estimates of the burden of conflict
Given the necessary caveats about the accuracy of epidemiological assessment, table 2 puts the potential size of mortality directly related to conflict in context. Globally, conflict is estimated to have caused 310 000 deaths in the year 2000, with more than half taking place in sub-Saharan Africa. About a fifth of deaths from global conflict were in South East Asia. The remaining conflict deaths were largely distributed in the Balkans, central Asia, and the Middle East. Direct mortality from

---

**Table 1** Ten most deadly conflicts originating in the 1990s, range of values for deaths from major published sources

<table>
<thead>
<tr>
<th>Conflict</th>
<th>Years</th>
<th>Estimated No of deaths (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwanda</td>
<td>1994</td>
<td>500 000-1 000 000</td>
</tr>
<tr>
<td>Angola</td>
<td>1992-4</td>
<td>100 000-500 000</td>
</tr>
<tr>
<td>Somalia</td>
<td>1991-9</td>
<td>48 000-300 000</td>
</tr>
<tr>
<td>Bosnia</td>
<td>1992-5</td>
<td>35 000-200 000</td>
</tr>
<tr>
<td>Liberia</td>
<td>1991-6</td>
<td>25 000-200 000</td>
</tr>
<tr>
<td>Burundi</td>
<td>1993</td>
<td>30 000-200 000</td>
</tr>
<tr>
<td>Chechnya</td>
<td>1994-6</td>
<td>30 000-90 000</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>1992-9</td>
<td>20 000-120 000</td>
</tr>
<tr>
<td>Algeria</td>
<td>1992-9</td>
<td>30 000-100 000</td>
</tr>
<tr>
<td>Gulf war</td>
<td>1990-1</td>
<td>4 300-100 000</td>
</tr>
</tbody>
</table>

---

**Fig 1** Sources of information on deaths from conflict and their interrelations

**Fig 2** Level of military conflict targeted at each country (from other countries or from within the country) based on systematic review of media reports by country for the year 2000 (increasing redness indicates more conflict) and availability of civil registration data (indicated by cross hatching). (Adapted from the output of the VRA Reader)
conflict accounts for 0.5% of all mortality. We have not included an estimate of indirect mortality from conflict because of the limited evidence available.

Figure 3 shows the distribution of direct deaths from conflict by age and sex. Particularly notable is the large number of deaths of children and adolescents. There is excess mortality in men aged 15-44, but nearly a quarter of war mortality is among women. Direct deaths from conflict occur in soldiers and civilians. If male and female civilians were at equal risk, the estimated age and sex distribution suggests that for every military death there is at least one direct civilian death.

Conflict also causes considerable disability, with the disabling effects of landmines being one manifestation. Based on limited follow up studies, the WHO estimated that 0.70% of the global burden of disease in the year 2000 was due to conflict, including years of life lost and years of life lived with disability. Conflict related death and disability is a smaller portion of the overall global burden than that of road traffic injuries (2.80%), self inflicted injuries (1.31%), or homicide (1.05%). At the global level, the ratio of years of life lost due to premature mortality caused by conflict to years lived with disability from conflict is 4.75. Not surprisingly, this burden is distributed across regions in similar proportions to direct deaths from conflict.

New methods of quantifying health effects
To better quantify the health consequences of conflict, we need more reliable data. A promising new approach is to include in household health surveys questions on deaths of siblings and household members from conflict. Similar approaches developed to quantify maternal mortality have proved useful.

The World Health Survey, which will begin in more than 65 countries in 2002, will provide a platform in which this type of information will begin to be collected. The development of standardised data collection tools such as injury surveillance guidelines for landmine injuries will also greatly improve future monitoring of ill health and death.

Prospects for forecasting and preventing conflict
Measuring the health consequences of conflict may provide the much needed evidence base on which to undertake risk assessments. Lately, political scientists have had some notable successes in forecasting international and intranational conflicts. Similarly, the first reliable forecasts of state failure have also recently become available. These studies are useful, but they are carried out only annually and are based on data sources that tend to be out of date upon completion. We need forecasts of the risk of conflict updated on the basis of events as they occur, perhaps automatically coded from news stories or eyewitness accounts. That way, better measurement will occur, perhaps automatically coded from news stories or eyewitness accounts. That way, better measurement will become feasible, validated forecasts can be produced, and the public health community can utilise its mission in assessing risk.

Accurate assessments of the risk of conflict and the magnitude of possible consequences would raise the possibility of preventing the health consequences of conflict. Since political scientists have long studied the causes of war, discovering the effects of deterrence and the pacifying effects of democracies in the international system, a collaboration between political scientists and public health researchers could provide a firmer basis for attempts to prevent conflicts. Unfortunately, the two professions seem to have little connection. Combining their research would give both sides a more complete approach and would help focus the attention of the international community on efforts to protect populations from the consequences of conflict.

Conclusion
More reliable data are needed to quantify the health effects of armed conflict. Better forecasts of war are also needed to enable public health workers to prepare for refugee problems and the numerous other public health consequences and to inform foreign policy. Reducing the uncertainties of life by providing better forecasts of war directly improves the human condition. Indeed, “human security” has at its core a concern about providing reasonable assurances about the future.
We thank Mie Inoue and Doris Mafat for their contribution of mortality data and Scott Bennett and Phil Schrodt for helpful suggestions. The boundaries shown in figure 2 do not imply the expression of any opinion by the WHO on the legal status of any territory or frontiers.

**Funding.** We are supported by grants from the National Institute on Aging, National Institutes of Health (PO1 AG17625-02), and the Weatherhead Center for International Affairs at Harvard University.

Competing interests: None declared.


---

**Children of war: the real casualties of the Afghan conflict**

Zulfiqar Ahmed Bhutta

Ignorance, isolation, illness, violence, and social upheaval have produced a “lost generation”; failure to provide long term support for Afghanistan risks losing another generation of Afghan children.

To many observers of the Afghan conflict, it seems as if the world suddenly discovered Afghanistan after 11 September 2001. Passing interest following the Soviet invasion in 1979 and the subsequent struggle of the Mujahideen against its occupation was soon replaced by war weariness and disinterest. The rise of the Taliban and their draconian policies made Afghanistan a pariah state. Events have moved quickly in recent months, with the US attack on Afghanistan, the defeat of the Taliban and the installation of an interim multi-ethnic government. However, few are fully aware of the plight of the main victims of this tragedy, the women and children of Afghanistan. Fewer still understand the genesis and significance of the Taliban movement and its relation to events in neighbouring Pakistan. This article explores the origin of the current Afghan crisis and describes the impact of a quarter of a century of incessant conflict on Afghan children.

**Impact of the Soviet invasion (1979-89)**

The Soviet invasion of Afghanistan in 1979 and the subsequent brutal military campaign resulted in one of the biggest humanitarian crises of modern history, with over five million refugees fleeing to Pakistan and Iran.