

A review of the operational definitions of conflict: implications for epidemiological research



Contents

1	Background.....	3
2	Methods	5
2.1	Literature review	5
2.2	Analysis.....	6
3	Results.....	7
3.1	Conceptualisation and relevance	7
3.1.1	The military perspective.....	7
3.1.2	The political science perspective.....	8
3.1.3	The human rights perspective	8
3.1.4	The legal perspective.....	8
3.2	Qualitative assessment of database utility	10
3.3	Quantitative assessment of database utility	15
4	Discussion.....	18
5	Conclusion	20
6	List of abbreviations.....	21
7	References	22
Table 1: Summary of Conflict Databases		11
Table 2: Inter-rater Agreement of Conflict Databases for 2006 Data		17

1 Background

The direct and indirect effects of conflict on health determinants and health outcomes are far reaching and persist for many years after a conflict ends. Conflict related death and injury, the most obvious and direct health outcome, contribute greatly to the global burden of disease. According to the latest revision of the Global Burden of Disease Study, deaths directly attributed to war (termed 'collective violence and legal intervention') for the year 2010 were estimated at 17,700 (95%CI 12,200-29,600) overall, compared to 63,500 (95%CI 44,300-101,800) in 1990. Males make up the more significant proportion of these at 11,500 (95%CI 7,000-23,200) with females at 6,200 (95%CI 3,800-12,600) [1]. War contributed 959,800 (95%CI 708,300-1,479,800) Disability Adjusted Life Years (DALYs) to the global burden of disease in 2010, with males accounting for 622,300 (95%CI 417,500-1,134,000) DALYs, and females 337,500 (95%CI 234,800-602,400). According to another source using a more inclusive methodology of estimation, between 2004 and 2007 at least 208,300 violent deaths were recorded in armed conflicts— an average of 52,000 people killed per year [2].

While numbers of deaths attributable to war potentially helps assess the intensity of a war and its evolution over time, these relatively low figures (in the tens of thousands annually) obscure the larger burden of mortality arising from indirect deaths in armed conflicts, thereby limiting the utility of findings and scope of interpretation [2, 3]. According to surveys from the Democratic Republic of Congo, of 3.9 million excess deaths from 1998 to 2004, only a small proportion have been directly related to political violence, with the remainder attributed to war-related ailments, such as disease [4]. It's estimated at least 200,000 people – and perhaps many thousands more – have died each year in conflict zones from non-violent causes (such as malnutrition, dysentery, or other easily preventable diseases) that resulted from the effects of war on populations. The gains in life expectancy that could be realised from cessation of conflicts have been reported at more than one year for men in many Central and South American countries [2]. Armed conflict also has an enormous deleterious effect on physical morbidity, including acting as a significant risk factor for development of mental disorders [5].

Additional indirect but interconnected consequences are exerted on known health determinants such as deterioration of social structures, exposure of the population to stress and trauma, and limited access to health services generating negative consequences across societies at multiple levels. Population-based surveys have also provided information about conditions in post-conflict settings.

Although peace should theoretically be associated with greater physical and mental well-being, this is not always true. For example, Physicians for Human Rights has studied health conditions in Chiapas, Mexico, years after insurgents ended their armed rebellion, and their survey of 2,997 households in 46 communities discovered that health conditions had in fact deteriorated alarmingly, with some communities being denied healthcare for political reasons. Thus, while Chiapas' shooting war had ended, health conditions were in fact getting worse, not better [6]. The lingering health impacts of conflict have been reiterated elsewhere [7, 8]

Despite an overall downward trend over the last decade, a rise in armed conflicts in 2011 demonstrates the resultant public health impact is not about to abate [9]. Documentation, analysis, and prevention of the harmful effects of armed conflict on populations are established public health priorities [3] and the dearth in epidemiological research into the health impacts of conflict desperately needs more attention. Undertaking research into the health impacts of war requires definitional clarity and an expertly constructed definition of what a conflict-affected population is.

When considering civilian populations affected by such conflict we generally envisage a conflict where the use of weapons results in widespread violence and death. Across the globe we see a longstanding array of conflicts arising from issues including territory and border disputes, minority and ethnic group persecution, competition for resources and political power struggles. Superficially it may seem obvious that a country is in a state of conflict – well-known recent examples being the wars of Iraq or Afghanistan. But what really defines a conflict? At what threshold does a country experiencing significant violence pass into a true state of war?

How we identify and characterise war, and assess its magnitude and duration has a decisive impact on results of empirical analyses across a broad range of disciplines [10]. One field of note, and the context used for this review, is epidemiological research assessing the health of populations within conflict zones. 'Armed conflict', as a conceptual construct, is amorphous and difficult to characterize. Adding to the challenge is the need, for a variety of pragmatic reasons, to routinely create dichotomous categories which aim to represent a 'conflict' or 'non-conflict' status. To-date there is no uniformly accepted definition of armed conflict. So, with a vast range of perspectives, criteria, definitions and databases available, how does a researcher determine what to use as the construct of choice? And should we be confining ourselves to just one?

It is the aim of this paper to examine the relevance and utility of current concepts and definitions of conflict with the view to aiding public health researchers in furthering epidemiological research in these contexts. The case-example used throughout this paper will be determining country conflict status for a systematic review of mental disorder epidemiology; however, the findings will be applicable to the broader public health profession. We outline varying perspectives from which we can define conflict and databases which reflect this viewpoint in their construct and origin (relevance), and critique and compare existing databases which have the potential for determining whether a country is in a conflict state or not (utility). For the purposes of this paper we will refer to the generic term 'conflict' as a substitute for armed conflict and war.

2 Methods

2.1 Literature review

Electronic search strategies were used to identify grey literature. The first step was to consult with a qualified librarian to identify databases for peace and conflict. Additionally, the names of organisations (and corresponding websites) responsible for collating conflict data were identified from several reports. Three key reports assisted significantly in our literature review [11-13]. Additional databases and websites were found by consulting the *related links* pages on websites that were identified. The final list of conflict databases and websites was complemented with suggestions by experts in the field.

Material in the identified grey literature sources allowed examination of alternative perspectives from which to define conflict. These perspectives were grouped into themed categories and consideration of public health outcomes was essential for a theme to be chosen for further investigation. Further inclusion criteria imposed to establish the most suitable database to aid a systematic review of epidemiological data in conflict and post-conflict countries can be found in Box 1.

Box 1: Database Inclusion Criteria

- Definition must consider public health outcomes
- Provides a clear definition of conflict
- Globally representative
- Captures data from a minimum of 1980
- Data to be update at least every two years
- In English
- Minimum reported variables were country of conflict, conflict status, year of start and end of conflict, and type of conflict

The fundamental process of determining whether an epidemiological survey relates to a conflict-affected population requires conflict status to be a dichotomous measure (i.e. conflict or non-conflict), and as such a clear definition of conflict (or multiple definitions for differing degrees of conflict) was required for inclusion in our review. In this respect it was preferable that a clear threshold exist, however, explicit qualitative categorisation was accepted. The database should capture data on a global level and we considered databases which captured data from 1980 onwards. We ideally sought annual data, and databases that were reported and updated at least every two years. The database needed to be available in English and preferably in an electronically accessible format such as Excel, SPSS or comma delimited text. Minimum reported variables were country of conflict, conflict status, year of start and end of conflict, and type of conflict. Desirable variables also included a measure of relative intensity or magnitude of the conflict and a description of the location within the country.

2.2 Analysis

Once the short-list of databases was compiled, a qualitative critique of the utility of each database was developed based on the criteria discussed previously. We then assessed concordance between databases for the randomly selected years 1995 and 2006.

The simplest way of assessing agreement between two observers is to calculate the *effective percentage of agreement* (calculated over those paired ratings where at least one observer concludes presence of the attribute); however, this does not take into account the agreement that would be

expected purely by chance [14]. The kappa (κ) statistic has been used frequently in concordance analyses and is considered the most relevant statistic in this context [14]. Cohen's kappa coefficient is a measure of 'true' agreement and is directly interpretable as the proportion of joint judgments in which there is agreement, after chance agreement is excluded. Its upper limit is +1.00 depending on the distribution of judgments by the two judges [15]. Kappa values in this paper were interpreted according to published recommendations where $\kappa < 0$ was taken as 'poor' strength of agreement, 0.01 – 0.20 as 'slight', 0.21 - 0.40 as 'fair', 0.41 - 0.60 as 'moderate', 0.61 - 0.80 as 'substantial', and 0.81 - 1.00 as 'almost perfect' [16]. 95% 2-sided confidence intervals were calculated around the estimate of kappa, using the standard error (se) of kappa and the formula:

$$\kappa \pm (1.96 \text{ se}) \text{ to } \kappa \pm (1.96 \text{ se})$$

The main criticism of the kappa statistic is that it is affected by bias between observers (i.e. differences between how the observers use the definitions) and dependent on the prevalence of the condition in the population [17]. Kappa on its own is difficult to interpret meaningfully unless bias and prevalence are taken into account. In addressing this, we calculate and report both the prevalence and bias index to assist in the interpretation of the kappa coefficient and additionally adjust accordingly to give the prevalence- and bias-adjusted kappa (PABAK) [14].

To facilitate analyses, conflict status was dichotomously coded as 0 (non-conflict) or 1 (conflict). For databases which report multiple definitions for varying degrees of conflict we chose the most appropriate threshold on a case by case basis. We utilised the 'kap' and 'pabak' commands in the statistical software Stata 11.2 [18].

3 Results

3.1 Conceptualisation and relevance

Four key perspectives were identified from which to view the construct of conflict.

3.1.1 The military perspective

The US Department of Defence, as expected, recognises the notion of military power as the central component of a conflict. It comments that although regular forces are often involved, irregular forces frequently predominate, and the episode will often be protracted, confined to a restricted geographic area, and constrained in weaponry and level of violence. It adds that within the conflict state, military

power, in response to threats, may be exercised in an indirect manner while supportive of other instruments of national power; however, limited objectives may be achieved by the short, focused, and direct application of force [19].

3.1.2 The political science perspective

The Jean Monnet Group from the University of Duisburg has published a discussion paper on the existing definitions of conflict from a political science perspective [12]. Another review, designed as a user's guide to conflict data, also provides a comprehensive summary of available definitions from this perspective. Clear from these synopses is that battle-related human casualty (soldiers and other military staff) thresholds are commonly used to define conflict in the quantitative sense and appear to be the main factor in causing diversity in the listing of wars. Other factors related to the varying assessments from the political scientists' view include the involvement of government forces on one side of the conflict, the degree of continuity in the hostilities, the degree of central organisation and the presence of a recognisable strategy [20].

3.1.3 The human rights perspective

Human rights violations are prevalent in conflict zones and in many ways reflect the experience of the civilian population. A number of countries in conflict may not represent the classical picture of two embattled parties, but instead, may exist as one party playing a more 'passive' role who is subjected to extreme political oppression by a more 'aggressive' party. Burma is one example of such dynamic and it has been shown that routine human rights violations in eastern Burma are associated with significantly increased morbidity and mortality [4].

The close relationship between human rights abuses and other perspectives discussed in this paper is highlighted by the fact that panels on the issues surrounding empirical approaches to human rights have been held at the annual conferences of the American Society of International Law, the Law and Society Association, and the American Political Science Association [21].

3.1.4 The legal perspective

International humanitarian law varies enormously in its application according to complex classifications of 'international' or 'internal' armed conflicts [13, 22]. As a result of President Bush's 'global war on terrorism' by May 2005, the International Law Association determined that there was a pressing need for a report on the meaning of armed conflict supported by international law. The Use

of Force Committee's '*Final Report on the Meaning of Armed Conflict in International Law*' concludes that all armed conflicts have as a minimum of two necessary characteristics: (1) the presence of organised groups that are (2) engaged in intense armed fighting [23]. The link between conflict, human rights and international humanitarian law is strong. Another 1999 study of mortality, this time in the Serbian province of Kosovo, which argued that 12,000 people likely died during the conflict between Serbia, NATO and the Kosovo Liberation Army. By mapping trend data against key political and military events, the report demonstrated that Serbian military activities, rather than NATO air strikes, were correlated with spikes in mortality. This study broke new ground by linking survey research to international humanitarian law [4].

While different interested parties bring a wide variety of perspectives, it is important to note that a number of them appear to share a loose, but common conceptualisation of what war events involve (see Box 2). On the other hand, how to operationalise and measure conflict creates significant divergence.

Box 2: Common Themes between Definitions (taken from (Most and Starr 1983))

- At least two parties, one of which is a nation
- Conflictual goals
- Parties that are aware of their conflicting goals
- Parties that are willing to attain a goal which they recognise conflicts with the wishes of the other(s)
- Situations in which each party has the opportunity or capacity to pursue its goal
- Situations in which at least one party is willing to use overt military force to attain its goal
- Situations in which at least one party is able to resist another's use of overt military force to the extent that it avoids immediate defeat, suffers a minimal number of casualties, and/or inflicts a minimal number of casualties on the other(s), and
- Situations in which no party that is willing to use overt military force can attain its goal which only a single use of force or with a series of such acts that are highly dispersed over time

3.2 Qualitative assessment of database utility

Given their relevance to public health outcomes it was decided to further consider databases from the political science and human rights perspectives. Five databases met our inclusion criteria (Table 1).

All five databases are open-source online and four are updated annually and available in an electronic format compatible with statistical software. Four databases are conflict databases with a clear and quantifiable violence threshold and one reports level of state terror according to state-perpetrated human rights violations. All four conflict database definitions of conflict describe the existence of opposing forces and four stipulate a violence threshold described in terms of number of deaths; however, within these common themes exists wide variation.

Table 1: Summary of Conflict Databases

	UCDP/PRIO (Uppsala Conflict Data Program 2012)	COW (Sarkees M. R. 2010)	INSCR (Integrated Network for Societal Conflict Research. 2012)	HIK (Heidelberg Institute for International Conflict Research. 2013)	PTS (Political Terror Scale. 2011)
Project name	The Uppsala Conflict Data Program (UCDP) International Peace Research Institute, Oslo (PRIO)	Correlates of War (COW) project	Integrated Network for Societal Conflict Research (INSCR)	Conflict Barometer	The Political Terror Scale
Organisation	Uppsala University, Sweden	Pennsylvania State University, Pennsylvania	Centre for Systemic Peace, USA	Heidelberg Institute for International Conflict Research, Germany	University of North Carolina, Asheville
Title of dataset(s)	UCDP/PRIO Armed Conflict Dataset	Non-State War Data (v4.0) Intra-State War Data (v4.0) Inter-State War Data (v4.0) Extra-State War Data (v4.0)	Major Episodes of Political Violence	CONIS (Conflict Information System)	PTS (Political Terror Scale)
Link	http://www.prio.no/Data/Armed-Conflict/UCDP-PRIO/	http://www.correlatesofwar.org/	http://www.systemicpeace.org/warlist.htm	http://hiik.de/en/konfliktbarometer/index.html	http://www.politicalterror scale.org/ptsdata.php
Conflict definition	An armed conflict is a contested incompatibility which concerns government and/or territory where the use of armed force between two	War must involve sustained combat, involving organized armed forces, resulting in a minimum of 1,000 battle-related combatant	Major episodes of political violence are defined by the systematic and sustained use of lethal violence by organized groups that	A political conflict is a positional difference, regarding values relevant to a society (the conflict items), between at least two decisive and directly	The PTS measures 'state terror': violations of physical or personal integrity rights carried out by a state (or its agents). Level 4

	parties, of which at least one is the government of a state, results in at least 25 battle-related deaths per calendar year.	fatalities within a twelve-month period.	result in at least 500 directly-related deaths over the course of the episode.	involved actors, which is being carried out using observable and interrelated conflict measures that lie outside established regulatory procedures and threaten core state functions, the international order or hold out the prospect to do so.	requires that civil and political rights violations have expanded to large numbers of the population and level 5 requires the same to the entire population.
Conflict categories	Extra-systemic Interstate Internal Internationalized internal	Non-state war Intra-state war Inter-state war Extra-state war	International violence, International war, International independence war, Civil violence, Civil war, Ethnic violence, Ethnic war,	Organized groups States Groups of states Organizations of state	N/A
Year start	1946	1816	1946	1945	1976
Year end	2011	2007	2012	2012	2011
Frequency of updates	Annual	Every six months if minor errors are discovered and corrected, and at longer interval as appropriate for major revisions and updates.	Annual	Annual	Annual
Levels of intensity	Minor: between 25 and 999 battle-related deaths in a given year. War: at least 1,000 battle-related deaths in a given year	Levels of intensity not stated	A scaled indicator of the destructive impact, or magnitude, of the violent episode on the directly-affected society or societies is measured on	IIK distinguishes five levels of intensity according to the dynamic conflict model: dispute, non-violent crises, violent	Political Terror Scale Levels 1-5

			a scale of 1 (smallest) to 10 (greatest).	crises, limited war and war. The latter two groups are classified as 'high intensity violence'.	
Additional reported variables	Country name(s), Involved actor(s), Name of territory involved, Year of observation, Intensity level, Conflict type, Start and end dates, Date of fatality threshold, Numbers of countries involved, Regional location	Name of conflict Type of conflict, Country name, Conflict parties, Start and end dates, Regional location, Battle-related deaths, War outcomes	Country name, Year, Magnitude and conflict type, Regional involvement and location, Start and end dates, Episode location, Estimates of 'directly-related' deaths	Name of conflict, Conflict actors, Country affected Start date, Change in intensity, Intensity level, Conflict related deaths	Country, Regional location, Income level, Year, Political Terror Scale rating, Human insecurity levels
Availability and format	Open access online; Excel and Access	Open access online; CSV	Open access online; SPSS and Excel	Open access online; Pdf	Open access online; Excel, 'R' and Stata formats

The prominent Uppsala Conflict Data Program (UCDP) and Correlates of War Project (COW) have based their thresholds on number of battle-related deaths within a one-year time period. Specifically, the UCDP follows a narrowly focused conflict definition '*as a contested incompatibility that concerns government or territory or both, where the use of armed force between two parties results in at least 25 battle-related deaths. Of these two parties, at least one has to be the government of a state*', whilst the Correlates-of-War-Project (COW) defines conflicts as '*violent dispute in which at least one of the combatant parties is a state, and there are at least 1,000 battle-deaths within a 12-month period*' [24]. The UCDP maintains the lowest threshold for conflict found amongst the databases.

The Centre for Systemic Peace 'Major episodes of political violence' (MEPV) datasets have taken a combination of these two ideas and dictates that "*Major episodes of political violence (MEPV)" involve at least 500 "directly-related" fatalities and reach a level of intensity in which political violence is both systematic and sustained (a base rate of 100 "directly-related deaths per annum")*'.

Standing alone, the Heidelberg Institute for International Conflict Research (HIIK) has recently revised and broadened its scope in definition of political conflicts and restructured its conflict intensity assessment – now evaluated by combining a number of both qualitative and quantitative indicators (of which deaths is but one) measuring the means and consequences of a conflict [25].

As with the overall construct itself, categorisations of conflict type and intensity level differ markedly, with no two databases being consistent. The UCDP divides armed conflicts into two subsets: 'minor armed conflict' – at least 25 battle-related deaths per year and fewer than 1,000 battle-related deaths during the course of the conflict; and 'war' – at least 1,000 battle-related deaths per year [26].

The Centre for Systemic Peace INSCR datasets codes the magnitude of episodes on a scale of one to ten according to an assessment of the full impact of their violence on the societies that directly experience their effects. HIIK distinguishes five levels of intensity according to the dynamic conflict model: dispute, non-violent crises, violent crises, limited war and war. The latter two groups are classified as 'high intensity violence'. Intensity descriptors are not stated in the COW Project.

Based on previously published reviews which clearly identify the Political Terror Scale (PTS) as the single most comprehensive and most accurate index of its type, this scale was selected in favour of other potential measures of political terror within a population [27, 28]. The PTS is a standards-based human rights data set which measures levels of political violence and terror that a country

experiences in a particular year based on a 5-level 'terror scale'. Level 1 relates to countries under a secure rule of law, people are not imprisoned for their view, and torture is rare or exceptional. Political murders are extremely rare. In contrast, level 5 reports that terror has expanded to the whole population. The leaders of these societies place no limits on the means or thoroughness with which they pursue personal or ideological goals. Originally developed by Freedom House, the data used in compiling this index comes from two different sources: the yearly country reports of Amnesty International and the U.S. State Department Country Reports on Human Rights Practices. The point of difference between this particular measure and others is that it is more specifically aimed at capturing "state terror", i.e. violations of physical or personal integrity rights carried out by a state (or its agents) [28, 29].

Comparing additional features across all five databases further delineates differences between databases. In addition to not providing details of conflict intensity, the COW Project is the least frequently updated dataset, its information is contained in 4 separate datasets as opposed to one central dataset making it awkward to navigate compared with the others. The COW deaths data has also come under attack for not being reliable [30].

The four political science databases provide us with a good description of the conflict, including information about the warring parties, and in particular their geographical relationship with one another. The UCDP, COW and MEPV datasets provide a cumulative listing of all conflicts that have taken place over the period the datasets existence. It is easy to identify the start and end dates of conflict in these three sources. However, the PTS and HIIK datasets are released as reports of the conflicts specific for that year and identifying the end date of a conflict requires tracing back through previous versions.

All five databases identify the country(s) involved and all except for HIIK provide information on the region or territory involved. All databases except for UCDP (and the PTS) provide information on number of deaths. UCDP, COW, MEPV and HIIK provide information about the actors involved.

3.3 Quantitative assessment of database utility

As discussed already in this paper, we elected to create dichotomous conflict measures for the quantitative analysis. This dichotomy is intrinsically created in the cases of UCDP, COW and MEPV datasets. In the case of the HIIK dataset we found the highest two levels of intensity to represent

violent conflict by definition (severe crisis and war). Similarly, the PTS levels 4 and 5 represent widespread human rights abuses and these two highest levels were selected as the threshold for quantitative assessment.

Table 2 shows the inter-rater agreement between databases for the year 2006. Based on the PABAK, the MEPV, UCDP and HIIK databases showed moderate concordance with each other with the best concordance observed between HIIK and UCDP ($\kappa=0.58(-0.18-0.41)$). However, no two databases demonstrated good or very good concordance. PTS showed very poor concordance with all databases except for the UCDP which was fair, and COW showed poor to fair concordance with any other database.

Table 2: Inter-rater Agreement of Conflict Databases for 2006 Data

Database	UCDP	COW	MEPV	PTS	HIK
UCDP		Agreement=60.47% $\kappa=0.26(0.03-0.49)$ Bias index=0.35 Prevalence index=-0.23 PABAK=0.21(-0.08-0.50)	Agreement=76.74% $\kappa=0.52(0.23-0.82)$ Bias index=-0.05 Prevalence index=0.16 PABAK=0.53 (0.28-0.79)	Agreement=65.12% $\kappa=0.26(-0.02-0.55)$ Bias index=-0.16 Prevalence index=0.28 PABAK=0.30 (0.02-0.59)	Agreement=79.07% $\kappa=0.58(0.28-0.88)$ Bias index=0.02 Prevalence index=0.09 PABAK=0.58(-0.18-0.41)
COW	Agreement=60.47% $\kappa=0.26(0.03-0.49)$ Bias index=0.35 Prevalence index=-0.23 PABAK=0.21(-0.08-0.50)		Agreement=55.81% $\kappa=0.21(0.00-0.42)$ Bias index=-0.4 Prevalence index=-0.19 PABAK=0.12(-0.18-0.41)	Agreement=34.88% $\kappa=-0.04(-0.21-0.14)$ Bias index=-0.50 Prevalence index=-0.07 PABAK=-0.30(-0.59-0.02)	Agreement=58.14% $\kappa=0.20(-0.04-0.43)$ Bias index=-0.33 Prevalence index=-0.26 PABAK=0.16(-0.13-0.46)
MEPV	Agreement=76.74% $\kappa=0.52(0.23-0.82)$ Bias index=-0.05 Prevalence index=0.16 PABAK=0.53 (0.28-0.79)	Agreement=55.81% $\kappa=0.21(0.00-0.42)$ Bias index=-0.4 Prevalence index=-0.19 PABAK=0.12(-0.18-0.41)		Agreement=51.16% $\kappa=-0.08(-0.37-0.21)$ Bias index=-0.12 Prevalence index=0.33 PABAK=0.02(-0.28-0.32)	Agreement=74.42% $\kappa=0.48(0.18-0.78)$ Bias index=0.07 Prevalence index=0.14 PABAK=0.49(0.23-0.75)
PTS	Agreement=65.12% $\kappa=0.26(-0.02-0.55)$ Bias index=-0.16 Prevalence index=0.28 PABAK=0.30 (0.02-0.59)	Agreement=34.88% $\kappa=-0.04(-0.21-0.14)$ Bias index=-0.50 Prevalence index=-0.07 PABAK=-0.30(-0.59-0.02)	Agreement=51.16% $\kappa=-0.08(-0.37-0.21)$ Bias index=-0.12 Prevalence index=0.33 PABAK=0.02(-0.28-0.32)		Agreement=53.49% $\kappa=0.04(-0.24-0.32)$ Bias index=0.19 Prevalence index=0.26 PABAK=0.07(-0.23-0.37)
HIK	Agreement=79.07% $\kappa=0.58(0.28-0.88)$ Bias index=0.02 Prevalence index=0.09 PABAK=0.58(-0.18-0.41)	Agreement=58.14% $\kappa=0.20(-0.04-0.43)$ Bias index=-0.33 Prevalence index=-0.26 PABAK=0.16(-0.13-0.46)	Agreement=74.42% $\kappa=0.48(0.18-0.78)$ Bias index=0.07 Prevalence index=0.14 PABAK=0.49(0.23-0.75)	Agreement=53.49% $\kappa=0.04(-0.24-0.32)$ Bias index=0.19 Prevalence index=0.26 PABAK=0.07(-0.23-0.37)	

K = Cohen's kappa coefficient (95% confidence interval). PABAK = prevalence- and bias-adjusted kappa (95% confidence interval)

For 1995, MEPV and UCDP show moderate concordance; however, once again no two databases demonstrated good or very good concordance. In the absence of 1995 data from HIIK, the best concordance was observed between MEPV and UCDP with all other database agreements rating very poorly (see Appendix).

4 Discussion

The considerable divergence in conflict characterisation found throughout this review highlights the inherent subjectiveness involved in database development. It is for this reason that an informed decision on the appropriateness of various conflict data sources is essential for public health research. Naturally, these assessments are subjective and will be influenced by the preferences and requirements of the user.

We found that the Correlates of War Project database held poor concordance with all other databases assessed at both time points. This could presumably be attributed to the high deaths threshold set by the COW.

Despite having quite different definitions of conflict, the relatively good concordance between HIIK, UCDP and MEPV in 2006 is encouraging in terms of establishing confidence in these measures. Assessing the pros and cons of these three databases apparently comes down to a qualitative comparison.

In favour of the HIIK is its broader encompassing definition. The Heidelberg Institute focuses on conflict processes rather than purely quantitative thresholds of casualties of war (such as deaths) giving a broader and more detailed empirical foundation over the other political science databases which rely solely on a battle-related deaths threshold. However, for the user who requires a substantial history of global conflicts and an end date to mark the post-conflict period, it falls behind in terms of ease of use due to its publication format. The two remaining political science databases are very comparable in terms of utility with the fact that the UCDP data is contained all in one dataset (as opposed to four for the INSCR) perhaps making it more user friendly.

This selection process may not need to be so ruthless for some users who may be willing (or in fact prefer) to use a hybrid of databases to inform their research. The UCDP and MEPV datasets could arguably provide a good option for this due to their relative comparability. Or, alternatively, the user may be looking to supplement data from a different 'conflict perspective' other than the political science one, as we have discussed in this paper.

Poor concordance between the PTS and other databases indicates a clear mismatch between human rights violations and battle-related deaths. Logically this makes sense on several levels, for example, one represents the effect on the general population and the other on military staff. Therefore, it may be unwise to consider the PTS and political science-based databases as comparable – the concordance results appear to attest to this. However, for reasons discussed above, the relevance of both types is high, and it may be deemed appropriate for one from each category to supplement each other. In no area of public health is this more important than that of mental health, where exposure to traumatic events is a known risk factor for depression and a prerequisite to a post-traumatic stress disorder diagnosis [31, 32].

It is disappointing that there are not more suitable sources that document human rights abuses in a standardised way. This may change in the future as, for example, the United Nations *Office of the High Commissioner for Human Rights* is now working to develop more sophisticated and consistent rights-based indicators for use in both its external monitoring and its internal assessments [33].

Epidemiologists are gradually demonstrating that most existing studies grievously under-estimate war's overall human cost by failing to capture its indirect and long-term impacts [4]. As discussed, the majority of the identified constructs of conflict rely on death only and overlook the broader picture of indirect public health impacts. This narrow focus brings significant limitations with it which, for now, we are bound by. However, in recent years there has been a concerted effort to revolutionise the way we think about and measure conflict in the general population with the emergence of databases such as the Global Burden of Armed Violence [34]. Interestingly, the 2011 report estimates that at least 526,000 people die violently every year, more than three-quarters of them in non-conflict settings. Unfortunately, data is only available for 2008-2011 period [34].

Another new tool is the Dirty War Index (DWI), a data-driven public health tool based on laws of war that systematically identifies rates of particularly undesirable or prohibited, i.e., 'dirty', war outcomes inflicted on populations during armed conflict (e.g., civilian death, child injury, or torture). DWIs are explicitly linked to international humanitarian law to make public health outcomes directly relevant to prevention, monitoring, and humanitarian intervention for the moderation of war's effects. DWIs reflect, in part, local conditions and when complemented by absolute numbers, can suggest strategic aspects of actors' methods. Unfortunately, at the time of writing, the DWI does not provide a quantitative format for use in the current context.

5 Conclusion

This paper highlights the need for critically assessing data sources when utilising conflict data for epidemiological research. We demonstrated that no two databases are comparable, and the choice of data source has the potential to influence results greatly. Using the case example of a mental health epidemiological systematic review we would propose the combined use of the UCDP, and/or MEPV, and PTS databases.

6 List of abbreviations

DALY	Disability-adjusted life years
COW	Correlates of War Project
HIK	Heidelberg Institute for International Conflict Research
INSCR	Integrated Network for Societal Conflict Research
MEPV	Major episodes of political violence
PABAK	Prevalence- and bias-adjusted kappa
PTS	Political Terror Scale
UCDP	Uppsala Conflict Data Program

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Contact details

Fiona Charlson

T +61 7 32178685

E f.charlson@uq.edu.au

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