
Accounting for Civilian Casualties: From the Past to the Future

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Assessment of the extent of civilian casualties during times of conflict presents significant challenges in data collection, quantitative methods, interpretation, and presentation. In this article, we briefly consider the motivation and use of casualty accounting and review historical approaches to these questions with illustrative comments on the US Civil War, World War I, World War II, and other conflicts. We provide an overview of several accounting methodologies including excess mortality, epidemiologic surveys, direct and indirect counts, multiple list estimation, and crowdsourcing. We reflect on the evolution toward modern approaches to casualty assessments, permitted by both a deeper understanding of human rights and by contemporaneous technological advances in data collection techniques. Our goal is to introduce several areas of research that deserve attention from social science historians and statisticians.

Introduction

On July 6, 2008, the United States bombed the Deh Bala double wedding party in the Nangarhar province of Afghanistan, killing 47 civilians including both brides, Fatima Zarpacha and Nazanin Zarin, each just 18 years old (Herold 2008; Human Rights Watch 2008). This incident and similar ones led to changes in US rules of engagement aimed at decreasing the killing of civilians (Motlagh 2010). Yet, in historical perspective, such concern for civilian deaths is a novelty that was hardly visible until the end of the nineteenth century. The modern value accorded to civilian war victims followed a long process of moral, cultural, and political change (Pinker 2011) and has progressed to a point where displaying at least some regard for the safety and welfare of a civilian population is generally understood to be an important part of any war effort. Twenty-first-century researchers and human rights activists devote considerable care and increasing sophistication to accounting for civilian war deaths: a remarkable turnaround in little more than a century.

In this article, we introduce a broad range of questions: Has the relative importance of military and civilian casualties changed over time as war and human rights issues have evolved, and what do any changes mean for future recommendations and policies? Is there evidence that civilian casualties were accounted for, or considered, in public policy and opinion during different historical periods? How has the perception and definition of a civilian casualty changed over time?¹ How has the

1. We follow the standard usage of the term *casualties* to cover both deaths and injuries but will focus more on deaths, than on injuries, in line with the preponderance of the literature on casualty accounting.

role of reporting civilian casualties changed over time? Has accounting for civilian casualties affected the conduct of war and human rights investigations? How can we overcome the difficulties in accounting for civilian casualties and what level of accuracy is needed? Can modern technology allow us to account for casualties more effectively in real time? When is it most important to get accurate accounts: during the time of conflict or historically? All these questions deserve careful study and analyses. We cannot hope to address all here but focus on giving a condensed introduction to historical developments and methods that have evolved to allow for the assessment of civilian losses during and after a conflict.

We define some crucial terminology before proceeding further. In what follows, “counting” will refer to an actual counting mechanism. The reader is free to think of dead bodies that are, literally, counted one by one. “Documenting” deaths means listing them together with some information about each one, for example, genders, ages, and locations of victims, weapons used to kill them, or the dates of the incidents. Counts can be produced automatically from documentation, but the latter provide more information than the former. “Estimating” numbers of deaths will usually mean using a statistical procedure, such as a sample survey, to extrapolate a total number from a subset of deaths that have been observed. However, sometimes we stretch this term to cover some educated guesswork. The processes of estimation and counting are very different although they both focus on the computation of a bottom-line number. We will use the term *accounting* as a general one covering counting, documentation, and estimation.

In this article we cover mostly violent deaths caused directly by military actions but will also treat nonviolent deaths that can be traced back to war through indirect channels. The many starvation deaths occurring during the German siege of Leningrad in World War II are clearly attributable to the war (Walzer 1978: 160–75). Deaths in the Bengal famine of 1943 are linked more indirectly to the British World War II effort: The flow of grain from Burma to India was disrupted by the conquering Japanese, and Churchill was unwilling to divert other grain and transport ships from British war operations to save starving Indians (Greenhough 1982; Stevenson 2005). The attribution of Spanish flu deaths to World War I is more tenuous and complex. On the one hand, Spanish flu was rampant in some countries that did not participate in the war while, on the other hand, it is likely that war conditions facilitated the spread of the virus within warring countries. We will return to this subject of “indirect” or “excess” deaths in the following text.

The plan of the article is as follows. We first discuss briefly the need and motivation for accurate accounting of civilian casualties in times of war. Subsequently, we assess previous historical attempts to address this issue with some illustrative, but far from comprehensive, examples. From this perspective, we then review some of the methodologies that have evolved to account for casualties, keeping the technical details necessarily brief. We then give an overview of the uses of casualty accounting in transitional justice processes. We close with a discussion that revisits some of the issues we have raised and presents suggestions for additional avenues worthy of considerable further research.

The Motivation and Use for Civilian Casualty Accounts

Although the focus of this article is *civilian* casualty accounting we should pause briefly to consider the rather different motivations to account for military losses. Military planners must assess their troops' capacity and location. There are also pressing bureaucratic concerns such as whom to pay, how many are sick or wounded, and so forth. Postconflict governments must set death benefits for surviving family members and pensions for surviving warriors. Accounting for enemy casualties is crucial for the planning of operations although it is much harder than assessing one's own losses and potentially subject to large errors and biases. For example, the counting of "enemy" casualties was a key component of US military strategy in Vietnam, although this was done in a very loose way, often leading to gross overcounts (Hirschman et al. 1995). Ironically, the US strategy of subjecting the enemy to steady losses over time was doomed by a failure to grasp basic demographic principles: "As high as Vietnamese death rates were, they were not high enough to sustain the assumptions behind a war of attrition" (ibid.: 809). Specifically, the mortality rates of young men remained below the rate of natural increase; each year more potential recruits came of age than were killed.

The motivation for an acceptably comprehensive and accurate accounting of civilian casualties probably changes over the course of a conflict, and beyond when the accounting becomes historical. One obvious *modern* reason for civilian casualty accounts, both during and postconflict, is to determine whether human rights violations, especially an act of genocide, might have occurred. Article 2 of the Geneva Convention on the Prevention and Punishment of the Crime of Genocide makes no direct mention of the number of victims being crucial to the definition of genocide. However, Gray and Marek (2008) argue that numerical counts must feature centrally in a determination of genocide or otherwise and, in practice, civilian death counts do seem to play such a role. Aside from genocides, civilian casualty accounts can provide insights into the scale of losses suffered by populations as well as the patterns of events, including the timing of mass killings and whether certain groups were specifically targeted.

Casualty accounts can also inform assessments of whether wars can be considered just. The concept of a "just war" reaches back throughout the history of war but has evolved more recently in response to the advent of nuclear weapons and discussions of the American War in Vietnam as articulated, for example, in the work of Walzer (1978), Dockrill and Paskins (1979), Norman (1995), and Orend (2000a, 2000b). One component of just war theory is that civilians are not permissible targets of war and that belligerents must strive to avoid civilian deaths. These ideals lead to the Rule of Proportionality whereby attacks on military targets should not inflict civilian casualties that are disproportionate to military gains. Daponte (2008) argues for the extension of the proportionality calculus to cover civilian casualties caused indirectly by military actions. In any case, any convincing proportionality calculation must be based on a careful accounting of civilian losses (Slobda 2008). Furthermore, when military strategy and tactics seek to protect civilians, for example through use

of the Civilian Battle Damage Assessment Ratio (Cameron et al. 2009), it becomes necessary to construct reliable civilian casualty accounts to assess the performance of these policies and to improve civilian protection. Nevertheless, Slim (2008: 41) cautions that it may be impossible to achieve an acceptable level of proportionality given that a primary purpose of war is “to reorder society by brutally transforming its social and political demography.”

Additional motivations to account for civilian casualties hinge on the political uses to which such numbers are employed by governments and other interested parties. Such groups do not necessarily prioritize accuracy because it may serve their purposes to inflate, deflate, or otherwise distort casualty numbers, depending on circumstances (Andreas and Greenhill 2010). Indeed, some argue that insistence on accuracy in civilian casualty accounting is counterproductive, siphoning attention from the need to actively help suffering civilians onto sterile debates over numbers. Greenhill (2010) rebuts this position convincingly, showing the pernicious effects of the circulation of mythical war-death numbers.

Attempts to account for violent civilian deaths with a view to informing and eventually changing public opinion and policy date from the very beginning of systematic civilian casualty accounting. For example, there were three primary sources recording lynching deaths in the United States starting from 1882 (before which there are no reliable data): (1) the *Chicago Tribune*, which reported lynching data that built statistically on the efforts of Ida Wells-Barnett in *The Memphis Free Speech and Headlight*, (2) the Tuskegee Institute in Alabama, and (3) the National Association for the Advancement of Colored People (which began its list in 1912) (Davenport 2009). A second example is the reporting of civilian casualties in the Congo during the reign of Leopold II of Belgium. Mark Twain (1905) wrote a political satire describing a 1899 massacre of more than 80 civilians, produced while he participated in a worldwide movement against slave labor in the Congo. His pamphlet inspired Adam Hochschild’s (1998) account of atrocities of that period. Further, Emily Hobhouse (1902), and subsequently Millicent Fawcett (in the Ladies, or Fawcett, Commission), documented civilian conditions deriving from the Boer Wars of 1880–81 and 1899–1902 with an eye toward influencing British policy.

In summary, the modern focus on civilian casualty accounting has arisen from a variety of new ethical and political interests, both in human rights and in the potential for litigating war crimes, but also from a broad cultural movement toward the significance and value of each individual life.

We make two additional points about the dissemination of civilian casualty accounts by the media before proceeding to the more modern history of civilian casualty accounting and the methods used in such research. First, current media policies seem to prioritize large numbers for high-profile coverage, sometimes without adequately considering the provenance of the data they are circulating. In the second Iraq war, the Burnham et al. (2006) estimate received extraordinary international attention unlike the substantially smaller, yet still quite large, estimates reported in surveys commissioned by the World Health Organization (Iraq Family Health Survey Study Group 2008) and by the United Nations Development

Programme (Iraq Living Conditions Survey 2005). Such recent practices suggest there may be systematic reporting biases that we may have to consider when examining historical information. Second, media, and even academic, discussions of war deaths often use the term *civilian* very casually and inappropriately. The estimates of violent deaths in all the previously mentioned surveys include both civilians and combatants, yet they are often described as covering civilians only. For example, all the sources that Burkle and Garfield (2013) present as the most reliable measures of civilian deaths in Iraq measure civilians plus combatants and are therefore of limited use for measuring civilian deaths.

However, there are other potential biases in the other direction associated with methods of accounting for conflict casualties that we describe briefly in the following text. We have argued elsewhere (Jewell et al. 2013) that the focus on a single number may be counterproductive and that we might better develop estimates for reasonable upper and lower bounds for civilian losses, in addition to mere statistical uncertainty ranges. However, given modern practices surrounding numerical reporting in an impatient world, this goal may simply be impractical.

Historical Antecedents to Modern Casualty Accounting

This brief historical sweep will be extremely selective, idiosyncratic, and US-centric. For broader discussion, see Gray and Marek (2008) and Rummel (1992, 1997). Our purpose is to trace the development of interest in, and methodologies for, civilian casualty accounting, not to make a list of wars and their estimated losses.

Historical accounts of war casualties are dominated by military losses. There exist lists of names of soldiers killed in battle going back at least as far as the Battle of Marathon in 490 BCE (Ancient Greek Battles 2016; Wright 2011). Yet for many centuries accounts of military dead generally take the form of numbers that are, essentially, guesses by people with some relevant knowledge of military losses (Dumas and Vedel-Petersen 1923; Leroy-Beaulieu 1869).

The US Civil War marked a turning a turning point for the US military in accounting for its *military* dead (Faust 2008). Both sides entered this war unprepared for the true scale of the carnage and without procedures or personnel dedicated to accounting for the dead. Horrified soldiers improvised to try to provide their falling and fallen comrades with decent deaths and burials. They often had to settle for wrapping bodies in blankets before placing them in shallow graves as a preferable alternative to leaving bodies to rot in fields while living soldiers walked over them. Soldiers and supporting civilians such as Clara Barton, the founder of the American Red Cross, struggled to provide essential information to next of kin and maintain lists of the fallen to the extent possible under extreme circumstances. Following the Civil War, the US Congress devoted considerable effort and resources to assessing the military casualties inflicted on both Union and Confederate forces. The Office of the Surgeon General initiated this accounting effort, shepherding it along a long and tortuous route through the War Department as its leadership changed. Civilians

joined military personnel in the collection and publication of these military records, the most prominent civilian being Joseph W. Kirkley who played a central role from the very beginning all the way into the twentieth century. Kirkley ultimately rose to head the Publication Branch of the Record and Pension Office of the War Department. However, its primary goal was clearly military, the most renowned output from this office being the 128-volume set *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*. An eloquent description of some of these accounting attempts, and the role of the public in demanding and digesting these military counts, can be found in the chapter entitled “Numbering: ‘How Many? How Many?’” in Faust (2008).²

Yet, to the best of our knowledge, none of these War Department documents pay serious attention to the considerable impact of the war on civilians. Thus, we are left with great uncertainty regarding the total number of direct and indirect civilian casualties in the Civil War. The eminent Princeton historian, James M. McPherson (1988: 619), claimed “a fair estimate of war-related civilian deaths might total 50,000.” However, he noted subsequently that this “figure is simply an estimate based on no hard data—such data simply do not exist, as far as I am aware” (McPherson, pers. comm. March 25, 2009).³ Thus, the Civil War’s civilian casualties have never been fully addressed numerically. The topic is too large to consider further here and would distract from our historical narrative and additional analysis will be tackled elsewhere.

It is important to note, nevertheless, that the surge of interest in naming the military Civil War dead did spill over partially to the civilian sphere. Ginnie Wade was the first and only direct civilian death in the Battle of Gettysburg, a three-day clash that caused the largest number of military casualties in the American Civil War (Busey and Martin 2005). Wade was killed instantly while kneading dough at her sister’s home when a small Minié ball entered the house—presumably at random—and pierced her heart. She was reburied in the Evergreen Cemetery at Gettysburg, Pennsylvania immediately after the war. Thirty-five years later, at the dawn of the twentieth century, a monument was erected at her gravesite watched over by a perpetually flown American flag, an honor afforded to only one other American woman from this era, Betsy Ross. The Ginnie Wade memorial remains to this day one of the most visited sites at Gettysburg.

We can make a few broad observations at this stage. There is a very long, but patchy, tradition of recording names of dead soldiers not matched by similar consideration for civilian war victims. Interest in accounting for human military losses grew in the mid-nineteenth century accompanied by a weak movement toward according similar treatment to civilians. Early casualty accounts used the most basic

2. In a parallel, but apparently unrelated, development the British became interested in naming their war dead during the Crimean war. These efforts culminated eventually in a searchable online database of names (Forces War Records 2016).

3. Unfortunately, the reported number has taken on the appearance of “hard fact” that was never intended by the author. Many others believe that it is a considerable underestimate of indirect casualties given the levels of famine and malnutrition noted in contemporary accounts of civilian conditions.

of methods: listing names.⁴ Thus, the emphasis on military over civilian deaths cannot be explained solely by technological factors.

In 1910, the Carnegie Endowment for International Peace was founded with a mission to “hasten the abolition of war, the foulest blot upon our civilization” (Carnegie 1910). In the aftermath of World War I it commissioned *Losses of Life Caused by War*, written in 1923 by Samuel Dumas and Knud Otto Vedel-Petersen, containing a monograph by each author. The first, Part I, by Dumas considers wars up to 1913, focusing generally on European conflicts dating as far back as the Seven Years’ War from 1756 to 1763. Part II, by Vedel-Petersen, discusses World War I. Perhaps the most striking fact about this publication is that the Carnegie Endowment and the authors are interested in human war losses in the first place. Even more remarkable is that they care quite a bit about civilian deaths and make great efforts to quantify them.⁵ We struggle to find hints of historical civilian casualty accounting prior to this remarkable work even though civilian casualties and, indeed, direct targeting of civilians have been a long-standing feature of war (Bell 2007). There is evidence, for example, of extensive civilian casualties in the Peloponnesian war between Athens and Sparta more than 400 years BCE. For example, Laveran (1863) covers the discussions of Thucydides and Diodorus of the Plague of Athens, the city in which people from Attica had sought refuge from the conflict only to die in great numbers, including some 10,000 civilians of all classes. Dumas mentions a few additional examples from this point in time through to the Middle Ages. Nonetheless, it is apparent that the Dumas and Vedel-Petersen monographs arose out of a growing—contemporary—broad interest in assessing statistical information regarding war losses (“Book Notes” 1924).

Civilians were almost always affected severely in the wars that raged throughout Europe in the sixteenth and seventeenth centuries. Sandberg (2009) discusses the atrocities and civilian casualties during the French Wars of Religion from 1562 to 1598, although he does not provide a quantitative assessment. The Thirty Years’ War, in what is now modern Germany (1618–48), also generated large numbers of casualties with estimates that approximately 25 to 30 percent of the civilian populations died either directly or indirectly (see Parker 1997, e.g.). Dumas, in Dumas and Vedel-Petersen (1923: 116–17), reports that during this conflict “the population of Bohemia was reduced from 4,000,000 to 80,000,” and discusses civilian losses in other major conflicts of that era and the following two centuries including the Seven Years’ War (1754–63) and the Napoleonic Wars of 1803 to 1815. Some historians believe that twice as many civilians as soldiers died in Europe as a direct or indirect result of the Napoleonic wars (McPherson 1988: 619). Dumas displays mortality

4. At this stage anything resembling a modern statistical estimate of numbers killed would have been a near impossibility, considering the state of the field of statistics at the time.

5. Of course, Dumas and Vedel-Petersen have to work within the confines of historical sources that value military personnel much more than civilians. In both monographs the assessments of civilian deaths are almost entirely based on civil registration data, of one form or another, regarding births, deaths, and other mortality-relevant information.

rates starting with Denmark, 1862–66, during the Dano-Prussian War of 1864, and for Germany, Austria, and Hungary before and after the Austro-Prussian War of 1866, as well as for several countries affected by the Franco-German War of 1870–71.

Dumas was a serious and numerate scholar, eventually becoming president of the Swiss Mathematical Society, but was largely reduced to making educated guesses due to the poor quality of the historical materials that were available to him. Vedel-Petersen and other statisticians and epidemiologists were able to bring greater sophistication to their accountings for civilian losses in World War I with estimates now becoming statistical in nature. Interesting works include Mallet (1918), War Office (1922), Hersch (1925), and Greenwood (1942) in addition to Vedel-Petersen, “Losses of Life Caused by War Part II—The World War” in Dumas and Vedel-Petersen (1923). It is well worth considering some interesting issues that arose in the new literature.

There was a debate over the extent to which “Spanish flu” deaths should be viewed as indirect war deaths. On the one hand, there were many influenza deaths in countries hardly participating in the war while, on the other hand, there is substantial evidence that troop movements contributed to rapid and widespread influenza infection rates (Barry 2004). Major Greenwood (1942: 6) argues that increases in deaths from tuberculosis during 1914–18 are rightly due to the war but asserts that the extraordinary influenza outbreak should not be considered a “war epidemic, in the sense that the typhus in South-eastern and Eastern Europe was a war epidemic.” He does agree that the war contributed to unusually high fatality levels while noting that this opinion is also subject to sharp differences of opinion amongst epidemiologists. This debate brings into sharp focus some of the methodological problems with the common practice of assuming all changes in mortality rates after a war starts are directly attributable to the conflict (Spagat and van Weezel 2016).

There was also quite an interesting discussion of infant births and deaths. Mallet (1918: 8) states: “Among the effects produced by the war on vital conditions the loss of potential lives to the belligerent countries by the decrease in the numbers of children born is perhaps the most important.” We agree that the idea of studying the effects of war on fertility should be revived in modern research although Mallet’s view, which appears to equate nonbirths with war deaths, strikes us as rather extreme.

A surprising discovery of this discussion was the fact that infant mortality rates declined during World War I, both in England and Germany. The English rate in 1916 was almost 20 percent below the average of the preceding 10 years.⁶ This finding anticipates that of the Human Security Report Project (2010), which notes that declines in infant mortality rates during recent wars are common, largely

6. Mallet attributed much of this improvement to declines in infectious disease deaths that had started around the turn of the twentieth century although the strong drop in births rates over the war years suggests that perhaps there was more to the mortality-rate decline than a simple continuation of established trends.

reflecting continuations of prewar trends. Of side interest, Mallet (1918: 27) noted a decline in infant mortality associated with suffocation that he considered to be a “striking indication of increased sobriety.”

Similarly, Winter (1977) uses insurance data from the Prudential Assurance Company, a company that provided life insurance to working class men in that era, to estimate mortality rates pre- and postwar. By focusing on older men, who were not subject to military service, Winter demonstrates a negative excess mortality for men over the age of 50, that is, an improvement in their mortality rate during wartime. In addition, he also uses infant mortality data from England and Wales to show declines in the rate of infant deaths during the war period as previously discussed.⁷ By contrast, France, Italy, and Austria suffered sharp increases in infant mortality rates at various times from 1914–18 (Hersch 1925: 3).

World War II represents a quantum leap up in the scale of civilian casualties unaccompanied by substantial progress in casualty accounting. There are estimates ranging from 40 to 50 million civilian dead, with as many as a third caused indirectly by disease and famine. However, these numbers are not estimates in any formal statistical sense. For example, they include China where war was waged with Japanese forces from 1937 to 1945, although there are no reliable demographic figures for China during this period as the country did not conduct its first national census until 1950. Moreover, China was racked by mass starvation and epidemic prior to the war. Nevertheless, Sokolov, a Russian historian and journalist, references Petrovich (2004/05) in indicating war-related civilian losses in China as high as 5 million but speculates that the count could possibly be much higher (Sokolov 2009: 439). Civilian deaths due to the war in the Soviet Union appear to be at least 12 million and possibly higher. Indeed, Sokolov (*ibid.*: 452–53) compares official population estimates for 1941 and 1947, subtracts off a separate estimate of direct military deaths, and conjectures that Soviet civilian deaths could be as high as 16 million. Haynes (2003) and Harrison (2003) draw attention to the issue of how to account for Soviet military personnel killed directly by the invading Germans who would have died differently, for example in an accident, if there had never been a war. These are just two of the many countries that suffered horrific losses in World War II. The civilian casualty numbers for this war are massive, vary widely by source, and are complicated by shifting boundaries among many other factors. A semblance of global precision is simply not possible. Nevertheless, there has been some extensive documentation of certain types of civilian losses in World War II such as *The Central Database of Shoah Victims' Names of Yad Vashem* (2017).

The Korean War from 1950 to 1953 seems to have aroused little interest in the Western World to account for civilian losses despite a view that “the Korean War

7. Winter attributed these health “gains” to an ironic rise in the standard of living in the British working class during the war, improvements in standards of care for pregnant women and their infants as a war response, and, to a lesser extent, the decreased use of cows’ milk for infant feeding (condensed and dried milk was less likely to carry the tubercle bacillus) and the reduced incidence of alcoholism due to war controls on liquor availability.

will be understood as one of the most destructive and one of the most important wars of the twentieth century. Perhaps as many as 3 million Koreans died, at least half of them civilians (Japan lost 2.3 million in the Pacific War)” (Cummings 2010: 243). The provenance of these numbers is unclear although comparable ones are quoted elsewhere (Nahm 1993; Rummel 1997). The South Korean Truth and Reconciliation Commission operated between 2005 and 2010 and studied human rights incidents occurring between 1910 and 1993. It documented many civilian massacres and conducted small-scale civilian mortality surveys in specific geographical regions. However, according to some accounts, it was not allowed to conclude its investigations of all reported massacres during the 1950–53 war (Selden and Dong-choon 2010). Lee Young Jo, the commission’s last president estimates “that South Korean and North Korean forces each killed about 150,000 civilians” (Kirk 2011). Several mass killings were also attributed to US Armed Forces. The commission issued a report in December 2010 in Korean, in four volumes (Ministry of Government Administration and Home Affairs Support for Past Affairs 2017), although it is difficult to find English translations. The commission “estimated that the data on 8,000 civilians killed during the Korean War represented only 5% of the actual number” (US Institute of Peace 2012), although this number is much lower than ones quoted in the preceding text. We have not yet been able to assess the methodology and findings of this commission.

Similar uncertainty surrounds Vietnamese casualties in the American war in Vietnam from 1965 to 1975 (the second Indochina war), with estimates of combatant plus civilian deaths ranging from 1 to 3 million. It is difficult to separate civilian from combatant deaths, particularly in North Vietnam. Estimates of civilian deaths range from 195,000 to 415,000 (Thayer 1985: 129) for the South with a very rough estimate of 65,000 for the North (Lewy 1978: 451). Lewy (*ibid.*) estimates 354,000 civilian deaths for the whole country, a number far lower than the figure of 1.2 million cited by Robert McNamara (McNamara 1991). Hirschman et al. (1995) uses demographic and survey techniques to yield an estimated range of 791,000 to 1,141,000 total deaths.

Casualty Accounting Methodologies

It would be of considerable historical interest to work through the past examples more extensively to document in each case how the necessary data was collected and assessed for quality and how the data was presented broadly and for what purposes. However, rather than looking at a specific example in great detail we now attempt to extract broad features regarding historical assessments of civilian casualties, thinking along four interrelated dimensions. Subsequently, we describe categories of estimation methods used both in the examples described and in current work on the topic.

The first dimension covers the diverse motives for building casualty accounts in the first place (see “The Motivation and Use for Civilian Casualty Accounts”). It is neither necessary nor feasible to compile a definitive and static list of all possible

motives for casualty accounting for all time. The salient point here is simply that the underlying issues can drive methods and vice versa. The goals of specific casualty accounting projects may range from the need to quantify the scale of human losses in a conflict, to shedding light on patterns of civilian casualties across time and space, to predicting and preventing atrocities, to using quantitative methods to analyze the economic impact of wars and their resolutions, to memorializing victims in a systematic and enduring manner. Certain goals tend to fit with particular accounting methods that have specific strengths and weaknesses in fulfilling these goals. For example, Klingberg (1996) made predictions for war terminations based on ratios of military to population losses using data going back to the early seventeenth century. For this work it was, arguably, sufficient to work with the estimates of Bodart (1908) for military population losses and those of Dumas and Vedel-Petersen (1923) and Bodart (1916) for population even though these are, essentially, educated guesses. These same figures would be woefully inadequate for memorializing the victims of these wars.

The second dimension comprises the distinctions between counting, documenting, and estimating casualties that we introduced in the "Introduction." Counting and documentation operate in terms of concrete individuals. Although disaggregated information on individuals can, in practice, be sketchy, contradictory, or missing, estimation still differs fundamentally from counting and documentation. This is because estimation attempts to account for deaths that have escaped specific detection, so-called hidden casualties, whereas counting and documentation are always of discovered casualties. Of course, if an estimate is accurate then it is, in principle, possible to document most of the estimated casualties although, in practice, such strong validation of a particular estimate may never be achieved. Detailed descriptions of methods and data are crucial components of every casualty accounting project but, arguably, the standards should be set particularly high for statistical estimation methods because the hidden casualties on which they focus may never be fully verified. War casualty figures are inherently controversial, so data validation must always be central to the enterprise of casualty accounting.

Third, we can differentiate methods according to the level of detail in the data collection and in the published output of a casualty accounting project. In other words, we should always ask what is counted, documented, or estimated and how the collected information is presented. At the coarsest level, investigators may focus on estimates for numbers killed in a conflict with no attempt at finer distinctions. At the other extreme, a project can compile a complete list of victims with information about each one such as gender, age, and circumstances of death.

Some projects group deaths by the discrete events (sometimes called "incidents") in which they occur, for example, suicide bombs or air strikes. Such *event data* can be regarded as an intermediate point on a continuum between aggregate counts and estimates, on the one hand, and person-by-person documentation, on the other. We prefer, however, to view groupings of deaths by events as qualitatively different from and complementary to person-by-person documentation rather than as a coarsening of the latter. In particular, a complete list of victims and their

characteristics can be enhanced by encoding the events in which these people were killed while we can also enhance an event-based data set by adding the names of all the victims that it covers.

It is important to distinguish between the details that are collected under a certain methodology and the material that is published in the end. For example, one can use detailed information on a small sample of war victims to produce statistical extrapolations that mobilize the collected detail to break down estimates of numbers killed by location, period, gender, weapons used, and so forth. Thus, fine disaggregation of information on a sample of deaths can yield substantial benefits even within the context of statistical estimation.

Fourth, some methodologies aim to account for violent deaths only whereas others strive to include nonviolent deaths that can be traced indirectly back to war conditions. Indirect war tolls can come through disease, famine, or a host of other factors and can be substantial. So there are strong motivations to account for indirect deaths in casualty accounting projects. However, it is hard to account accurately for indirect deaths as our earlier discussion of influenza deaths in World War I attests (see “Historical Antecedents to Modern Casualty Accounting”). We must bear in mind that throughout history and right down to the present, serious casualty accounting, even for direct deaths, has been rare to the point where we are often left with numbers that can only be described as speculative guesses not rooted in data, an environment in which myths can flourish. For example, much modern literature accepts that 90 percent of current-day war deaths are noncombatants (e.g., Carnegie Commission on Preventing Deadly Conflict 1997: 11)—a figure that turns out to have no evidentiary support (Eck 2005; Kreutz 2006; Roberts 2010). (Earlier calculations place this percentage around 50 percent historically—see Eckhardt 1989). Indirect deaths are still more challenging to account for than direct deaths and must, therefore, be approached with considerable caution.

We focus in the following text on six broad categories of techniques: (1) listings of direct violent deaths person by person and/or grouped together by event; (2) the use of census and other population demographic information to estimate mortality potentially attributable to both direct and indirect losses, that is, what is often called *excess mortality*; (3) the use of epidemiologic or demographic household surveys to estimate violent or excess deaths during and after conflicts; (4) indirect estimates of casualty numbers based on assumed relationships between war deaths and information present in *found data*, that is, data that happen to be available; (5) *crowdsourced* compilations of casualty reports often supplemented with video and other corroborating evidence for validation; and (6) the combination of information from distinct and separate listings of casualties using capture-recapture methods, also known as multiple systems estimation, where information is required to be at the individual level with sufficient detail to reasonably identify distinct deaths. In many cases, some of these methods are combined, rendering our separation of methods somewhat artificial, but still useful.

It is beyond the scope of this article to discuss comprehensively the strengths and weaknesses of each approach, and, specifically, the biases to which each method

may be vulnerable. In all cases, systematic bias is often of much greater concern than statistical variability because, unfortunately, it is the general size of casualty estimates and counts that are widely disseminated with little attention to how much the numbers might vary under reasonable assumptions. Nevertheless, precision is important because estimates associated with wide ranges of uncertainty are usually of very limited value.

Listing Direct Victims and/or Events

This is the most basic of methods for which the minimum technology has been available as long as writing has existed; one simply lists the names of people who have been killed. We can improve on a simple list of names by adding information about each victim such as ages, genders, and so forth. Deaths can also be grouped by event, either as an alternative or a complement to listing deaths by victim.

The Kosovo Memory Book (2000; hereafter KMB) is a remarkable example of a virtually complete list of every person killed in a modern war (Krüger and Ball 2014; Spagat 2014). This database, the inspiration of Nataša Kandić, was produced in collaboration between the Humanitarian Law Center and the Humanitarian Law Center–Kosovo in a multiyear project to account for all deaths attributed to the war in Kosovo from 1998 to 2000. The findings were released in February 2015, providing documentation of 13,517 unique deaths, with 76 percent identified as civilians of which 84 percent were further identified as Albanians. These numbers are considerably lower than discredited figures reaching into the hundreds of thousands that were circulated during the war (Greenhill 2010), although Kandić allows for the possibility that a relatively small number of further deaths will be documented in the future. The KMB database does not, at present, group the deaths by events, but there are plans to add this information in the future.

It is unlikely that many projects will attain the quality level achieved by KMB within the foreseeable future, and we hope that these inevitable disparities will not undermine support for valuable casualty accounting projects. The Kosovo war was relatively short and took place within a small geographical area. Moreover, Kosovo had excellent population records prior to the war and KMB received considerable financial support that has allowed it to conduct in-depth research sustained over many years. Few other projects enjoy either of these advantages. Thus, we see a danger that the exceptionally high achievements of the KMB could have an unintended effect of discouraging casualty accounting efforts that need to be conducted in much more challenging environments and that would, necessarily, fall short of KMB-level quality. In other words, we think it is important to avoid making the extraordinary the enemy of the good.

In another direction, namely event recording—and on a global scale, the Uppsala Conflict Data Program (2016; hereafter UCDP) gathers data systematically on conflicts from all over the world going back as far as 1975. Sundberg and Melander (2013) give an overview of this data set (another important and similar data set is ACLED—see Raleigh et al. 2010). UCDP's Georeferenced Event Dataset, which

includes civilian war deaths, is organized by event with no plan to gather data at the individual victim level. UCDP's events come primarily from media sources although they integrate data from other sources, such as human rights organizations, whenever possible. Event data tends to have *event size bias*—events with many deaths tend to be captured by the data-gathering system more readily than events with a small number of deaths. The media, for example, may simply overlook many events in which a single person is assassinated while rarely failing to cover a suicide bombing that kills 20 people. Thus, there is always the potential with event data of shifting too much attention away from perpetrators of selective crimes onto perpetrators of mass events.

Iraq Body Count (2016; hereafter IBC), founded by John Sloboda and Hamit Dardagan, has created a detailed recording of civilian deaths in Iraq since the 2003 military intervention, continuing to the present day (Sloboda et al. 2013). Its list is based on cross-checked media reports of violent civilian deaths supplemented by official records from morgues, hospitals, nongovernmental organizations, and so forth. A range of plausible counts is provided online with considerable accompanying detail including a time series graph. For our present purposes, the main interesting feature of the IBC database is that it represents a hybrid of enumeration methods. Like KMB, it attempts to list each victim in the war; however, it succeeds in naming less than 10 percent of these victims so it is far less successful than KMB is in this regard. Like UCDP, it endeavors to group deaths by events, at present listing nearly 50,000 such events. However, IBC, unlike UCDP, includes counts of deaths that IBC is unable to break down into constituent events. For example, IBC's count includes nearly 20,000 violent deaths recorded as bodies that passed through the Baghdad morgue but that cannot, at present, be disaggregated down to individual events. IBC, thus, mixes together events, counts, and individually documented deaths.

The bare minimum technology for "listing" approaches is rudimentary but the invention of computers, the Internet, social media, and many interconnected electronic devices are revolutionizing this approach. It is now possible for researchers to sit in front of computer screens and assemble valuable casualty data. The information collected can be stored and manipulated in ways that would have been unthinkable even a few decades ago. At the same time, fieldwork can make huge contributions to a listing project. Indeed, extensive fieldwork is one of the primary reasons for the high quality of the KMB database. Modern methods of qualitative interviewing techniques are an important part of this success story. Similarly, B'Tselem, an Israeli human rights organization, maintains a very high-quality listing of deaths in the Palestinian-Israeli conflict that is underpinned by strong fieldwork (B'Tselem 2016).

Every Casualty Worldwide (2016; hereafter ECW) is a registered charity that advocates for a world in which all war casualties are recorded individually. A campaign to support this goal of moving beyond aggregate casualty estimates to identify and document unique information on all such individuals was launched in 2012 with the participation of more than 50 civil society organizations (*ibid.*). Fischhoff et al. (2007) makes a persuasive case for the value of such an approach. ECW also provides support to groups that document war casualties, including

assistance for establishing standards for best practice. ECW did not invent casualty documentation but the fact that it has been able to gather together so many organizations that document war casualties shows how extensively this idea has spread since the Battle of Marathon.

Population-Level Data and Analysis: Excess Mortality

In modern times, mortality information can often be obtained from official population registries, supplemented by census estimates of population density. In the United Kingdom, the availability of vital registration information collected by the Register-General of Births, Deaths, and Marriages for England and Wales provided much of the data employed by Mallet (1918), and subsequently Dumas and Vedel-Petersen (1923), to study mortality in World War I. The General Register Office for England and Wales was established in 1836 with data collection commencing in 1837. In 1909 Mallet was appointed Registrar-General of the United Kingdom, a position he held until his retirement in 1920 (“Obituary: Sir Bernard Mallet” 1933: 148). Vedel-Petersen used analogous demographic and census information for other countries in his expanded discussion.

Often, we wish to separate the deaths caused directly by war violence from the indirect casualties resulting from war-related causes such as the deterioration of economic, health, or social conditions due to a conflict. As mentioned previously, wars can create conditions under which factors such as infectious disease transmission, poor sanitation, malnutrition, and social upheaval can cause increases in mortality rates above a background or natural level. Unfortunately, demographic mortality information or vital registration records do not normally allow us to distinguish between direct and indirect conflict mortality unless some additional details on causes of death are available. Thus, estimates based on official statistics are typically of *excess deaths*, meaning that we subtract a baseline—preconflict—mortality rate from the mortality rate experienced during a conflict period to calculate an *excess mortality rate* and then combine this rate with knowledge of population size to estimate *total excess deaths*. All deaths, violent and nonviolent, are mixed together in such calculations. In one of the most careful applications of these methods, Heuveline (2015) estimated between 1.2 and 2.8 million excess deaths during the reign of the Khmer Rouge in Cambodia between 1975 and 1979.

Estimates of excess mortality can be highly sensitive to measurement errors in baseline rates. For example, the Human Security Report Project (2010) examined excess death estimates made by the International Rescue Committee (IRC) in the Democratic Republic of Congo and found that simply making a plausible adjustment to the baseline used by the IRC would reduce a casualty estimate from 2.8 million to 900,000. A further complication is that mortality trends are rarely static during the run-up to a war and, ideally, such trends should be accounted for in assessing excess mortality (ibid.). Thus, one needs multiple estimates over time, not only a single good estimate, to build a proper trend effect into an excess mortality estimate. Thus, a further weakness of excess mortality calculations is that they rely on

counterfactual calculations: What would the mortality have been during a certain period had a conflict not occurred? In light of these problems, precise numerical calculations may often be problematic.

Population Surveys

More recently, systematic quantitative attempts to describe civilian casualties have included random sample population surveys of conflict zones. Landman and Carvalho (2010) give a general description of population surveys for the measurement of human rights violations, with issues ranging from sampling methods to questionnaire design. In its simplest form, the key idea underpinning casualty accounting through surveys is that if X percent of the population directly covered by survey interviews has been killed in a war then we can estimate (subject to a margin of error) that X percent of the war-affected population has been killed in the conflict.

The foundation for extrapolation from sample to population comes from the random character of the sample that provides a reason to expect the sample to be representative of the whole population. The insight that such an extrapolation is possible emerged from intellectual breakthroughs in the field of statistics that only started gathering steam in the 1930s (Groves 2011). Thus, the technology for the survey approach to war mortality estimation only became available sometime in the middle of the twentieth century.

Spiegel and Salama (2000) was a timely survey estimate of the number of people killed in the Kosovo war, numbers that were later validated by the KMB, a type of success that is unusual in this field. Silva and Ball (2006) conducted a high-quality household survey for the Timor-Leste Commission on Reception, Truth, and Reconciliation that included retrospective family mortality histories that they incorporated into their mortality estimates for the commission. At the other extreme, the Iraq mortality survey of Burnham et al. (2006) was highly controversial and had major weaknesses (Spagat 2010), some of which led to an official censure by a professional association of survey researchers.

Spagat (2012) and Asher (2013) provide overviews of conflict surveys, with the latter article stressing the importance of the frequently neglected issue of questionnaire design. Respondents may struggle to recall deaths that occurred long ago, displace deaths in time, for example, reporting prewar deaths as during-war deaths; create or omit deaths depending on how they view the purpose of the survey; or attribute inaccurate causes to deaths that did occur. Some surveys address some of these issues by only asking respondents to recall very recent casualty information, for example, over the last 90 days, while other surveys rely on respondents to accurately remember deaths that may have occurred a decade or more in the past. However, questionnaire design is only one of many issues that affect survey quality. For example, people need to survive a war to be available for interviews and such survivors might not be representative of the full war-affected population. Traditional sample survey techniques, created for application to the developed world, are often difficult to apply in conflict zones that can lack essential ingredients such as a list of

candidate households for interviews (*a sampling frame*), an amenity that tends to be readily available through population registries in developed countries with relatively stable populations. Thus, sampling procedures in conflict environments often take on an improvised character with field teams literally spinning bottles or pens to simulate the random procedures that are assumed to have been implemented when estimation is done. Fieldwork can be dangerous, so interviewers often must either risk their lives, which is ethically unacceptable, or they must compromise the integrity of the statistical estimation by avoiding certain areas. Conducting surveys only in refugee camps can help to maintain quality, as with Bell et al. (2008), but refugees can never adequately represent the population from which they are drawn. One final issue derives from the fact that modern conflicts tend to be comprised of pockets of violence interspersed with islands of peace. Thus, small conflict mortality surveys run risks of either stumbling into a few unusually violent areas and overestimating the real death toll by a large margin or finding their way only to peaceful areas and doing the opposite.

A further challenge to survey-based estimation is that while a sample's size might be sufficient to give reasonable estimates at the population level, they are often rarely sufficient to provide disaggregated estimates in demographic, temporal, and/or geographic subgroups. The latter information is often crucial in supporting specific conflict narratives that may be crucial for transitional justice arguments that we discuss later.

Despite the serious challenges, population household surveys remain one of the most important and heavily used tools for casualty estimation in modern wars. Surveys may be the only viable choice for casualty accounting in conflicts that get little systematic coverage from the media or human rights groups. Or surveys may be the best way to get a handle on the broad contours of a war in an environment where listings of victims and events are likely to be relatively incomplete and biased.

Indirect Estimation

Landman and Carvalho (2010) classify some data sources as *found data* by which they mean that a casualty accounting project did not design its data collection process but, rather, "found" some useful records to work with. Accordingly, some casualty figures are *indirect estimates* based on extrapolations from records that are considered related to occurrences of war deaths. The methods that are applied in these cases are, necessarily, eclectic depending on the nature of the found data. Thus, we are brief because we cannot give a general treatment that covers the myriad of possibilities.

Sokolov (2009) discusses estimating the number of Soviet military deaths in World War II based on counts of the number of wounded servicemen and assumptions about how injuries are related to deaths. Such an indirect approach is valuable although it cannot be fully satisfactory for quantifying the full extent of civilian casualties in the war. As a further example, "found" prison records in Chad covering the repressive regime of Hissène Habré (1982–90) suggested abnormally high mortality rates for prisoners of war, even compared to mortality rates recorded

in German and Japanese World War II prisons, and were used to counter arguments presented in the defense of Habré (Extraordinary African Chambers 2016: 358). (See also Bercault et al. [2013] for more details.)

Crowdsourcing

Crowdsourcing is such a close cousin of the listing methodology discussed in “Listing Direct Victims and/or Events” that we could have covered it there. However, we elect to treat crowdsourcing separately because this method is more appropriately associated with modern technologies than are traditional listing approaches. In particular, we can think of a crowdsourcing method as a listing system with two additional characteristics. First, anyone can contribute information, although such methods usually provide for banning contributors found to have fed dubious information into the system. These voluntary contributors are the “crowd” that are the sources of any information collected. Second, crowdsourcing makes heavy use of modern digital technologies including e-mail, short message service (SMS), and Twitter for inputs into the system, and special software is used in filtering, processing, and presenting the information that is received, often associated with relevant geographic maps. Ushahidi provides a software platform and support for a wide range of crowdsourcing projects including election monitoring, crisis response, and conflict observation (Ushahidi 2016).

Syria Tracker, a project of Humanitarian Tracker (2016a) supported by Ushahidi, is probably the most prominent current application of crowdsourcing methods to casualty accounting. Syria Tracker accepts text, voice, photo, and video contributions. These can be uploaded directly onto the Syria Tracker web site or delivered through e-mail, Twitter, or voicemail. The reports are screened for quality, reliability, and duplication. A selection of reports is then placed on a map so that users can see at a glance from where they originated and access the material through mouse clicks. These eyewitness reports can be supplemented and/or confirmed through software tools that scan the Internet, including official news outlets and information feeds such as Twitter, and blogs.

Before briefly discussing the advantages and disadvantages of crowdsourcing we pause to draw attention to the ambiguous borderline between what is and is not crowdsourcing. We have followed a standard concept of crowdsourcing in requiring a central platform into which all the information flows. Other projects pull information in from a range of sources that can include social media such as Twitter and Facebook as well as traditional media sources. For example, Airwars (2016) monitors air attacks in Syria, Iraq, and Libya using just such a combination of sources. Airwars incorporates tweets aimed at an audience wider than just the Airwars database so it is not, in some technical sense, a crowdsourcing platform. However, in a broader sense, Airwars mobilizes a crowd to produce information and is, therefore, similar in spirit to a crowdsourcing project.

There are two main advantages of the crowdsourcing approach. First, data can be assembled in something close to real time, although this process can be slowed down by the necessity to cross-check submitted reports. Second, use of the crowd

can provide coverage of events that would, otherwise, be lost. Syria Tracker illustrates these advantages with its relatively up-to-date coverage of a country with little on-the-ground media because Syria is currently such a dangerous environment for journalists. As of August 2016, Syria Tracker had documented nearly 150,000 deaths occurring between March 18, 2011 and February 29, 2016.

There are two main disadvantages of crowdsourcing conflict data with both again illustrated by Syria Tracker. First, the incidents in a crowdsourced database may be unrepresentative of a conflict. In truth, the possibility of unrepresentativeness is an issue with all methods discussed here. However, the bias danger looms particularly large for crowdsourcing because it is a relatively uncontrolled data-gathering process. For example, in some parts of a conflict zone it could become fashionable to make reports into a crowdsourcing platform while in other areas the same system might never take off. These disparate reporting practices can create a false sense that the former areas are more violent than the latter ones. Syria Tracker appears to add a second possible layer of selection bias because it has many submitted reports that have not made it into the system because the organizers lack the resources to process them: “[O]nly 6% of citizen reports that we receive directly (via email, web-form, twitter, etc.) have been published publicly. A significant number of those that have not are not duplicates, but rather ones that we’ve not had the time or resources to verify” (Humanitarian Tracker 2016b). A second potential weakness is that people might make false reports into the system. Again, this problem can arise in all casualty accounting methodologies, but the unusual openness of the crowdsourcing method leaves it relatively vulnerable to manipulation. By contrast, there has been progress on this issue, much of it involving extensions of traditional journalistic techniques such as triangulating information from multiple sources and consulting with trusted actors (Heinzelman and Meier 2012). Any crowdsourcing project must strike a delicate balance between allowing, and even encouraging, anonymous submission of a wide range of casualty information and the ability to verify information and match multiple accounts of the same event.

We regard crowdsourcing as a promising new methodology that will, undoubtedly, be used more in the future although this method currently lacks validation in the casualty accounting field and there is, as mentioned previously, good cause for concern over biases in data collection. Compared to other methods, crowdsourcing approaches have not been available for sufficiently long for good or poor applications to have risen to attention—the absence of current illustrations should not be taken as evidence that the methods will ultimately prove valuable. An interesting new development that does address the bias issue is *crowdseeding*, that is, purposefully selecting a cadre of data contributors who are well positioned to cover a conflict area well (van der Windt and Humphreys 2016). Given the pace of technological development, it is hazardous to predict the exact role that crowdsourced data and its offshoots will ultimately play in the casualty accounting field, but this role will inevitably grow over the foreseeable future.

This section could usefully be expanded into a much deeper discussion about modern developments regarding the use and impact of technology to document

human right abuses including civilian casualties, but this demands a separate analysis in future work.

Combination of Data Sources: Multiple Systems Estimation

The statistical capture-recapture technique has a long tradition in estimating elusive wildlife populations since its introduction in the late nineteenth century. In its simplest form, data from two independent “captures” of a fixed wildlife population are classified by whether unique “animals” are tagged on either one or both captures, with interest focusing on estimating the unseen—“missing”—numbers of animals not tagged. Under certain assumptions, estimates of the latter then permit an estimate of the entire population size. Qualitatively, if few animals tagged on the first capture reappear in the second capture, this suggests that there must be a large population of animals unseen. However, if the two captures overlap substantially then it is reasonable to conclude that each capture identified most of the population.

Interest in this methodology expanded substantially in the later part of the last century as the method was applied to assessing the size of human populations with specific characteristics. In these applications, the definition of a capture translates into appearance on a sample or list drawn from the population in question. Each list is based on a system for capturing individuals; thus, the new name, *multiple list estimation*, or perhaps the more common usage, *multiple systems estimation* (MSE). Applications in epidemiology include assessments of the comprehensiveness of specific disease registers and counting elusive individuals with particular characteristics. The methods have been extended to exploit more than two lists, allowing the relaxation of at least some of the assumptions necessary for unbiased estimation. It turns out that in many war settings multiple organizations make overlapping lists of people killed in the war. This casualty documentation activity enables the possibility of casualty accounting through multiple systems estimation.

The earliest application of these methods to lists of casualties was released as part of the report of the Guatemalan Commission for Historical Clarification (1999), a truth commission that addressed the Guatemalan Civil War from 1960 to 1996. Working together, Patrick Ball and Fritz Scheuren applied the multiple list estimation technique to estimate that 200,000 people were killed or disappeared during this period, the overwhelming majority of which were attributed to the government and its allies (Ball et al. 1999; Human Rights Data Analysis Group 2016). Soon thereafter Ball et al. (2002) made a new application of the methodology to the war in Kosovo. These estimates received validation from the listing work of KMB and the sample survey of Spiegel and Salama (2000) noted previously. The convergence of the three very different methodologies of listing, sample survey, and multiple systems estimation on compatible figures is remarkable (Spagat 2014).

Manrique et al. (2013) provide a good exposition of what is a challenging and complex statistical methodology. Jewell et al. (2013) contribute a somewhat more skeptical treatment of the same ground. A primary advantage of MSE is that it offers an opportunity to estimate the number of people who have been killed in a war but

who have been missed by all available lists. Moreover, this methodology can possibly give breakdowns of the numbers of people missed by various categories such as periods, geographical areas, or perpetrators. Accurate estimates can in principle provide a more precise picture of the scale and contours of a war than may be available from lists of known victims that may be biased in favor of certain periods, regions, or types of victims.

Many examples are available that describe the application of MSE to civilian casualty accounting. Some of these are discussed in the overview discussion paper by Lum et al. (2013). Two innovative applications relating to the Bosnian conflict are described in Brunborg et al. (2003) and Zwierchowski and Tabeau (2010).

One disadvantage of MSE is that it is mathematically complicated and, therefore, difficult to understand even for people with some statistical training. The complexity of the method creates a transparency problem. Everyone can understand a list of victims and even arguments why a list may be biased or inadequate. Sample surveys are more complex, and discussions of survey quality can quickly get technical, but the idea of a representative sample is still accessible to most people. Crowdsourcing relies on sophisticated machines but the idea of people reporting what they know is basic. MSE, however, *has* to become technical in real applications. To be sure, people can understand the motivating example about tagged animals (see preceding text), but this example does not go far enough to unlock all the subtleties of MSE in actual casualty accounting. MSE can be, therefore, a relatively unsatisfactory tool for building understanding and confidence in “total” casualty accounts. Nevertheless, this technique can potentially help to uncover truths about casualties in particular wars that may not be apparent from records of documented deaths.

The main disadvantage of MSE is that the assumptions that underpin its uses are strong and sometimes far from being satisfied in real applications (Jewell et al. 2013). Forcing MSE estimates under unfavorable conditions can introduce new biases or accentuate existing ones. For example, demonstrations of the good properties of MSE estimates assume that all deaths on the multiple lists employed are real and that all duplicates both within and between lists are accurately identified. These assumptions are implicit in the listing approach to casualty accounting and, when violated, reduce the quality of these lists. However, MSE may increase the damage done by these violations because MSE treats failures to match deaths, real or unreal, as evidence of further uncovered deaths.⁸ To be fair, statistical techniques are rarely applied in environments that satisfy all their assumptions while there are still many successful applications of these techniques. In other words, MSE can be useful even though some of its assumptions are violated. Moreover, as noted, various extended techniques have been developed to reduce bias in multiple list estimation such as the use of several

8. A recent and ironic challenge for multiple list estimation lies in the relative availability of portions or all of one listing source to organizations providing a second list. While such data availability is encouraging in that it allows potential data validation from one source to another, it also encourages a given list “borrowing” victims from another source and adding them for completeness. Such deliberate list overlaps are often not systematically recorded and are thus difficult to model statistically but can have profound implications for total estimates—see Jones et al. (2014).

lists, rather than just two, and stratification that disaggregates the counts into relatively homogeneous categories based on, for example, time, geography, demography, or perpetrators. Such breakdowns are useful beyond the quality boost they give to the estimates because they can give insights into disaggregated relationships beyond the question of the total number of civilians killed. Nevertheless, amongst the casualty accounting methodologies covered in this article, we believe that MSE presents the strongest tension between its assumptions and its ambition.

Transitional Justice

Transitional justice refers to a wide range of measures that many countries have employed to move forward in the aftermath of a war or other violent events. Here we necessarily provide a short overview of the role that casualty accounting has played in some transitional justice environments.

Prosecutions for mass atrocities, which include genocide, crimes against humanity, and war crimes, occupy one extreme on a continuum of transitional justice measures. Lucas (2012) argues that statistics have no useful role to play in such proceedings although he only considers the polar extremes of either entirely banning statistical evidence or allowing only statistical evidence into transitional justice court cases. We agree that mass atrocity prosecutions must rely heavily on traditional staples of ordinary prosecutions such as witness statements and forensic evidence; however, we also think that some forms of statistical evidence could be of potential use in atrocity cases. Betts (2016) points out that people in high positions of authority often organize, plan, or at least decide not to prevent mass atrocity crimes without necessarily participating directly in the commission of these crimes. Such central direction or acquiescence may come without documents or witness statements tracing events back to these central authority figures. Moreover, judgments such as whether a series of massacres constitute a genocide can turn on the questions of whether they fit into a systematic pattern of targeting a particular group or, by contrast, whether they are random initiatives of scattered on-the-ground commanders. Betts (2016) maintains that statistical analysis of casualty accounts and other related data can illuminate these issues for judges. She admits that the International Criminal Tribunal for the Former Yugoslavia (ICTY) rejected such evidence in one of its cases but insists that better presentations and education can make such evidence more attractive to future courts (Hoover Green 2010). In the example of the Hissène Habré case discussed previously, the Extraordinary African Chambers explicitly used indirect statistical estimates to inform its judgment. There is currently no information about how the International Criminal Court perceives the value of statistical evidence. In general, we believe that casualty accounting statistics can play a valuable role in mass atrocity legal proceedings although we do perceive a substantial unresolved tension; standards of statistical proof that may be fully acceptable within a social science context can, however, be deemed inadequate as lynchpins for a trial on grave atrocity crimes such as genocide.

Truth (and reconciliation) commissions provide natural sponsors and homes for casualty accounting. Indeed, the book-length survey of the field by Hayner (2011) offers a five-point definition of truth commissions that “investigates a pattern of events that took place over a period of time” (ibid.: 11). See also the work of the International Center for Transitional Justice. We think that civilian casualty accounts must be part of any acceptable treatment of the patterns of a war. Thus, such accounts should be included in the detailed reporting associated with truth commissions that aim, to the extent possible, to provide complete historical records of injustices and human rights violations.

Hayner provides a detailed analysis of the origin and purposes underlying these formal investigations of the past, describing 40 of the most prominent commissions between 1974 and 2011. She indicates that the most basic “objective of a truth commission is sanctioned fact-finding: to establish an accurate record of a country’s past, clarify uncertain events, and lift the lid of silence and denial from a contentious and painful period of history” (ibid.: 20). The goals of accurate and detailed casualty accounting clearly overlap these objectives although the mandates of truth commissions do not typically include formal counts or estimates. All postwar truth commissions do include a substantial component of civilian casualty documentation. In fact, testimony from victims and witnesses is perhaps the most canonical feature of these proceedings.

Up to a point, the many powerful testimonies received by truth commissions can stand on their own. However, as masses of testimony accumulate it becomes increasingly attractive to organize these statements into databases to study their overall patterns. Thus, some truth commissions have built and analyzed victim databases, and such documents often include new or updated estimates of civilian deaths and disappearances. Prominent examples include reports to the Peru Truth and Reconciliation Commission (Ball et al. 2003), a statistical appendix to the report of the Truth and Reconciliation Commission of Sierra Leone (Conibere et al. 2004), and a statistical report to the Commission for Reception, Truth, and Reconciliation in Timor-Leste (Silva and Ball 2006). Seybolt (2013: 24) notes that, in the context of truth commissions, “[C]ivilian casualty estimates represent more than just technical efforts to get accurate numbers. Rather, they enable individuals to understand the nature and causes of a conflict and the roles that various actors played in it. Accurate numbers, produced transparently, with candid acknowledgments of potential error and limits can reduce the chance of politically determined figures becoming social facts.” Note, however, that the testimonies provided voluntarily to a truth commissions are not necessarily representative of the broad patterns of a war. Therefore, the truth commission casualty estimation projects have tended to apply statistical adjustments to their raw numbers with the goal of reducing their biases. These adjustments have come at the cost of some transparency to the public, which will inevitably find them to be opaque.

The role of aggregate casualty counts and estimates in truth commission investigations remains open to debate. Whenever a truth commission issues such a number it is certain to be cited many times, and official totals are often one of the

first facts cited about a war in introductory expositions. In other words, official totals released by truth commissions embed themselves in the historical record of a war, possibly to the point where they may become harder to dislodge through further research than should be the case. The magnitude of an aggregate casualty count could also potentially affect practical policies, for example, for reparations or justice, although Hayner (2011: 17) notes that “the actual number of victims does not seem to determine how heavy the past will weigh on the future, nor the intensity of interests in accountability.”⁹ Indeed, having a large number of victims can make it difficult for a country to redress past harms because the implications of doing so would be correspondingly large. Invariably, quantitative casualty accounting for truth commissions goes well beyond aggregate totals, offering breakdowns along various dimensions such as time, space, and perpetrator. This detail is, arguably, of more interest than the totals, and sometimes comes with surprises such as the claim made by the commission in Peru that the guerrillas, rather than the government, were the primary killers of civilians.

Casualty documentation by truth commissions, rather than statistical estimation, may be more useful, overall, for criminal tribunals and international courts. By contrast, foreknowledge that truth commission findings might feed into criminal prosecutions can undermine the truth discovery function of a commission. Moreover, these relationships could become still more complex to the extent that future courts become more receptive to statistical evidence on patterns of abuse than the ICTY was.

Howland (2008) describes a successful project conducted in postwar El Salvador that operated in a transitional justice zone somewhere between truth telling and criminal prosecution. This work used event-level casualty listing data combined with data on areas of responsibility of government military units to identify military personnel with direct command responsibility for human rights violations. Many members of the military who were implicated by this analysis were dismissed.

Discussion

There have been surprisingly few efforts to systematically and contemporaneously account for civilian casualties during times of major conflict, at least until the twentieth century. An obvious reason for this lack of activity is the difficulty in assessing civilian losses amidst the chaos of a battle and conflict. Nevertheless, chaotic circumstances surrounding local reporting agencies do not arise solely in times of war. For example, similar issues have hindered reporting on major epidemics throughout history. Yet despite, and perhaps because of, dramatic mortality spikes during plagues societies have systematically attempted to count and assess losses inflicted by disease as part of their attempts to address these crises (Alcabes 2009).

9. In the case of Peru, there remains ongoing controversy about the total number of deaths and its composition, 11 years after the commission's publication.

The move toward a more comprehensive and principled recording of the extent of civilian losses began roughly around the middle of the nineteenth century. The Battle of Solferino in 1859 observed by Henry Dunant began a process that led to the Hague Convention of 1899, which at least recognized the distinct role of civilians (as opposed to military combatants) during warfare even though it still provided few civilian protections. This recognition generated an evolutionary process that seemed to move inexorably through a period of history that included two worldwide conflicts, and which led to the 1949 Geneva Convention that provided legal protections to civilians, at least in international conflicts. This progress extended to cover local civil conflicts as appended through the 1977 amendment protocols (Elliott 2011; Seybolt 2013). Such international agreements reflect the enhanced standing and rights now proffered to civilians during conflict. At the same time, the agreements stimulated greater interest in the treatment of noncombatants and assessments of civilian losses in war. These advances in societies' appreciation, understanding, and protection of human rights occurred simultaneously with advances in scientific methods that enabled much improved attempts at casualty accounting. Clearly, modern survey methods, let alone crowdsourced casualty documentation, were not possible during World War I. Thus, the marriage of a deeper understanding of the value and rights of civilians with modern technological and analytical methods for documenting and estimating civilian losses provides us with special tools to address the horrors of war and take responsibility for alleviating the accompanying human suffering.

The modern euphemistic phrase "collateral damage," first used in nonmilitary contexts, is generally taken to reflect the cynical idea that civilians must sometimes become inadvertent casualties in the art of war, sacrificed for the benefit of the "greater good." This term is sometimes extended to cover situations in which civilians are specifically targeted to achieve a political goal: The bombings of Hiroshima and Nagasaki on August 6 and August 9, 1945, respectively, are two of the most notable instances in which civilian deaths have been inflicted to end a war. Rockel (2009) discusses the evolution of the term *collateral damage*, arguing that its use has been promulgated as an artifice to avoid a frank debate about civilian casualties ("legitimizing the illegitimate") and as an acceptable formulation to justify the human cost of obtaining military goals. However, Carpenter (2010) disputes this view as applied to the second Iraq war. Her examination of the use of the term in the Wiki Leaks Iraqi War Logs finds it to be used mostly to indicate why certain military targets were not pursued ("not possible due to collateral damage" [ibid.]).

Of course, there always have been and will be major challenges to counting, documentation, and estimation of civilian casualties. Groups fighting in conflicts often consider it to be contrary to their interests to document such losses for reasons of internal morale and/or because such efforts might cause them to lose the moral high ground in a highly publicized conflict, or simply because they do not wish to disclose sensitive information. Because civilians are commonly viewed as innocents, high rates of civilian casualties may undermine any moral basis for pursuing a conflict. In the American Vietnam War, the My Lai Massacre was a turning point in

public opinion toward US involvement in the conflict, in large part because the victims were all civilians with the majority being women, children, and the elderly.

Historically, the idea of “civilian” as an opposite of “combatant” was very late in coming. Indeed, the word *civilian* in the sense of a noncombatant was not part of either English or French dictionaries until the nineteenth century (Bell 2007: 11). Slim (2008: 183) discusses the difficulties associated with the labeling of civilians and the importance of this practice for addressing their fate. He notes the crucial distinction between combatants and noncombatants: “International law has never defined exactly what a civilian is in positive terms. The Geneva Conventions only really describe civilians by what they are not” (ibid).

Further, there are considerable difficulties in distinguishing the nature and/or cause of a casualty: Is it directly due to conflict (as in a bombing raid, e.g.), or indirectly when deaths occur due to malnutrition or disease that may not have occurred absent the impact of the conflict. Further losses may occur due to massive relocation of refugees who are forced from their homes and livelihood to avoid the direct impact of a conflict. Such indirect deaths may only be understood fully sometime after a conflict has ended if ever.

As current efforts to improve casualty accounting increase in intensity, considerable effort is going into developing standards for both suitable methodologies and reporting. Of course, the United Nations has long had standards for documenting individual violations against civilians that result in death that have influenced subsequent work (International Committee of the Red Cross 2013; United Nations 1991). More recently, and within a broader context, Every Casualty International is working to develop international norms and standards for credible casualty assessments, including work on establishing recognized legal obligations for the recording of civilian casualties of armed conflict (Breau and Joyce 2011). The same group has provided analysis and policy recommendations arising from a study of casualty recorders (Minor 2012) and a related “handbook” on good practices of casualty recording (Minor et al. 2012). Cameron et al. (2009) briefly discuss characteristics of a data structure that describes civilian violence in conflict including the need for (1) categories of violence and incident detail, (2) transparency of data collection techniques and an oversight mechanism, and (3) the need for multiple sources of information. These are important contributions to a continuing debate that will attract increased attention from scientists, statisticians, government officials, and policy makers.

Accurate casualty estimates will continue to play an important function in addressing the scale of human costs involved in conflicts, with the potential to contribute to community healing or peacebuilding. Regarding the latter, memorialized lists of victims, even incomplete, also have a crucial function. It is important to note in conclusion that any act of accounting for civilian casualties is fundamentally political: “[Q]uantification is rarely an escape from politicization in civilian casualty counting; rather, it is an invitation for further political intervention” (Aronson 2013: 46). Thus, reported counts or estimates must necessarily be interpreted in that context in addition to an appropriate assessment of scientific integrity in the methodologies employed.

It should be clear from this brief article that we have not been able to do justice to the history of civilian casualty accounting in human conflicts. Each of the topics we have raised deserves a richer context and discussion, and this piece serves primarily as an introduction to a much deeper and longer commentary, a project with which we will continue to engage in the future.

References

- Airwars (2016) <https://airwars.org/> (accessed October 28, 2016).
- Alcabes, P. (2009) *Dread: How Fear and Fantasy Have Fueled Epidemics from the Black Death to Avian Flu*. New York: Public Affairs.
- Ancient Greek Battles (2016) "Marathon stone," www.ancientgreekbattles.net/Pages/49036_MarathonStone.htm (accessed October 24, 2016).
- Andreas, P., and K. M. Greenhill, eds. (2010) "Introduction: The politics of numbers," in P. Andreas, and K. M. Greenhill (eds.) *Sex, Drugs, and Body Counts: The Politics of Numbers in Global Crime and Conflict*. Ithaca, NY: Cornell University Press: 1–22.
- Aronson, J. D. (2013) "The politics of civilian casualty counts," in T. B. Seybolt, J. Aronson, and B. Fischhoff (eds.) *Counting Civilian Casualties: An Introduction to Recording and Estimating Nonmilitary Deaths in Conflict*. Oxford: Oxford University Press: 29–50.
- Asher, J. (2013) "Using surveys to estimate casualties post-conflict: Developments for the developing world," in T. B. Seybolt, J. Aronson, and B. Fischhoff (eds.) *Counting Civilian Casualties: An Introduction to Recording and Estimating Nonmilitary Deaths in Conflict*. Oxford: Oxford University Press: 97–122.
- Ball, P., P. Kobrak, and H. F. Spierer (1999) "State violence in Guatemala, 1960–1997: A quantitative reflection." Washington, DC: American Association for the Advancement of Science, www.aaas.org/sites/default/files/migrate/uploads/Guatemala_en.pdf (accessed October 28, 2016).
- Ball, P., J. Asher, D. Sulmont, and D. Manrique (2003) "How many Peruvians have died? An estimate of the total number of victims killed or disappeared in the armed internal conflict between 1980 and 2000." Report to the Peruvian Truth and Reconciliation Commission. Washington, DC: American Association for the Advancement of Science.
- Ball, P., W. Betts, F. Scheuren, J. Dudukovich, and J. Asher (2002) "Killings and refugee flow in Kosovo March–June 1999: A report to the International Criminal Tribunal for the Former Yugoslavia." Washington, DC: American Association for the Advancement of Science.
- Barry, J. M. (2004) *The Great Influenza: The Epic Story of the Deadliest Plague in History*. New York: Viking.
- Bell, D. A. (2007) *The First Total War: Napoleon's Europe and the Birth of Modern Warfare*. London: Bloomsbury.
- Bell, J., D. Nolle, R. Citrin, and F. Scheuren (2008) "Afghan refugee camp surveys in Pakistan, 2002," in J. Asher, D. Banks, and F. J. Scheuren (eds.) *Statistical Methods for Human Rights*. New York: Springer.
- Bercault, O., R. Brody, M. Koulouris, and M. Schotsman (2013) "La Plaine des Morts. Le Tchad de Hissène Habré 1982–1990: Human rights watch," www.hrw.org/sites/default/files/reports/chad1013frwebwcover_0.pdf.
- Betts, W. S. (2016) "Evidence by the numbers: Using statistical analyses as evidence of international atrocity crimes." *University of San Francisco Law Review* 50 (3): 357–400.
- Bodart, G. (1908) *Militär-historisches Kriegs-Lexikon, 1618–1905*. Vienna: C. W. Stern.
- (1916) *Losses of Life in Modern Wars*. Oxford: Clarendon.
- "Book Notes" (1924) *Political Science Quarterly* 39 (3): 537–48.
- Breaux, S., and R. Joyce (2011) "Discussion paper: The legal obligation to record civilian casualties of armed conflict." Oxford Research Group, [www.oxfordresearchgroup.org.uk/sites/default/files/1st legal report formatted FINAL.pdf](http://www.oxfordresearchgroup.org.uk/sites/default/files/1st%20legal%20report%20formatted%20FINAL.pdf) (accessed October 28, 2016).

- Brunborg, H., T. H. Lyngstad, and H. Urdal (2003) "Accounting for genocide: How many were killed in Srebrenica?" *European Journal of Population* 19 (3): 229–48.
- B'Tselem (2016) "The Israeli Information Center for Human Rights in the Occupied Territories," www.btselem.org/statistics (accessed October 27, 2016).
- Burkle Jr., F., and R. Garfield (2013) "Civilian mortality after the 2003 invasion of Iraq." *Lancet* 381 (9870): 877–79.
- Burnham, G., R. Lafta, S. Doocy, and L. Roberts (2006) "Mortality after the 2003 invasion of Iraq: A cross-sectional cluster sample survey." *Lancet* 368 (9545): 1421–28.
- Busey, J. W., and D. G. Martin (2005) *Regimental Strengths and Losses at Gettysburg*, 4th ed. Hightstown, NJ: Longstreet House.
- Cameron, E., M. Spagat, and M. H. Hicks (2009) "Tracking civilian casualties in combat zones using civilian battle damage assessment ratios." *British Army Review* 147: 87–93.
- Carnegie, A. (1910) "Mr. Carnegie's letter to the trustees," Carnegie Endowment, December 14, <http://carnegieendowment.org/about/pdfs/CarnegieLetter.pdf> (accessed October 26, 2016).
- Carnegie Commission on Preventing Deadly Conflict (1997) "Final report: Preventing deadly conflict," www.carnegie.org/media/filer_public/b2/0e/b20e1080-7830-4f2b-9410-51c14171809b/ccny_report_1997_cpcdc_final.pdf (accessed October 27, 2016).
- Carpenter, C. (2010) "An interesting pattern in the Wikileaks data," *Duck of Minerva* (blog), November 9, <http://duckofminerva.com/tag/collateral-damage> (accessed October 28, 2016).
- Conibere, R., J. Asher, K. Cibelli, J. Dudukovich, R. Kaplan, and P. Ball (2004) "Statistical appendix to the Report of the Truth and Reconciliation Commission of Sierra Leone," Human Rights Data Analysis Group, The Benetech Initiative, <https://hrdag.org/publications-year/2004/> (accessed March 15, 2016).
- Cummings, B. (2010) *The Korean War: A History*, Modern Library Edition New York: Random House.
- DaPonte, B. O. (2008) "Why estimate direct and indirect casualties from war?" in J. Asher, D. Banks, and F. J. Scheuren (eds.) *Statistical Methods for Human Rights*. New York: Springer.
- Davenport, C. (2009) "Casualty counts and contentious politics." Paper presented at conference on Casualty Recording and Estimation in Times of Conflict, Carnegie Mellon University and University of Pittsburgh, October 23–24.
- Dockrill, M., and B. Paskins (1979) *Ethics of War*. London: Gerald Duckworth & Co. Ltd.
- Dumas, D. G., and K. O. Vedel-Petersen (1923) *Losses of Life Caused by War*, H. Westergaard (ed.) Oxford: Clarendon Press.
- Eck, K. (2005) "The myth of civilian war deaths." in Human Security Centre. (ed.) *The Human Security Report 2005: War and Peace in the 21st Century*. Oxford: Oxford University Press.
- Eckhardt, W. (1989) "Civilian deaths in wartime." *Bulletin of Peace Proposals* 20 (1): 89–98.
- Elliot, M. (2011) "The institutional expansion of human rights, 1863–2003: A comprehensive dataset of international instruments." *Journal of Peace Research* 20: 537–46.
- Every Casualty Worldwide (2016) www.everycasualty.org (accessed October 27).
- Extraordinary African Chambers (2016) *Ministère Public v. Hissain Habré*, www.chambresafriaines.org/pdf/Jugement_complet.pdf (accessed October 28).
- Faust, D. G. (2008) *This Republic of Suffering*. New York: Alfred A. Knopf.
- Fischhoff, B., S. Atran, and N. Fischhoff (2007) "Counting casualties: A framework for respectful, useful records." *Journal of Risk and Uncertainty* 34: 1–19.
- Forces War Records (2016) "Crimean War records," www.forces-war-records.co.uk/crimean-war-records (accessed October 26).
- Gray, M. W., and S. Marek (2008) "The statistics of genocide." in J. Asher, D. Banks, and F. J. Scheuren (eds.) *Statistical Methods for Human Rights*. New York: Springer.
- Greenhill, K. M. (2010) "Counting the cost: The politics of numbers in armed conflict." in P. Andreas and K. M. Greenhill (eds.) *Sex, Drugs, and Body Counts: The Politics of Numbers in Global Crime and Conflict*. Ithaca, NY: Cornell University Press: 127–58.
- Greenhough, P. R. (1982) *Prosperity and Misery in Modern Bengal: The Famine of 1943–1944*. New York: Oxford University Press.

- Greenwood, M. (1942) "British loss of life in the wars of 1794–1815 and in 1914–1918, (with discussion)." *Journal of the Royal Statistical Society* 105: 1–16.
- Groves, Robert (2011) "Three eras of survey research." *Public Opinion Quarterly* 75: 861–71.
- Guatemalan Commission for Historical Clarification (1999) "Guatemala memory of silence: Report of the Commission for Historical Classification Conclusions and Recommendations," www.aaas.org/sites/default/files/migrate/uploads/mos_en.pdf (accessed October 28, 2016).
- Harrison, M. (2003) "Counting Soviet deaths in the Great Patriotic War: Comment." *Europe-Asia Studies* 55: 939–44.
- Hayner, P. B. (2011) *Unspeakable Truths: Confronting State Terror and Atrocity*. New York: Routledge.
- Haynes, M. (2003) "Counting Soviet deaths in the Great Patriotic War: A note." *Europe-Asia Studies* 55: 303–09.
- Heinzelman, J., and P. Meier (2012) "Crowdsourcing for human rights monitoring: Challenges and opportunities for information collection and verification." in J. Lannon, and E. Halpin (eds.) *Human Rights and Information Communication Technologies: Trends and Consequences of Use*. Hershey, PA: IGI Global: 123–38.
- Herold, M. (2008) "University of New Hampshire" http://pubpages.unh.edu/~mwherold/Anotherweddingpartymassacre_July62008.html (accessed November 26, 2016).
- Hersch, L. (1925) "La mortalité causée par la guerre mondiale." *Metron* V (I): 89–133.
- Heuveline, P. (2015) "The boundaries of genocide: Quantifying the uncertainty of the death toll during the Pol Pot regime in Cambodia (1975–79)." *Population Studies* 69 (2): 201–18.
- Hirschman, C., S. Preston, and M. V. Loi (1995) "Vietnamese casualties during the American War: A new estimate." *Population and Development Review* 21 (4): 783–812.
- Hobhouse, E. (1902) *The Brunt of War, and Where It Fell*. London: Methuen and Company.
- Hochschild, A. (1998) *King Leopold's Ghost*. New York: Houghton Mifflin.
- Hoover Green, A. (2010) "Learning the hard way at the ICTY: Statistical evidence of human rights violations in an adversarial information environment," in A. Smeulers (ed.) *Collective Violence and International Criminal Justice: An Interdisciplinary Approach*. Antwerp, Belgium: Intersentia: 325–54.
- Howland, T. (2008) "How El Rescate, a small nongovernmental organization, contributed to the transformation of the human rights situation in El Salvador." *Human Rights Quarterly* 30: 703–57.
- Humanitarian Tracker (2016a) www.humanitariantracker.org/ (accessed October 28).
- (2016b) www.slideshare.net/slideshow/embed_code/15862056 (accessed October 28).
- Human Rights Data Analysis Group (2016) "Guatemala: Collecting and protecting human rights data in Guatemala (1991–2013)" (accessed October 28).
- Human Rights Watch (2008) "Troops in contact: Airstrikes and civilian deaths in Afghanistan," www.hrw.org/report/2008/09/08/troops-contact/airstrikes-and-civilian-deaths-afghanistan (accessed November 26).
- Human Security Report Project (2010) *Human Security Report 2009/2010: The Causes of Peace and the Shrinking Costs of War*. Oxford: Oxford University Press.
- International Committee for the Red Cross (2013) "Professional standards for protection work: Carried out by humanitarian and human rights actors in armed conflict and other situations of violence," www.icrc.org/eng/assets/files/other/icrc-002-0999.pdf (accessed March 26, 2017).
- Iraq Body Count (2016) www.iraqbodycount.org/ (accessed October 27).
- Iraq Family Health Survey Study Group (2008) "Violence-related mortality in Iraq from 2002 to 2006." *New England Journal of Medicine* 358: 484–93.
- Iraq Living Conditions Survey 2004 (2005) Baghdad, Iraq: Central Organization for Statistics and Information Technology, Ministry of Planning and Development Cooperation.
- Jewell, N. P., M. Spagat, and B. L. Jewell (2013) "MSE and casualty counts: Assumptions, interpretations and challenges," in T. B. Seybolt, J. Aronson, and B. Fischhoff (eds.) *Counting Civilian Casualties: An Introduction to Recording and Estimating Nonmilitary Deaths in Conflict*. Oxford: Oxford University Press: 185–211.
- Jones, H. E., M. Hickman, N. J. Welton, D. De Angelis, R. J. Harris, and A. E. Ades (2014) "Recapture or precapture? Fallibility of standard capture-recapture methods in the presence of referrals between sources." *American Journal of Epidemiology* 179: 1383–93.

- Kirk, D. (2011) "South Korea: Truth but no reconciliation." *International Justice Tribune*, #121, February 2.
- Klingberg, F. L. (1966) "Predicting the termination of war: Battle Casualties and Population losses." *Journal of Conflict Resolution* 10: 129–71.
- Kosovo Memory Book (2000) www.kosovomemorybook.org/ (accessed October 27, 2016).
- Kreutz, J. (2006) "Patterns of major armed conflicts 1990–2005." in L. Harbom, and L. Wallensteen (eds.) *Sipri Yearbook 2006*. Oxford: Oxford University Press: 173–91.
- Krüger, J., and P. Ball (2014) "Evaluation of the database of the Kosovo Memory Book." *Human Rights Data Analysis Group*, https://hrdag.org/wp-content/uploads/2015/04/Evaluation_of_the_Database_KMB-2014.pdf
- Landman, T., and E. Carvalho (2010) *Measuring Human Rights*. New York: Routledge.
- Laveran (1863) "De la mortalité des armées en campagne au point de vue de l'étiologie." in *Annales d'hygiène publique et de médecine légale*, 2ème série, tome 19. Paris: Baillière.
- Leroy-Beaulieu, P. (1869) *Contemporary Wars: 1853–1866; Statistical Researches Respecting the Loss of Men and Money Involved in Them*. London: London Peace Society.
- Lewy, G. (1978) *America in Vietnam*. New York: Oxford University Press.
- Lucas, S. R. (2012) "The road to hell...: The statistics proposal as the final solution to the sovereign's human rights question." *Wisconsin International Law Journal* 30 (2): 259–343.
- Lum, K., M. E. Price, and D. Banks (2013) "Applications of multiple systems estimation in human rights research." *The American Statistician* 67 (4): 191–200.
- Mallet, B. (1918) "Vital statistics as affected by war." *Journal of the Royal Statistical Society* 81: 1–36.
- Manrique, D., M. E. Price, and A. Gohdes (2013) "Multiple systems estimation techniques for estimating casualties in armed conflicts." in T. B. Seybolt, J. Aronson, and B. Fischhoff (eds.) *Counting Civilian Casualties: An Introduction to Recording and Estimating Nonmilitary Deaths in Conflict*. Oxford: Oxford University Press: 165–82.
- McNamara, R. S. (1991) "The post-Cold War world: Implications for military expenditure in developing countries," in *Proceedings of the World Bank Annual Conference on Development Economics, 1991*. Washington, DC: International Bank for Re-construction and Development: 95 Washington, DC: 126.
- McPherson, J. M. (1988) *Battle Cry of Freedom*. Oxford: Oxford University Press.
- Ministry of Government Administration and Home Affairs Support for Past Affairs (2017) "Report on the Truth and Reconciliation Committee." <http://pasthistory.go.kr/cop/bbs/selectBoardArticle.do> (accessed March 25).
- Minor, E. (2012) "Towards the recording of every casualty: Analysis and policy recommendations from a study of 40 casualty recorders." Oxford Research Group, www.oxfordresearchgroup.org.uk/sites/default/files/TowardsTheRecordingOfEveryCasualty_0.pdf (accessed October 28, 2016).
- Minor, E., J. Sloboda, and H. Dardagan (2012) "Good practice in conflict casualty recording: Testimony, detailed analysis and recommendations from a study of 40 casualty recorders." Oxford Research Group, www.everycasualty.org/practice/methods-research (accessed October 28, 2016).
- Motlagh, J. (2010) "Petraeus toughens Afghani rules of engagement." *Time*, August 6, <http://content.time.com/time/world/article/0,8599,2008863,00.html> (accessed November 26, 2016).
- Nahm, A. (1993) *Historical Dictionary of the Republic of Korea*. Metuchen, NJ: Scarecrow Press.
- Norman, R. (1995) *Ethics, Killing, and War*. Cambridge: Cambridge University Press.
- Obituary (1933) "Sir Bernard Mallet." *Journal of the Royal Statistical Society* 96: 148–51.
- Orend, B. (2000a) *Michael Walzer on War and Justice*. Cardiff: University of Wales Press.
- (2000b) *War and International Justice: A Kantian Perspective*. Waterloo: Wilfrid Laurier Press.
- Parker, G. (1997) *The Thirty Years' War*, 2nd ed. New York: Viking Press.
- Petrovich, V. (2004/05) "Otechestvennaia istoriia XX-nachalo XXI v. Kurs lektsii dlia distantsionnogo obucheniiia po uchebniku avtorskogo kollektiva pod rukovodstvom akademika RAN A. O. Chubar'iana." *National history of the twentieth — beginning of the twenty-first centuries. Course of lectures for distance learning following the textbook by the author collective under the leadership of Russian Academy of Sciences Academician A. O. Chubar'ian*: <http://his.1september.ru/articleg.php?ID=200500109> (accessed March 24, 2017). (Editor note: confusing reference – Russian website).
- Pinker, S. (2011) *The Better Angels of Our Nature*. New York: Viking Press.

- Raleigh, C., A. Linke, H. Hegre, and J. Karlsen (2010) "Introducing ACLED: An armed conflict location and event dataset." *Journal of Peace Research* (47) 5: 651–60.
- Roberts, A. (2010) "Lives and statistics: Are 90% of war victims civilians?" *Survival* 52: 115–36.
- Rockel, S. J. (2009) "Collateral damage: A comparative history." in S. J. Rockel, and R. Halpern (eds.) *Inventing Collateral Damage: Civilian Casualties, War, and Empire*. Toronto: Between the Lines: 1–93.
- Rummel, R. J. (1992) *Democide: Nazi Genocide and Mass Murder*. New Brunswick, NJ: Transaction Publishers.
- (1997) *Statistics of Democide: Genocide and Mass Murder Since 1900*. New Brunswick, NJ: Transaction Publishers.
- Sandberg, B. (2009) "Only the sack and the noose for its citizens: Atrocities and civilian casualties during the French Wars of religion." in S. J. Rockel, and R. Halpern (eds.) *Inventing Collateral Damage: Civilian Casualties, War, and Empire*. Toronto: Between the Lines: 97–114.
- Selden, M., and K. Dong-choon (2010) "South Korea's Embattled Truth and Reconciliation Commission," http://fpif.org/south_koreas_embattled_truth_and_reconciliation_commission (accessed October 27, 2016).
- Seybolt, T. B. (2013) "Significant numbers: Civilian casualties and strategic peacebuilding," in T. B. Seybolt, J. Aronson, and B. Fischhoff (eds.) *Counting Civilian Casualties: An Introduction to Recording and Estimating Nonmilitary Deaths in Conflict*. Oxford: Oxford University Press: 15–28.
- Silva, R., and P. Ball (2006) "The profile of human rights violations in Timor Leste, 1974–1999." Human Rights Data Analysis Group, The Benetech Initiative, <https://hrdag.org/content/timorleste/Benetech-Report-to-CAVR.pdf> (accessed October 27, 2016).
- Slim, H. (2008) *Killing Civilians*. New York: Columbia University Press.
- Sloboda, J. (2008) "Can there be any 'just war' if we do not document the dead and injured?," Oxford Research Group, www.oxfordresearchgroup.org.uk/publications/briefing_papers/can_there_be_any_just_war_if_we_do_not_document_dead_and_injured (accessed October 24, 2016).
- Sloboda, J., H. Dardagan, M. Spagat, and M. Hsiao-Rei Hicks (2013) "Iraq body count: A case study in the uses of incident-based conflict casualty data." in T. B. Seybolt, J. Aronson, and B. Fischhoff (eds.) *Counting Civilian Casualties: An Introduction to Recording and Estimating Nonmilitary Deaths in Conflict*. Oxford: Oxford University Press: 53–76.
- Sokolov, B. (2009) "How to calculate human losses during the Second World War." *Journal of Slavic Military Studies* 22: 437–58.
- Spagat, M. (2010) "Ethical and data-integrity problems in the second Lancet survey of mortality in Iraq." *Defence and Peace Economics* 21: 1–41.
- (2012) "Estimating the human costs of war: The sample survey approach." in M. R. Garfinkel and S. Skaperdas (eds.) *The Oxford Handbook of the Economics of Peace and Conflict*. Oxford: Oxford University Press: 318–41.
- (2014) "A triumph of remembering: Kosovo memory book," www.kosovskaknjigapamcenja.org/wp-content/uploads/2015/02/Michael-Spagat-Evaluation-of-the-Database-KMB-December-10-2014.pdf (accessed October 27, 2016).
- Spagat, M., and S. van Weezel (2016) "Half a million excess deaths in the Iraq War: Terms and conditions may apply," http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2664659 (accessed on October 27).
- Spiegel, P. B., and P. Salama (2000) "War and mortality in Kosovo, 1998–99: An Epidemiological Testimony." *Lancet* 355: 2204–9.
- Stevenson, R. (2005) *Bengal Tiger and British Lion: An Account of the Bengal Famine of 1943*. Lincoln, NE: iUniverse.
- Sundberg, R., and W. Melander (2013) "Introducing the UCDP Georeferenced Event Dataset." *Journal of Peace Research* 50 (4): 523–32.
- Thayer, T. C. (1985) *War without Fronts: The American Experience in Vietnam*. Boulder, CO: Westview Press.
- Twain, M. (1905) *King Leopold's Soliloquy*. Boston: P. R. Warren.

- United Nations (1991) "United Nations Manual on the Effective Prevention and Investigation of Extra-Legal, Arbitrary and Summary Executions," U.N. Doc. E/ST/CSDHA/.12, <http://hrlibrary.umn.edu/instree/executioninvestigation-91.html> (accessed October 28, 2016).
- Uppsala Conflict Data Program (2016) www.pcr.uu.se/research/ucdp/ (accessed October 27).
- Ushahidi (2016) www.ushahidi.com/ (accessed October 28).
- US Institute of Peace (2012) "Truth Commission: South Korea 2005," www.usip.org/publications/2012/04/truth-commission-south-korea-2005 (accessed October 27, 2016).
- van der Windt, P., and M. Humphreys (2016) "Crowdseeding conflict data." *Journal of Conflict Resolution* 60: 748–81.
- Walzer, Michael (1978) *Just and Unjust Wars*. New York: Basic Books.
- War Office (1922) *Statistics of the Military Effort of the British Empire during the Great War 1914–1920*. Reprinted by Naval and Military Press.
- Winter, J. M. (1977) "The impact of the First World War on civilian health in Britain." *Economic History Review*, New Series 30: 487–507.
- Wright, D. G. (2011) "The marathon stone," *Surprised by Time* (blog), April 8, <http://surprisedbytime.blogspot.co.uk/2011/04/marathon-stone.html> (accessed October 24, 2016).
- Yad Vashem (2017) "The central database of Shoah victims," <https://yvng.yadvashem.org/> (accessed March 25).
- Zwierzchowski, J., and E. Tabeau (2010) "The 1992–95 War in Bosnia and Herzegovina: Census-based multiple system estimation of casualties' undercount," Conference Paper for the International Research Workshop on "The Global Costs of Conflict," www.icty.org/x/file/About/OTP/War_Demographics/en/bih_casualty_undercount_conf_paper_100201.pdf (accessed October 28, 2016).