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Lethal instruments: Small Arms and Deaths in Armed Conflict

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I. Introduction

Assessing the number of casualties and fatalities as a result of warfare has proven a key focus of studies into the destructive potential of small arms and light weapons (SALW). Estimates of conflict deaths have been used as a means of mobilising attention around the need to control the proliferation of SALW. Nevertheless, there is a need to review our existing findings and refine the methods used by researchers to estimate both the number of people killed by armed conflict and those deaths attributable to SALW.

This chapter begins with a critique of the oft-repeated estimate of 300,000 conflict deaths as a result of SALW. It presents disaggregated data on the gender and age of victims of armed conflict, and between direct and indirect victims of violence. It examines whether civil wars kill more people than interstate conflicts and investigates whether the widely observed decline in the number of wars since the mid-1990s has been accompanied by a reduction in the number of direct battle deaths. It then explores the available data on the type of weapon, and particularly prevalence of small arms injuries, in a variety of armed conflicts. The chapter concludes with an assessment of the various methodologies used to calculate mortality and morbidity as a consequence of armed conflict.

II. Deaths per annum due to armed conflict

The absence of systematically collected data on the number of deaths in armed conflict has led to the use of estimates, wherein the sources, definitions, and methodologies are unclear. For example, the figure of 300,000 deaths has been reiterated many times over without due explanation of the evidence upon which it is based.[1]

The most high profile source is the 2001 Small Arms Survey (Muggah, 2001, p. 208), which states 'an estimated 300,000 intentional firearms deaths occur each year as a direct result of armed conflict.' Four years later, the Small Arms Survey (Wille and Krause, 2005, pp. 256–7) concluded that the estimate 'may be too high for recent years' and that it was important 'not to claim that SALW "caused" all these deaths…SALW are directly responsible for 60–90 per cent of direct conflict deaths, but they cannot be considered responsible in the same way for indirect deaths'. Wille and Krause (2005, p. 256) consequently offer revised estimates; suggesting that in 2003 there were 80,000–108,000 direct deaths due to conflict and that it would be 'reasonable to assume that overall conflict deaths would reach well beyond 300,000 if indirect deaths were included'.

The 300,000 figure first appeared in 1999 when Cukier, Chalpedine and Collins (1999, p. 40) claimed that '3,000,000 people have been killed with small arms in conflict over the past 10 years, about 300,000 per year', citing the 1996 Project Ploughshares Armed Conflict Report as the primary data source. Notwithstanding, the latter publication does not offer any annual death toll. It is not until the introductory chapter of the *1998* Project Ploughshares Armed Conflict Report that a figure approximating their estimation appears: 'in the more than three dozen current wars, probably 90 per cent of killings are by small arms, and, by some estimates, in the past decade alone they have caused more than 3,000,000 deaths.' Moreover, the authors warn that the number of fatalities is impossible to verify and that the Projects' casualty estimates for countries in conflict includes victims of famine in Somalia, genocide in Rwanda, executions of political prisoners in Iran, and tribal fighting over land in Ghana.

The International Committee of the Red Cross in a 1999 report (ICRC, p. 5) suggests that 3,200,000 deaths occurred in internal armed conflicts during 1990–95 and 'that SALW were generally the weapons of preference or even the only weapons used'. It cites Wallesteen and Sollenberg (1997) as the source. The latter, however does not even mention small arms or the suggested figure. In fact, the 3,200,000 fatality estimate was suggested by Sivard (1996) and includes war-related famine and structural violence−deaths associated with deprivation and poverty.

The first global estimates of SALW war-related casualties often included a cautionary note and many scholars have since reassessed their figures downwards (Cukier, 2007). The available data was primarily used as an advocacy tool to mobilise an international constituency around the small arms issue; the lack of precision should be viewed in this context. Estimates were designed to show the magnitude of the problem rather than provide a precise account of the people killed by SALW. The roughly calculated 'ballpark' figures enabled decision-makers to assess the relative importance of small arms compared to other pressing international problems.

Nevertheless, the continued use of the 300,000 figure by governments and NGOs is problematic. At the very least, it risks undermining people's support for the small arms issue as it is obvious that as conflicts wax and wane the number of annual casualties will fluctuate. Moreover, as the mobilisation of the policy community to work on small arms has largely been accomplished (although of course it needs to be continually developed and reinforced), it has become more important to accurately measure the impact of many policy initiatives associated with SALW. Similarly, the priority in the late 2000s and beyond is to target specific interventions to countries and regions in need. In this context, amorphous global estimates have little practical value, indeed they can obscure important variations in the extent of victimisation by SALW. It is therefore important to research mortality and morbidity due to small arms in *specific* conflict settings and so develop accurate data for all the world's conflict zones.

III. Research on all conflict deaths

In the nineteenth century, the existing body of 'war scholars'−historians, philosophers, strategists and of course soldiers−were joined by specialists in the emerging fields of sociology, economics, and politics. Following the First World War, several universities established departments of International Relations to understand why states might go to war. Research into armed conflict received more resources and became more systematic during the cold war. The pioneers in the field were generally concerned with interstate warfare, arguing that the use of arms for political reasons occurred as a consequence of the breakdown of social and cultural relationships (Sorokin, 1937; Richardson and Wright, 1960). Inspired by the behavioural revolution in the social sciences, the Correlates of War (COW) project was developed at the University of Michigan, USA, in 1963. Based on the idea that the occurrence of war could be explained as a repetitive pattern originating in basic and observable social conditions, the initiative collected information about armed actions between states, but also on several other key variables that could explain (or correlate with) the outbreak of war such as iron and steel production, demographic data, or diplomatic linkages (Singer 1972).[2] Istvàn Kende in Budapest, whose work became the basis for the Arbeitsgemeinschaft Kreigsursachenforschung (AKUF) at the Univeristy of Hamburg, focused more upon intrastate conflicts. Definitions for inclusion were fairly exclusive in both COW and AKUF, leading to calls for datasets which also covered smaller conflicts. The Uppsala Conflict Data Programme (UCDP)[3] and the International Peace Research Institute in Oslo (PRIO) joint project was accordingly established which is annually revised and updated, and encompasses both international and internal wars plus small conflicts.

These conflict datasets originally only provided information about the number of active conflicts and sometimes an approximate of the severity of the fighting. As it became apparent in the mid-1990s that global casualty estimates in conflict were extremely limited (see above), several projects started to review and improve their methodology. At around the same time, public health researchers also started to provide global estimates of the lethality of war. There was a previous literature on the numbers of deaths and wounded caused by different types of weapons, but it had almost exclusively focused on specific cases rather than global estimates over time. By reviewing the existing literature and initiating coherent reporting procedures, scholars such as Robin Coupland at the ICRC stressed the importance of this kind of research (Coupland and Meddings, 1999; Taback and Coupland, 2005). Even though the conflict data research projects and the public health researchers view war very differently and focus on dissimilar aspects of a conflict, the methodologies they employ have become increasingly similar.

Given the many negative consequences of armed conflict, it is perhaps surprising that researchers focus upon measuring deaths. This is primarily because data on deaths is far more readily available on a global level than any other conflict-related factor. It is also comparatively easy to aggregate and compare deaths. Trying to do so with other measures—such as the destruction of property or lost economic activity—arguably poses insurmountable methodological barriers. As Fischer and Brauer (2003, p. 229) note, one of the least studied aspects of conflict has been the economic impact of warfare. Moreover, measuring deaths provides a more wide-ranging indicator than other factors: crucially, it encompasses both the direct consequences of fighting and the longer-term indirect costs. Lastly, and perhaps most importantly, the ultimate normative goal behind conflict research is to prevent and reduce unnecessary human death. A focus upon death, as opposed to other factors, is wholly consistent with that goal.

Depending on the definitions and methodology used for obtaining casualty estimates, figures can differ quite significantly. As part of the 2005 *Human Security Report*, an attempt was made to study as many sources as possible to identify the most likely figure of battle-related deaths for the years 1946– 2002. This project—the Lacina and Gleditsch battle-deaths dataset—concludes that there has been a clear but uneven decline in battle-deaths around the world and that interstate conflicts have generally been more deadly than intrastate fighting (Lacina and Gleditsch, 2005). During the first years of the 1990s, there were around 100,000 battle-related deaths per year, followed by a dip in 1995–97 when 50,000–70,000 casualties were reported and then a temporary upsurge in 1999–2001. The WHO *World Health Report* (Krug et al. 2002) similarly draws from a number of sources to estimate the number of war deaths. It noted a decrease of war-related deaths between 1998–2002 from 588,000 to 172,000 (Mathers et al., 2005; Mack, 2005). Such attempts at approximation have not been repeated in subsequent editions. Generally considered the most conservative source, the UCDP only include victims of direct violence where every incident is reported and where both warring parties can be identified. The latest update of UCDP datasets suggest that there was *at least* 12,000–32,000 reported battle-related deaths per year in armed conflicts during every year between 2002–2006.

IV. Defining deaths in armed conflict

Depending on their field, researchers often discriminate between different forms of violence: that which is attributable to the conflict and that which may be due to other motives. Conflict researchers are primarily interested in the socio-political phenomenon of conflict and the concomitant violence employed, sometimes going to great lengths to exclude other forms of violence. Almost all existing conflict data projects define conflicts as consisting to some extent of three factors: i) two or more organized parties of which at least one is a state; ii) a stated political disagreement between these parties; iii) the violence between these parties (Singer, 1972; Heldt, 1993; Gantzel, 1981). All of these elements need to combine in order for a conflict researcher to define a violent act as being part of an armed conflict. The term thus excludes other violence occurring in a conflict country, in particular: criminal violence (which may account for more deaths than warfare in some countries); massacres carried out against civilians; violence between two or more non-governmental groups (such as criminal organizations); or violence between the government and a group without any political identity. All these types of violence have serious consequences and are researched elsewhere, but are nonetheless excluded from many measures of the intensity and dynamics of warfare.

Using this definition can result in a significant difference between the number of deaths in a 'conflict' and the number of deaths within the country in which the conflict takes place. Research has suggested that the factors contributing to an increase in criminality are also manifest in wartime. Social controls such as family life are diminished and scarcity of goods generates a greater incentive for theft and illicit trade. At the same time, the punitive cost of crime reduces as the police and judiciary weaken and norms restricting the use of violence breakdown (Bonger, 1936 in Ruggiero, 2005; Kalyvas, 2006). Although these effects are not consistent across *all* conflicts and countries, they often develop over time in prolonged conflict situations. In parts of Colombia, for example, there have been estimates that around 80 per cent of violent deaths−most caused by firearms−take place outside of the fighting between the government and leftist guerrillas (Bejarano, 2003; see also Jackson and Marsh in this volume). Some conflict studies, in particular those targeting policy-makers, have argued that other types of violence should be included in the measurement of the conflict severity. Such an approach would be useful when looking at a specific country or a region but is often problematic when attempting to provide global data. Without universally agreed definitions, it is difficult to determine a particular conflict's make-up, including when it began or when it has terminated.

The strict classifications used by conflict researchers are not followed by others studying 'violence'. In particular, the WHO (Krug et al., 2002, p. 215) defines 'collective violence' as being the 'instrumental use of violence by people who identify themselves as members of a group−whether this group is transitory or has a more permanent identity−against another group or set of individuals, in order to achieve political, economic or social objectives'. This is a much wider interpretation, produced by people more concerned with the public health consequences of violence. As Wille and Krause (2005, p. 232) note, such a definition 'includes fighting between non-state groups and captures genocidal violence, whether perpetrated by a state or not, even if the victims are unarmed. It also identifies armed conflict as a category of collective violence, rather than a *sui generis* phenomenon.' The application of such a wide ranging definition, however, is problematic: it provides a better scope of the total number of victims but at the expense of our understanding of armed conflict as a particular form of organized violence.

As Kreutz, Marsh, and Torre in this volume point out, armed conflict overlays a variety of acts of violence which have a much more individual animus. Certainly, warfare may make robbery, revenge, or sadism much easier to perpetrate (if only due to the frequent absence of effective law enforcement) but these acts form an entirely different category of violence. If we wish to understand the severity, origins, and means of resolving warfare, then other forms of violence need to be excluded from our calculations.

V. Direct and indirect deaths

An important distinction used by conflict researchers lies between 'battle deaths' or 'conflict deaths' which are a direct consequence of fighting−such as those due to gunshots or bombing−and 'indirect deaths' which are due to wider structural and physical degeneration caused by warfare. Other research on war deaths has distinguished between civilian and combatant fatalities. The two are not synonymous because the category 'battle deaths' generally includes civilians killed in fighting between two armed parties, such as innocent victims caught in the crossfire.

Li and Wen (2005, p. 473–75) suggest five indirect consequences of warfare that contribute to increased mortality: economic disruption (including the production and distribution of food); damage to healthcare infrastructure and the killing or intimidation of health workers; diversion of spending away from public health and to the military; reduced social cohesion that may lead to more criminal homicide or sexual violence; and psychological distress. These indirect effects and the increased mortality they engender can be linked to conflict, however, it is important to question the extent to which they may be *caused* by SALW. If someone is the victim of a gunshot, one may assume that if the weapon was not present they would not have been injured by it; such a link is much more tenuous in indirect deaths. For example, many war zones experience an increase in road traffic accidents. These can be attributed to drivers speeding in order to avoid ambush, a breakdown in the enforcement of traffic regulations, and a general increase in risk-taking. When measuring increased mortality during wartime, traffic accidents are as relevant as other indirect effects, however, it is difficult to definitively state that SALW (or any other weapon) were a causal factor. The use of weapons in the war zone is certainly a contributory factor, but too many elements separate the gun from the driver to be certain that a direct causal relationship exists.

Research from a public health perspective highlights direct and indirect mortality. For example, Grein et al. (2003) undertook a retrospective survey of camps containing members of the União Nacional para a Independência Total de Angola (UNITA). They surveyed 6,599 people before and after the 2002 ceasefire which brought an end to the 27 year civil war. Prior to the ceasefire, 'war injuries' were the leading cause of death, this figure decreased after the agreement was reached. Malnutrition and malaria were also at emergency levels before the ceasefire but did not decline once it had been established. The authors suggest that very high levels of malnutrition and malaria were due to the population's isolation; 46 per cent of all reported deaths were among children under 5.

Aboutanos and Baker (1997) find that across five case studies (see Table 2 below), there is a clear distinction between non-civilian and civilian fatalities: the former are overwhelmingly male and between 20–50 years; the latter comprise of both genders and all ages. Similarly, Li and Wen (2005, p. 487) also note in their survey of adult conflict deaths in 84 countries over 34 years that 'severe conflict affects male mortality both immediately and over time after conflict, while such conflict raises female mortality mainly in the long run'. Reza, Mercy, and Krug (2001) present a worldwide survey using global mortality data for the year 1990. They demonstrate that male conflict deaths are higher than female (a ratio of 1:3), and that, whilst the highest death rate for females is amongst girls aged 0–4, in males it peaks between the ages of 0–4, 15–29, and 60–69, with the highest being in the middle age group. Their findings also suggest that whilst the majority of battle deaths are young men, females are equally represented in civilian deaths, along with older men and boys. Nevertheless, Plümper and Neumayer (2006) observe that, on average, warfare reduces women's life expectancy more than men's. They claim (2006, p. 747) this indicates 'that the direct and indirect consequences of wars combined either kill more women or that the killed women are younger on average than the killed men'. Plümper and Neumayer (2006) hypothesise that whilst men are more likely to be the immediate victims of battles, women and girls are likely to suffer disproportionately from the indirect effects of armed conflict.

Studies by conflict researchers on direct and indirect deaths have focused upon attempts to disaggregate the two so that battle deaths as a measure of conflict intensity can be more accurately assessed. Sarkees, Wayman, and Singer (2003) note that whilst the dominant form of warfare has changed since 1815 (from imperial conquest, through interstate war, to contemporary civil war) levels of mortality are roughly similar. Lacina, Gleditsch and Russett (2006, p. 679), however, suggest this finding is based upon data which has combined battle and indirect deaths. They maintain that since 1945 there has been 'a remarkable decline in the numbers of combat deaths worldwide'. Their claims accord with Marsh's finding in this volume that in the previous interstate wars sophisticated weaponry with its greater destructive potential was much more widely deployed than in the civil wars of the 1990s and 2000s. Lacina et al.'s research contradicts many authors who stress that contemporary civil wars are more bloody than previous forms of conflict (for example Kaldor, 1999).

The proportion of SALW casualties

Assessing the number of deaths caused by SALW in warfare requires an understanding of the proportion which are attributable to SALW as opposed to other types of weapons, such as artillery or air strikes. Unfortunately, we do not have enough data to make precise calculations. The available research does though (unsurprisingly) suggest that the means of death in a war reflects the types of weapons used by the protagonists. There are therefore considerable variations. Nevertheless, firearms cause between 20–55 per cent of casualties (deaths and injuries) in the majority of cases examined below.

There have been several general reviews of the type of weapon used to inflict death and injury on the battlefield,[4] and numerous studies−generally written by doctors or public health professionals−have outlined the types of weapons which cause death or injury in individual conflicts (often particular hospitals). Many present information on wounded people as well as deaths. They have been included in the discussion in this section because statistics on wounds provide an indication of the types of weapons used and therefore of how combat deaths may have occurred; moreover data on patients treated for wounds includes some that died in care.

The difficulties in determining the type of weapon used are evident in a study of hospital admissions in Kandahar, Afghanistan between 1991 and 1997 (Meddings, 1997; ICRC, 1999). The period up until March 1995 is described as a 'conflict' period, after which the city was taken over by one faction and a 'post-conflict' period ensued. During the first phase, 1,825 people were admitted to hospital having been injured by weapons. Of these, 670 (37 per cent) had gunshot wounds, 729 (40 per cent) were injured by mines, and 426 (23 per cent) were injured by fragmenting munitions. The survey highlights two dilemmas. Firstly, whilst the gunshot wounds and injuries from mines are definitely caused by small arms or light weapons respectively, the third category is more difficult to assess. Fragmenting munitions injure by exploding and spreading metal fragments over a wide area. Such injuries can be caused by: light weapons such as grenades, mortars, improvised explosive devices (IED) and mines; larger weapon systems, such as artillery; weapons such as rockets or missiles which may be light weapons depending upon their size. As these weapons disintegrate into chunks of flying metal it is difficult for a doctor to identify the origin of the shrapnel, attempting to do so may require resources unavailable in a conflict zone. The second problem is that a survey of hospital admissions, especially in a combat zone such as Afghanistan, is likely to ignore all those who were killed outright on the battlefield or suffered such serious injuries that they were not brought into hospital. This may distort the results. If one weapon type caused many more battlefield fatalities than another, it may well be under-represented in statistics on people admitted to hospital with weapon injuries.

The only specific study concerning with SALW and conflict deaths is found in Wille and Kause (2005, p. 248–9). They report upon a survey conducted by the International Institute of Strategic Studies (IISS) in which press reports of eight conflicts were monitored over a period of four months (June to October 2004). The countries examined were: Aceh; Algeria; Chechnya; Colombia; Ivory Coast; Nepal; Uganda. They (2005, p. 249) report that 'of the 1,364 recorded conflict deaths with specified causes in the eight conflicts, 1,225 could be attributed to SALW.' Of those deaths attributed to SALW, only 66 concerned light weapons, the rest were small arms.

Other conflicts display very different patterns of weapon use. For example, Human Rights Watch (HRW) conducted a meticulous study of civilian direct casualties in the 2006 war in Lebanon. The subsequent (2007) report describes the circumstances of 1,109 deaths: of these 561 were investigated directly and documentation was collected on the remaining 548. The report also notes the death of 43 Israeli citizens and 12 Israeli soldiers by rockets fired into Israel by Hezbollah. The focus of the HRW study was on civilian casualties, so it did not aim to assess the circumstance of *every* death that occurred during the conflict. Of the 1,109 deaths identified,[5] only five were due to gunshot wounds (2007, pp. 172–178). The remainder were caused by air strikes−conventional bombs and cluster munitions−or by artillery. The overwhelming majority of identified civilian casualties in Lebanon were thus not caused by SALW. A second example comes from Lett, Kobusingye, and Ekwaru's (2006) survey of 8,595 people from 1,475 households in Gulu province, Northern Uganda. The region is dominated by a civil conflict between the Lord's Resistance Army (LRA) and the Government of Uganda, although the survey included data on some non-conflict injuries. The survey questioned people about deaths and injuries they had witnessed or experienced; some of its results are summarised in Table 1.

Table 1: Cause and Consequence of Injury Gulu Province

Injury	**Death**	**Disability**	**Recovery**
Gunshot	168	87	288
Stab/Cut	71	59	183
Blunt Force	41	112	201
Land Mine	26	36	70
Poisoning	22	24	58
Snake Bite	9	16	63
Road Traffic Accident	8	55	88
Burn	7	19	63
Drowning	5	0	5
Fall	1	76	117
Other	39	95	171

All Causes	397	579	1,307

Source: Lett, Kobusingye, and Ekwaru (2006, p. 54)

In contrast to Lebanon, gunshots are the largest cause of death; the only injuries from light weapons are from landmines and there are no deaths or injuries attributable to major conventional weapons. The low-tech nature of the fighting is underlined by the high numbers of fatalities caused by blunt instruments and cutting weapons. Lett, Kobusingye and Ekwaru (2006, p. 55) report that the 'civilian population bears most of the burden of injury death' and that the rates of injury are similar to those found in Kosovo in 1999 and Afghanistan in 1994. The importance of war-related injury is underlined by their finding that fatal injuries in Gulu were '835 per cent higher than that in Mukono district, a similar Ugandan district that does not have armed conflict.' They also find that 27.4 per cent of fatal injuries in Gulu occurred in schools, substantiating widespread reports of LRA raids to kidnap children for forced labour or to become child combatants.

Analyses of a wide range of conflicts find more consistency in the weapons used, at least where the use of firearms is concerned. The results of 15 studies are summarised in Table 2. It covers information from surveys, mortality data, and records of hospital admissions. As it does not take account of information from press articles it is possible to compare the findings from Table 2 with the press article based survey presented in Wille and Krause (2005) and so highlight the different findings produced by various methodologies. More studies are available on some of the conflicts examined, but only one per war was included. As it summarises various studies using different methodologies and classifications—most notably some are concerned with mortality whilst others examine injuries—the table should be viewed with caution. Moreover, the studies are not a representative sample of conflicts: over half involve armed forces of the developed world. This bias reflects the data-gathering capacity in different conflict zones. Nevertheless, some tentative conclusions can be drawn concerning the type of weapons used to inflict casualties in conflicts.

The various studies in Table 2 reflect a wide range of weapons use. At the two extremes, firearms accounted for 93 per cent of casualties in the Republic of Congo study, but less than 1 per cent of casualties in the 2006 Lebanon conflict survey. The disparity is due to the different levels of technology and strategies used by the protagonists. In the Republic of Congo the conflict concerned lightly armed militias whereas in Lebanon almost all the casualties were caused by aerial bombardment from a technologically advanced state.

Clearly, the high number of casualties due to air strikes in Lebanon are not representative of the conflicts included in Table 2. Most wars are fought in developing countries which do not possess the high tech weaponry employed by the Israeli government.[6] Nevertheless, it is not the only recent occasion in which firearms account for a very small proportion of casualties. For example, a study by Hodalić et al. (1999) of 1,211 patients at the Vinkovci General Hospital during the 1991–2 war in Croatia found that some 90 per cent were injured by shell explosions, with only 3 per cent of injuries due to firearms and 4 per cent from landmines.[7]

The majority of cases in Table 2 coalesce around a proportion of 20–55 per cent of casualties being caused by firearms, with the most extensive study (of eight hospitals in five countries) reporting a percentage of 45. One factor which may influence the proportion of gunshot wounds by non-technologically advanced protagonists is the use of landmines, which account for a large proportion of casualties in Cambodia and Afghanistan. A further remarkable finding from Table 2 is the prevalence of blade and blunt force injuries in several conflicts. These may be under-estimated in other studies included in Table 2 which tend to focus upon patients that require surgery (needed for most ballistic injuries but not always for fractures or stab wounds to the extremities). The use of bladed or blunt weapons to kill or injure in warfare has received scant attention from publications on SALW and general works on warfare.

The prevalence of firearm injuries found in Table 2 indicates a reversal of a reported trend toward an increasing proportion of combat casualties being caused by shells and bombs. Aboutanos and Baker (1997) find a long term decrease in the proportion of gunshot wounds and note that in the US Civil War firearms accounted for 75 per cent of casualties and explosives only 9 per cent, but 'recent wars are marked by an increase in explosive wounds caused by fragmenting anti-personnel weapons such as rockets, artillery shells, mortar bombs, and mines'. Johnson et al. (1981, pp. 487–88) note that among US forces in World War Two small arms accounted for 17.9 per cent of casualties, land mines 3 per cent and artillery or bombs 58.6 per cent.[8] Their finding that the conflict in Thailand involved far more gunshot and landmine casualties (37.5 and 42.3 per cent respectively) is echoed by almost all of the research summarised in Table 2. The high prevalence of gunshot and landmine injuries indicate that (as Marsh in this volume also notes) combatants in contemporary civil wars generally employ technologically unsophisticated weapons compared to those fighting in interstate warfare (even wars that took place some sixty years ago).

The prevalence of a means of injury may also change during the course of a particular conflict. Table 3 demonstrates that firearms caused most injuries to Russian troops in Afghanistan at the start of the conflict, a trend which was reversed at the end. This change is most likely to have been due to the weapons acquired and used by the Mujahideen. In the beginning, they mainly used small arms but were able to obtain−through capture and supply via Pakistan−a variety of more sophisticated weapons during the course of the conflict, especially mines, mortars, missiles, rockets, and even artillery.

Table 3: Method of injury of Russian casualties in Afghanistan 1980–1988

Method of Injury	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
Per cent gunshot	62.2	54.7	50.4	46.0	34.1	36.6	31.8	26.5	28.1
Per cent fragmentation	37.2	45.3	49.6	54.0	65.9	63.4	68.2	73.5	71.9

Source: Grau and Jorgensen (1998)

VII. Methodologies for conflict data collection

Murray et al. (2002, p. 347) note several basic sources of information on deaths in armed conflicts, namely:

- Censal and other demographic analysis;
- Civil registration of vital statistics (such as deaths, births, and injuries);
- Surveys;
- Eyewitness reports (generally contained in press articles);
- Official government reports (such as by ministries of defence).

Some of these methods have been highlighted in the examples used for this chapter. For instance, in Table 2 the data on Croatia derives from official mortality statistics, on Uganda from a survey, Plümper and Neumayer analyse life expectancy whilst Lacina and Gladitsch's data is based in part upon press reports. These various sources are examined in greater detail below.

Global conflict datasets

Initially, the global conflict datasets only provided casualty information in the form of a severity measure, either a rough estimation of the number of deaths or some sort of index for conflict intensity. The UCDP-PRIO Armed Conflict Dataset, for example, differentiates between conflicts that cause 25–999 deaths in a year (minor armed conflicts) and those that cause at least 1,000 battle-related casualties (wars) (Gleditsch et al., 2002).

All global conflict datasets are constructed through basically the same methodology, which consists of reviewing a large number of media or research reports and employing consistent definitions across all countries to extract conflict information. The type and number of sources have evolved over time, particularly following the introduction of the internet during the 1990s. To code active conflicts in 2006, the UCDP read more than 40,000 news articles extracted from the Factiva database, which itself includes more than 10,000 global and local sources. Information was then added from reports by HRW, the International Crisis Group, Amnesty International, as well as numerous region or country-specific sources. The information collected through this method has traditionally been presented for every year, or sometimes as a total for the conflict from start to end.

With regards to the severity variable, different projects have chosen from two approaches: either using the total or yearly casualty estimate provided in the sources or coding each event and then aggregating the total figures. Both processes are unfortunately sensitive to bias: the former may rely on statements that are politically motivated; the latter demands more precision within the reports as many events will be considered hard to classify and thus uncertain. Several projects are trying to overcome these limitations through the use of case-specific experts to interpret the information, the use of 'low, best, and high' estimates, and by constantly reviewing and updating earlier versions of the databases. During the conflict in Bosnia-Herzegovina 1992–95, it was not uncommon for commentators to claim that there were 250,000 deaths as a result of the fighting and ethnic cleansing. Following an extensive research project, this estimate has been more than halved (RDC 2007). Conversely, the 2005 update of the UCDP-PRIO Armed Conflict Dataset reported an 'unclear' conflict in the Pakistani region of Baluchistan. Following a careful re-examination of available sources, the 2006 version of the UCDP-PRIO data included the conflict not only for that year but also for 2004 and 2005. An advantage of having data collected on an event basis is that interested researchers can focus on a detail within the dataset. This can then be used to study only the events where small arms are used in conflict. This data format may also facilitate research on the use of small arms to *threaten* even where other weapons are used to *inflict* death, such as in Rwanda (Vervimp 2006). Notwithstanding, the collection process for event data is extremely labour-intensive and there is a risk of under-reporting due to 'unclear' events. It is also important to note what type of violence is included or excluded from the in-country study.

Mortality and life expectancy datasets

An alternative approach to identifying the lethality of conflicts is promoted in studies that analyse more factors than simply the use of direct violence. The numbers of people dying from structural inequalities can be observed using various types of data (Galtung and Höivik, 1971). In particular, it is suggested that mortality rates and life expectancy can provide important information about the severity of violence. Calculating the mortality rate in the developed world is a simple process as it is based upon the registration of deaths and births in-country during a given year. In contrast to media-based reporting methodologies, the mortality rate includes all deaths regardless of their cause, thus including the effects of starvation, disease, accidents, and old age. Moreover, the registrations of deaths often includes information on the cause of death, and since this data is submitted the WHO, researchers should−in theory−be able to utilise a global mortality-related dataset.

Notwithstanding, there are limitations to the WHO dataset, especially with regards to conflict countries. As mentioned above, in many cases official statistics are non-existent or incomplete. The WHO acknowledges that only 75–100 countries report data and many of these are rarely updated. For most of Africa, the most recent figures remain based on data drawn from the 1950s. There may be political or cultural reasons to misrepresent the statistics reported to the WHO, for example in the reporting of suicides. Moreover, the WHO previously also included war-related mortality figures but these were in part calculated using Project Ploughshares estimates, which depend on media reports (Reza et al., 2001; Mack, 2005.) Furthermore, in order to identify the effect of a conflict, life expectancy datasets compare the actual mortality with the expected mortality if there was no conflict active in the country at the given time. Since 'normal (peace) data' is limited, such a comparison must be calculated using proxies or assumptions. These are generally developed with the intent of identifying increased mortality through disease and include factors such as climate, season, access to immunization programmes and so on. Due to the chaotic impact of an active armed conflict, it is difficult to identify a 'normal' death rate. An even greater challenge is to assume how many deaths could be caused by small arms outside of the war, for example to disaggregate homicides by gunshot wound from conflict deaths due to firearms.

Surveys

Some recent estimates of casualties in conflict have received much media attention, provoking discussion regarding the reliability of different methodologies. Using data compiled through surveys, it was suggested that over 20,000 *violent* deaths had occurred in Iraq during 18 months after the US invasion in 2003 (Roberts et al., 2004). A follow-up study in 2006, updated the numbers of violent deaths to 601,000 between March 2003 and June 2006 (Burnham et al., 2006). The estimates are significantly higher than those provided by any other methods, causing significant debate.

The use of survey data has become increasingly common in conflict situations even though the methodology was not originally developed for this purpose. Health surveys have become common in countries without reliable official documentation such as hospital records. The research team calculates a random representative cluster sample to become the focal group for the survey. A number of households in a given geographical area are interviewed about their health history or experiences of violence. The results are then extrapolated into regional or national totals using statistical methods and available estimates with regards to population etc. In the second survey of Iraq, for example, the team visited 1,849 households in 18 different regions of the country. Amongst these, the total of 629 deaths was converted into a national estimate (Burnham et al., 2006).

There has been some discussion about potential bias in the selection of households, as not all areas of the country may be accessible in a conflict location. As violence is rarely equally distributed throughout a country, or even a region or city, during a conflict estimates could be distorted. 'Main street bias' may significantly skew survey findings if the people interviewed are only located in the easily accessible areas of a war zone (Johnson et al. 2007). Using random sampling should ensure that these effects are minimal, however, this is easier said than done in a war zone.

As when calculating life expectancy, the results of survey data depend on accurate national data to properly calculate the relationship between the sample and the total. The estimated number of deaths by two studies on Cambodia under the Khmer Rouge 1976–79 is illustrative. Both rely primarily on refugee surveys, however Vickery (1984) suggests that 740,000 people died whereas Kiernan (1996) estimates approximately 1,500,000. Vickery bases his estimate on an assumed Cambodian population in 1975 of 7,100,000, whilst Kiernan claims the population should be 7,900,000. Thus, the quality of estimates from surveys is in part dependent on having correct information about aspects external to the study itself. This could lead to some confusion in reporting, especially when trying to identify deaths of a conflict or deaths caused by small arms. Survey responses from just a few people or households can be the basis for estimates of hundreds or thousands of victims for a certain type of violence.

The method of choice?

All these methods have strengths and weaknesses. The most comprehensive and accurate assessment of conflict deaths should come from official mortality statistics, however, in many conflict areas government data collection has either broken down or did not exist in the first place. If statistics are available at all they may only cover the capital and perhaps areas under government control. Li and Wen (2005, p. 487) find in areas of armed conflict 'a strong selection bias in the mortality data. Adult mortality data are likely to be missing during the conflict year and the year immediately following the conflict onset.' Government statistics must also be treated with caution as the number of conflict deaths is intensely political and so may be subject to deliberate over- or under-estimation.

Surveys can provide an accurate assessment of the prevalence of mortality and morbidity. But they are expensive to organize, require large numbers of trained staff and some conflict areas are too dangerous or inaccessible to work in effectively. More importantly, they can suffer from methodological flaws if questions are not asked properly or if the people surveyed are not representative of the wider population.

Eyewitness reports are the most prevalent source of information as they are widely accessible through the media. Press reports are often available from areas where there are no official statistics and it would be impractical to conduct a survey. Analysis of these documents is also a much more cost-effective means by which modestly funded research centres can collect data. Moreover, the advent of the internet and digital archiving of press reports allows a researcher to easily obtain a very large quantity of data. Unfortunately, reliance on local media may expose a researcher to its biases. In particular, the varied capacity of reporters to collect and disseminate correct information on conflict deaths.

Following recent high profile publications, such as the *Human Security Report 2005* or the discrepancy between mortality studies on Iraq (Roberts et al., 2004; Burnham et al., 2006) and mortality estimates based upon press sources (such as the *Iraq Body Count*), there has been an intense debate over the reliability and validity of data on conflict deaths. In general, coding event-based data (primarily from press reports) provides lower estimates than mortality studies. Neither method has yet been compared with a post-conflict investigation which is arguably the most reliable method. Almost all mortality studies focus on countries where little or no comparative information is available, such as Iraq or the Democratic Republic of Congo, whilst the event-based data estimates are probably best in countries in which there are numerous reporters and local media sources, such as Israel.

Those comparisons between surveys and event data that have been completed reveal different results. Benini and Moulton (2004) conducted a community survey in Afghanistan designed to measure mortality during the 2001 *Operation Enduring Freedom*. They find (2004, p. 417) that the number of deaths identified by the survey (5,576) was significantly higher than the number identified through analysis of media reports (the highest estimate found by Benini and Moulton being 3,000 deaths). They also note that surveys capture the number of people wounded, something rarely reported in press articles. Similarly, Wille and Krause (2005, p. 246) claim that 'media reports miss a considerable share of incidents. The degree of under-reporting appears to depend on the intensity and remoteness of the conflict, increasing as conflict becomes more intense and more remote.' In contrast, a study comparing different methods of collecting information on violent deaths in Kenya asserts that surveys suggest unreasonably high rates whilst using press reports are 'particularly appropriate to analyse low intensity conflicts' (Bocquier and Maupeu, 2005, p. 342). The differing proportion of deaths by firearms in the eight conflicts studied by the IISS (cited in Wille and Krause, 2005) and the 15 studies summarised in Table 2 is most likely due to variations in methodologies and scope of the studies. The IISS figures were based upon press articles whereas Table 2 uses surveys, mortality data, and hospital studies. It is likely that many casualties−particularly those by landmines−may not be deemed as newsworthy as those caused by shootings. The proportion of firearm deaths reported by the IISS may therefore be exaggerated. Moreover, as mentioned above, hospital studies that exclude those killed on the battlefield may suffer from a selection bias. More research is needed to evaluate the various methods.

Much better estimates can be produced by historical investigations which assess the number of fatalities after the conflict has ended. By using a plethora of methodologies, Patrick Ball and others at the Human Rights Data Analysis Group have participated in 17 different investigations of conflict zones and produced more reliable estimates of deaths (HRDAG, 2007). However, this approach is time-consuming, expensive, and has only been undertaken for a small sub-set of highly publicized cases. More importantly, it can only be performed after the conflict has ended and in countries where it is possible to work openly. It will thus not be able to inform policy-makers who require up-to-date information on which cases most urgently require intervention.

VIII. Conclusion

All methodologies can at best produce an estimate of fatalities in a conflict. The mortality data based on birth and death registrations is more reliable but currently rarely available for conflict countries. For small arms research, the registered mortality data, if it exists, provides the most accurate information about the impact of certain weapons. The media-based datasets that focus on event-coding are also useful for research on the use of small arms in conflict, but these rarely include information on other types of violence−such as criminal homicide−where the use of small arms is most common.

The original global death estimates served their purpose in mobilising opinion. What is required now is to obtain much more accurate indications of conflict deaths and the means of death, so that decision-makers can target the correct resources to the most urgent cases. There is therefore a need to develop cross-methodological approaches which can accurately calculate the number of people killed in conflict and assess the impact of small arms in conflict countries. Existing methods should be compared and evaluated with the help of historical investigations or across cases; one methodology may well present better results in some settings and another in others. It should also be possible to incorporate information collected using diverse methods into the same dataset: something that is easier with the use of low, best, and high estimates. Another approach is the use of the public health database, a project initiated by Taback and Coupland at the University of Toronto and the ICRC. It will be possible for people to add events from media or eyewitness reports to the database. There are obvious limitations with over-reliance on such a source since there will be less control over the consistency of definitions across cases and 'manipulated figures', but it could still provide a useful indicator as it includes details about actors, victims, context, and effects.

The ability to produce case-specific and global information has improved due to an expansion of openly available sources and methodologies. Much has been gained by having more accurate information about conflicts, particularly in terms of appropriate resource allocation. Moreover, through the study of detailed accounts of *previous* conflicts it might be possible to identify the type of cases that have the greater risk for extensive destruction or the most potential for peaceful resolution, such as ethnic or resource-driven wars. One of the most crucial factors in armed conflicts, regardless of whether these are fought between states or within states, is the use and misuse of SALW. As the availability of such weapons undoubtedly influences conflict dynamics, and the existence of conflict creates a demand for SALW, data collection efforts within the two fields should continue to cooperate.

Endnotes

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[1] For example, see United Nations Security Council, 2006; Global Issues, 2006; Austria, 2006 (speaking on behalf of the European Union).

[2] For a more thorough overview of the theoretical background for different conflict datasets, see Eck (2005) or Brzoska (2007).

[3] Conflict data from UCDP is also the basis for the armed conflict information in the annual *SIPRI Yearbook* (since 1987), the *Human Security Report* (since 2005), and the University of Maryland *Peace and Security* (since 2007).

[4] Examples include Aboutanos and Baker, 1997; Coupland and Samnegaard, 1999; Wille and Krause, 2005; Willy et al 2007.
[5] The 1 109 deaths included 51 Hezbollah fighters and the total figure accords with approximates of the total death toll from other sources, for example Ploughshares (2007) estimate that the fighting caused the death of 'over 1100' Lebanese.
[6] The data on injuries presented in Table 2 supports findings by theorists of the use of technology in warfare (see Marsh in this volume) who claim that the majority of casualties in civil wars in developing countries are caused by SALW whilst governments from developed countries, i.e. more technologically advanced protagonists, rely upon weapons such as air strikes missiles and artillery.
[7] Although a study on *all* mortality in Croatia presented in Table 2 indicates that in general gunshot injuries were much more common throughout the war.
[8] Johnson et al cite the *Department of the Army Field Manual Fm8-55 Army Medical Service Planning Guide October 1960*.