

Accounting for Civilian Casualties: From the Past to the Future

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§A Introduction

On July 6, 2008, the US 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 (Human Rights Watch 2008; Herold 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 19th 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 essay, 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 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 of 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, e.g., 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 paper we cover mostly violent deaths caused directly by military actions but will also treat non-violent 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: 160-175). 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

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.

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 below.

The plan of the paper 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.

§B The Motivation and Use for Civilian Casualty Accounts

Although the focus of this essay 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, etc.. Post-conflict 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 over counts (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 post-conflict, 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 itself, 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 since 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): (i) the *Chicago Tribune* which reported lynching data that built statistically on the efforts of Ida Wells-Barnett in *The Memphis Free Speech and Headlight*, (ii) the Tuskegee Institute in Alabama, and (iii) the National Association for the Advancement of Colored People (who began their 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 over eighty civilians, produced while he participated in a worldwide movement against slave labor in the Congo. His pamphlet inspired Adam Hochschild (1998)’s 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 1880-1881 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 a broad cultural movement towards 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 (The 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 of the above surveys include both civilians and combatants yet they are often described as covering civilians only. For example all of the sources that Burkle and Garfield (2013) present as the most reliable measures of civilian deaths in Iraq actually measure civilians plus combatants and are therefore of limited use for measuring civilian deaths.

On the other hand, there are other potential biases in the other direction associated with methods of accounting for conflict casualties that we describe briefly below. 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.

§C 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; 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 (Leroy-Beaulieu 1869; Dumas 1923).

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 20th 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 further 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 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 V 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 19th century accompanied by a weak movement toward according similar treatment to civilians. Early casualty accounts used the most basic 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 1756-1763. 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.

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).

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.

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.

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 despite the fact that civilian casualties and, indeed, direct targeting of civilians have been a longstanding feature of war (Bell 2007). There is evidence, for example, of extensive civilian casualties in the Peloponnesian war between Athens and Sparta more than four hundred 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 16th and 17th 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 (1618-1648), also generated large numbers of casualties with estimates that approximately 25-30% of the civilian populations died either directly or indirectly (see Parker 1997, for example). Dumas, in Dumas and Vedel-Petersen (1923: 116-117), 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 (1754-1763) 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 begins to display mortality rates starting with Denmark, 1862-1866, 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 1870-1871.

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

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.

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 that 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 non-births 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% 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 reflecting continuations of pre-war 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 post-war. 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 On the other hand, France, Italy and Austria suffered sharp increases in infant mortality rates at various times from 1914-1918 (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 40-50 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.*: 452-3) compares official population estimates for 1941 and 1947, subtracts off a separate estimate of direct military deaths and conjectures that

⁶ Mallet attributed much of this improvement to declines in infectious disease deaths that had started around the turn of the 20th 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.

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.

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, e.g. 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 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 1950-1953 war. (Selden and Dongchoon 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 U.S. 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” (United States Institute of Peace 2012), although this number is much lower than ones quoted above. 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 one to three 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.

§D 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 (section B). 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. Particular 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 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 the purpose of memorializing the victims of these wars.

The second dimension comprises the distinctions between counting, documenting and estimating casualties that we introduced in section A. 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 since 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, e.g., 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 dataset by adding the names of all of 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 fairly small sample of war victims to produce statistical extrapolations that mobilize the collected detail to break down estimates of numbers killed by location, time period, gender, weapons used, etc. 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 via 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 (section C). 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% 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 (Kreutz 2006; Eck 2005; Roberts 2010). (Earlier calculations place this percentage around 50% 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 below on six broad categories of techniques: (i) listings of direct violent deaths person-by-person and/or grouped together by event, (ii) the use of census and other population demographic information to estimate mortality potentially attributable to both direct and indirect losses, i.e., what is often called *excess mortality*, (iii) the use of epidemiologic or demographic household surveys to estimate violent or excess deaths during and after conflicts, (iv) indirect estimates of casualty numbers based on assumed relationships between war deaths and information present in *found data*, i.e., data that happen to be available, (v) *crowdsourced* compilations of casualty reports often supplemented with video and other corroborating evidence for validation, and (vi) 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 that each method may be vulnerable to. In all cases, systematic bias is often of much greater concern than statistical variability since, 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 since estimates associated with wide ranges of uncertainty are usually of very limited value.

§D.1 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, etc. Deaths can also be grouped by event, either as an alternative or a complement to listing deaths by victim.

The Kosovo Memory Book (KMB 2000) is a remarkable example of a virtually complete list of every person killed in a modern war (Spagat 2014; Krüger and Ball 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 multi-year 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% identified as civilians of which 84% 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 (UCDP, accessed October 27, 2016) 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 dataset (another important and similar dataset 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 a large number of 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 twenty 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 (IBC, accessed October 27 2016), 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. Its list is based on cross-checked media reports of violent civilian deaths supplemented by official records from morgues, hospitals, and NGOs etc. 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% 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 which 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 inter-connected 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, field work can make huge contributions to a listing project. Indeed, extensive field work 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 field work.

Every Casualty Worldwide (ECW, accessed October 27 2016) 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 fifty 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.

§D.2 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 U.K., 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 above, 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—pre-conflict—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, both violent and non-violent, 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 the 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 a counterfactual calculation: what would the mortality have been during a certain period of time had a conflict not occurred? In light of these problems, precise numerical calculations may often be problematic.

§D.3 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% 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% 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 population as a whole. The insight that such an extrapolation is possible emerged from intellectual breakthroughs in the field of statistics that only started gathering steam in the 1930's (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 which 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, e.g., reporting pre-war 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 really did occur. Some surveys address some of these issues by only asking respondents to recall very recent casualty information, e.g., 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 in order 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 charter with field teams literally spinning bottles or pens to simulate the random procedures that are assumed to have been implemented when estimation is done. Field work 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.

§D.4 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 since 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

(1982-1990) 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.)

§D.5 Crowdsourcing

Crowdsourcing is such a close cousin of the listing methodology covered in section D1 that we could have covered it there. However, we elect to treat crowdsourcing separately since 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 email, 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 (2016) 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 email, 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 the use of 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 what 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 they are 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 crosscheck 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 as a whole. In truth, the possibility of unrepresentativeness is an issue with all methods discussed here. However, the bias danger looms particularly large for crowdsourcing since 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 since it has many submitted reports that have not made it into the system because the organizers lack the resources to process them: “only 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, accessed October 28, 2016). 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. On the other hand, 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 above, 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 or not. An interesting new development that does address the bias issue is *crowdseeding*, i.e., purposively 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 it is clear that 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.

§D.6 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 19th 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 at all. 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; on the other hand 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 (Human Rights Data Analysis Group; Ball et al. 1999). 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 above. 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 time periods, geographical areas or perpetrators. Accurate estimates can in principle provide a more accurate 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 time 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 Zwierzchowski 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 fairly accessible to most people. Crowdsourcing relies on sophisticated machines but the idea of people reporting what they know is basic. MSE, on the other hand, *has* to become

technical in real applications. To be sure, people can understand the motivating example about tagged animals (above) 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 lists, rather than just two, and stratification that disaggregates the counts into relatively homogeneous categories based on, e.g., 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 the present paper, we believe that MSE presents the strongest tension between its assumptions and its ambition.

§E 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

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).

central direction or acquiescence may come without documents or witness statements tracing events back to these central authority figures. Moreover, judgments such as whether or not 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, on the other hand, 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 above, the Extraordinary African Chambers (CAE) explicitly used indirect statistical estimates to inform their judgment. There is currently no information about how the International Criminal Court (ICC) 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, on the other hand, 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 which 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 forty 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 post-war 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) notes that, in the context of truth commissions, “civilian 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 general 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, e.g., 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, on the whole, for criminal tribunals and international courts. On the other hand, 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 post-war 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.

§F Discussion

There have been surprisingly few efforts to systematically and contemporaneously account for civilian casualties during times of major conflict, at least until the 20th 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

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

and assess losses inflicted by disease as part of their attempts to address these crises (Alcabes 2009).

The move towards a more comprehensive and principled recording of the extent of civilian losses began roughly around the middle of the 19th 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 (Seybolt 2013; Elliott 2011) 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 non-combatants 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 non-military 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 where 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 as a means 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 non-combatant was not part of either English or French dictionaries until the 19th 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 non-combatants: “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, for example), 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 long influenced subsequent work (United Nations 1991; International Committee of the Red Cross 2013). 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 (i) categories of violence and incident detail, (ii) transparency of data collection techniques and an oversight mechanism, (iii) 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. With regard to 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: “quantification 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 essay 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.

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