Methodological annexe
Geveva, March 2009

Chapter One
Direct Conflict Death
Methodology for selecting the main armed conflicts

The *Global Burden of Armed Violence* (GBAV) report estimates direct conflict deaths for a large sample of ongoing armed conflicts. The GBAV direct conflict deaths (DCD) estimate is based on all countries for which data is available in the following eight robust comparative databases.[1]

- International Institute for Strategic Studies (IISS), Armed Conflict Database, for data covering the period 2004–07
- Uppsala Conflict Data Program (UCDP) Battle-deaths Dataset, v.4.1, covering 2004–05
- UCDP Non-state Conflict Dataset, v.1.1, covering 2004–05
- UCDP One-sided Violence Dataset, v.1.2, covering 2004–05
- Stockholm International Peace Research Institute, *SIPRI Yearbook 2007,* covering 2006
- Political Instability Task Force (PITF) database, covering 2004–06
- Project Ploughshares, *Armed Conflicts Report,* covering 2004–07
- International Peace Research Institute, Oslo (PRIO), Battle-Deaths Dataset, v.2.0, covering 2004–05

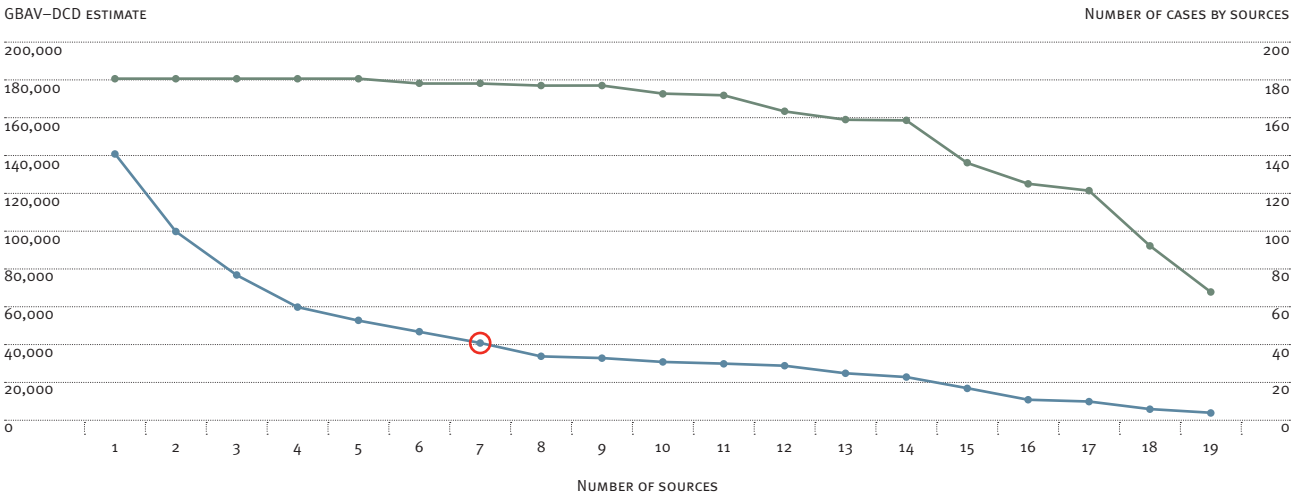
In order to render cross-country comparisons, it is necessary to define a primary set of armed conflicts ('main armed conflicts') from the eight datasets. The 41 selected conflict countries fulfil at least two of the following three conditions:

1. Case appearance in multiple databases: The first criterion establishes a list of conflict cases that have appeared in the databases since 2000, considering 19 cross-country databases and reports (hereafter, 'sources') related to armed conflict.[2] At least one database features 141 cases in this category, yet only 4 cases appear in all sources (Afghanistan, Burundi, Iraq, and Uganda). The GBAV report thus selects 41 cases that appear in at least seven sources.[3]

Figure 1 shows the number of times each case appears in sources and the total direct death count during the period 2004–07 (final GBAV–DCD estimate). The blue dots represent the number of cases by the number of sources. The green points show the GBAV-estimated number of casualties associated with the cases in the given number of sources. The red circle marks the combination of the number of cases and the number of sources that are included in this criterion: 14 cases that are in at least 41 sources.

Figure 1 demonstrates that the largest concentration of conflicts and direct conflict deaths is found in the cases that appear in at least 14 sources and that the excluded cases account for a marginal difference. This approach provides a measure of

Figure 1 Number of cases in sources versus GBAV–DCD point estimates, 2004–2007



Legend:

- GBAV–DCD estimate cumulative sum (main armed conflicts)
- Number of cases by sources

the reliability of sources and signals areas where they overlap.

2. Armed conflict intensity measured by number of conflict deaths: This criterion focuses primarily on cases noted above, but it singles out those exhibiting a great intensity of armed conflict. Only cases that feature at least 100 deaths in a given year are included; those featuring fewer than 100 deaths in all sources for the entire period are excluded.[4]

3. Ongoing conflicts: A conflict is considered to be 'ongoing' if it has reported at least one death in 2007 and, according to reliable background information, is described as 'active'.[5]

Figure 2 displays conflicts that exhibit the above-mentioned criteria and the overlap between these criteria. The 'main armed conflicts'—conflicts that are represented in at least two of the three criteria—appear in red.

Establishing the GBAV direct conflict death estimate

Eight cross-country databases with national-level data spanning 2004–07 were selected from a short-list of almost 20 sources. The GBAV–DCD thus draws from the eight cross-country sources and is complemented, where appropriate and possible, with micro-level conflict data after a careful screening of the information and differences between sources and outliers. The development of the GBAV–DCD estimates involved the following steps:

Standardizing and organizing of the information

This step was designed to produce annual figures comparable across sources. The information is aggregate at the national level. Cases involving several countries are referred to as 'multi-country conflicts' (mostly corresponding to the categories 'international' or 'internationalized' in consulted datasets).

Figure 2 Selected conflicts by criterion (GBAV conflicts in red)

Producing ranges

The highest and lowest values of direct conflict deaths were identified for each country for each year across the eight sources. The ratio between these values by country and by year provides a measurement of the range width. The ratios are then classified in four groups:

- No difference: maximum and minimum values are the same.
- Low difference: the minimum value is more than 50 per cent of the maximum value.
- Medium difference: the minimum is between 50 and 30 per cent of the maximum value.

Table 1 Comparisons in the definitions and methodological aspects of the sources included in the GBAV–DCD estimate

	IISS Armed Conflict Database	PITF	Project Ploughshares	PRIO Centre for the Study of Civil War	UCDP Battle-deaths Dataset	UCDP Non-state Conflict Dataset	UCDP One-sided Violence Dataset	Conclusions
Armed conflict	'Covers the world's international, internal and terrorist conflicts, whether active, subject to a ceasefire, or halted by a peace accord' (IISS, 2008).	'"Wars" are unique political events that are characterized by the concerted (or major) tactical and strategic use of organized violence in an attempt by political and/or military leaders to gain a favourable outcome in an on-going, group conflict interaction process. "Revolutionary and ethnic wars" are both primarily internal, domestic, civil, intrastate, or "societal" wars, although they are often "internationalized" to some extent as one or more of the contending groups may receive substantial indirect, or direct, support from foreign governments or other groups' (Marshall, Gurr, and Harf , 2001).	'An armed conflict is defined as a political conflict in which armed combat involves the armed forces of at least one state (or one or more armed factions seeking to gain control of all or part of the state), and in which at least 1,000 people have been killed by the fighting during the course of the conflict' (Project Ploughshares, 2008).	'[A] contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths' (UCDP and PRIO, 2007, p. 4).		'A non-state conflict is the use of armed force between two organized groups, neither of which is the government of a state' (Kreutz and Eck, 2005a, p. 1).	'One-sided violence is the use of armed force by the government of a state or by a formally organized group against civilians which results in at least 25 deaths. Extrajudicial killings in custody are excluded' (Kreutz and Eck, 2005b, p. 1).	An armed conflict involves group-based violence by groups seeking to attain their preferred outcomes as opposed to the ones preferred by other social groups. Conflict deaths are all fatalities occurring in the context of conflict-group events, as defined by distinct time–space occurrences of violent actions, including both battle-related deaths and one- sided violence.
Deaths	'Fatality statistics relate to military and civilian lives lost as a direct result of an armed conflict . . . . Fatality figures for terrorism may include deaths inflicted by the government forces in counter-terrorism operations' (IISS, 2008).	'Code based on source estimates of annual fatalities directly attributed to fighting, armed attacks, and revolutionary protest including rebel fighters and leaders, demonstrators, regime forces and officials, civilians massacred in war zones or caught in cross-fire, and victims of terrorist attacks' (Marshall, Gurr, and Harf, 2001). Genocide definition: 'the mass	Not specified.	'Deaths resulting directly from violence inflicted through the use of armed force by a party to an armed conflict during *contested combat*. *Contested combat* is use of armed force by a party to an armed conflict against any person or target during which the per-	'Deaths caused by the warring parties that can be directly related to combat over the contested incompatibility. This includes traditional battlefield fighting, guerrilla activities (e.g. hit-and-run attacks/ambushes) and all kinds of bombardments of military bases, cities and villages etc. Urban warfare (bombs, explosions, and assassinations) does not resemble what happens on a battlefield, but such deaths are considered to be battle-related' (UCDP, 2006d, p. 4).			

		murder of members of a distinct ethnic group by agents of the state' (Marshall, Gurr, and Harf, 2001).		petrator faces the immediate threat of lethal force being used by another party to the conflict against him/her and/or allied fighters' (Lacina, 2006, p. 5).			
Types of armed conflict	'1) International Armed Border and Territorial Conflict: Involving governments in armed conflict over sovereignty or territory. 2) Internal Armed Conflict: Taking place between government forces and organized groups, which control sufficient territory to sustain concerted military operations. These conflicts sometimes spill across international borders without being considered international conflicts between state parties. 3) Terrorism: involving one or more factions in significant armed opposition to the state. The intensity in violence in such attacks varies. Violence directly	'1) Revolutionary wars are episodes of violent conflict between governments and politically organized groups (political challengers) that seek to overthrow the central government, to replace its leaders, or to seize power in one region. 2) Ethnic wars are episodes of violent conflict between governments and national, ethnic, religious, or other communal minorities (ethnic challengers) in which the challengers seek major changes in their status. 3) Genocide: sustained policies by governing elites or their agents—or in the case of civil war, either of the contending authorities—that result in the deaths of a substantial portion of a communal group or politicized non-communal group' (Marshall, Gurr, and Harf, 2001).	'The following is a simple typology of modern intrastate armed conflict based on three overlapping types: state control, state formation, and state failure' (Project Ploughshares, 2008). Note: the information is not classified using this typology.	By intensity: '1. Minor: between 25 and 999 battle-related deaths in a given year. 2. War: at least 1,000 battle-related deaths in a given year' (UCDP and PRIO, 2007, p. 10). By type: '1. Extrasystemic armed conflict occurs between a state and a non-state group outside its own territory. (In the COW project, extrasystemic war is subdivided into colonial war and imperial war, but this distinction is not used here.) These conflicts are by definition territorial, since the government side is fighting to retain control of a territory outside the state system. 2 Interstate armed conflict occurs between two or more states. 3. Internal armed conflict occurs between the government of a state and one or more internal opposition group(s) without intervention from other states. 4. Internationalized internal armed conflict occurs between the government of a state and one or more internal opposition group(s) with intervention from other states (secondary parties) on one or both sides' (UCDP and PRIO, 2007, p. 11).	Not specified.	Not specified.	The types of conflict can be related to the intensity, measured as the number of battle-related deaths (UCDP and PRIO projects). The geographical aspect (international, internal) is also considered by IISS and UCDP and PRIO.

	attributable to organized crime is not included' (IISS, 2008).							
Violence threshold	Zero deaths or casualties.	'For revolutionary and ethnic wars whereby there must be at least 1000 direct conflict-related deaths over the full course of the armed conflict and at least one year when the annual conflict-related death toll exceeds 100 fatalities' (Marshall, Gurr, and Harf, 2001).	'At least 1,000 people have been killed by the fighting during the course of the conflict' (Project Ploughshares, 2008).	As per the UCDP/PRIO definition, incompatibilities that result in at least 25 battle-related deaths.			At least 25 deaths.	All UCDP/PRIO projects use a threshold of 25 deaths in one year. Other databases, such as PITF and Project Ploughshares, use the threshold of 1,000 annual deaths in the course of the conflict. IISS does not have a threshold.
Civilians in battle-related deaths	Included.	'Civilians massacred in war zones or caught in cross-fire, and victims of terrorist attacks' (Marshall, Gurr, and Harf, 2001).	Not specified.	'Battle fatalities are defined as civilians and combatants killed in the course of combat' (Lacina, 2006, p. 7).	'The target for the attacks is either the military forces or representatives for the parties, though there is often substantial collateral damage in the form of civilians being killed in the crossfire, indiscriminate bombings, etc. All fatalities—military as well as civilian—incurred in such situations are counted as battle-related deaths' (UCDP, 2006d, pp. 4–5).		No battle-related deaths.	Civilians are included in all databases as part of armed conflict, and specifically in reference to battle-related deaths.
One-sided violence	Included.	Civilians massacred in war zones are included in revolutionary and ethnic conflicts. Genocide and politicide are coded separately.	Included.	Only battle-related deaths.	Only battle-related deaths.	Only battle-related deaths.	'The use of armed force by the government of a state or by a formally organized group against civilians' (Kreutz and Eck, 2005b, p. 1).	One-sided violence is not included in the battle-related deaths databases (UCDP Battle–deaths Dataset and UCDP Non-state Conflict Dataset as well as the, PRIO Battle-Deaths Data).
State/non-state actors	Included.	Not specified.	Included.	The UCDP/PRIO definition includes only state actors.	The UCDP/PRIO definition includes only state actors.	Only non-state actors.	'Government of a state or by a formally organized group' (Kreutz and Eck, 2005b, p. 1).	For the majority of databases.

Excluded	'Violence directly attributable to organized crime is not included' (IISS, 2008).	Not specified.	Not specified.	Non-state actors and one-sided violence are excluded. 'Contested combat excludes the sustained killing of soldiers or civilians in the absence of any reciprocal threat of lethal force (e.g. execution of prisoners of war)' (Lacina, 2006, p. 5).	The following are excluded: 'Indirect deaths due to disease and starvation, criminality, or attacks deliberately directed against civilians only (one-sided violence)' (UCDP, 2006d, p. 4).	The following are excluded: 'Battle-related deaths and extrajudicial killings in custody' (Kreutz and Eck, 2005b, p. 1).	All databases exclude indirect deaths and organized crime.
Methodology	'The figures relate to the country which is the main area of conflict. For some conflicts no reliable statistics are available. Estimates of war fatalities vary according to source, sometimes by a wide margin. In compiling data on fatalities, the IISS has used its best estimates and takes full responsibility for these figures. Some overall fatality figures have been revised in light of new information. Changes in fatality figures may therefore occur as a result of such revisions as well as because of increased fatalities' (IISS, 2008).	'Cases and codings are based on information compiled from multiple sources; discrepancies in the historical records are scrutinized and reconciled by analysts to construct unitary estimates of factors that identify and characterize each distinct event' (Marshall, Gurr, and Harf, 2001).	Not specified.	Not specified.	'The data presented by UCDP is based on information taken from a selection of publicly available sources, printed as well as electronic. The sources include news agencies, journals, research reports, and documents of international and multinational organizations and NGOs. This includes documents of the warring parties (governments and opposition organizations) when such sources are available, since they serve as a crucial complement when identifying statements about the parties' incompatible positions. Global, regional and country-specific sources are used for all countries. . . . Since most sources are secondary sources, UCDP attempts to trace reports back to the primary source in order to decide whether they are reliable. . . . The Factiva news database (previously known as the Reuters Business Briefing) is indispensable for the collection of general news reports (Factiva is a news and information service database that contains more than 8,000 sources)' (UCDP, 2006d, p. 5).		Combination of sources.

Additional comments	The database is available with a paid subscription. The online information may change without notice. The database provides comprehensive contextual and descriptive information on each conflict.	This source provides conflict death information on a large scale. For revolutionary and ethnic conflicts: 0 = fewer than 100 fatalities, 1 = 100 to 1,000 fatalities, 2 = 1,000 to 5,000 fatalities, 3 = 5,000 to 10,000 fatalities, 4 = more than 10,000 fatalities, 9 = no basis for judgeing. Information on genocide and politicide in 2004–06 is provided only for Sudan. The source provides limited contextual information.	Project Ploughshares does not provide information via a database but rather in texts that contain information about conflict deaths. Descriptions of conflicts do not include specific numbers or ranges; qualifiers such as *at least* and *more than* are used in the text. References to certain regions and specific forms of violence may be ambiguous due to the absence of contextual information.	Not specified.	'The general rule for UCDP's estimation of battle-related deaths is moderation. . . . The UCDP Best estimate consist of the aggregated most reliable numbers for all battle-related incidents during a year. If different reports provide different estimates, an examination is made as to what source is most reliable. If no such distinction can be made, UCDP as a rule include the lower figure given' (UCDP, 2006d, p. 6).	As per the UCDP/PRIO definition, only deaths incurred in non-state conflicts are included.	As per the UCDP/PRIO definition, only one-sided conflict deaths are included.	—
Outliers, comparison with the other sources	IISS reports a significant outlier for Sudan in 2004 that is probably related to the number of genocides; IISS produces 43 per cent of the high limits in the GBAV–DCD estimate.	Wide ranges do not produce large differences in relation to other sources. Making comparisons is complicated.	Project Ploughshares provides a big quantity of both high and low limits of the GBAV–DCD estimate (24 per cent of the high and 22 per cent of the low). This is the database with the largest quantity of dropped figures.	PRIO does not produce an important number of high or low limits.	UCDP provides the highest number of low limits of the GBAV–DCD estimate (49 per cent).	The UCDP Non-state Conflict Dataset is not used in the comparison; rather, the sum of UCDP's Battle-deaths, Non-state Conflict, and One-sided Violence Datasets is used.	UCDP's One-sided Violence Datasets is not used in the comparison; rather, the sum of UCDP's Battle-deaths, Non-state Conflict, and One-sided Violence Datasets is used.	The varying definitions of armed conflict and direct conflict deaths, combined with differing coverage of events in the databases, yield discrepancies in the number of direct conflict deaths by year and country or territory.

Sources for definitions: IISS (2008); Marshall, Gurr, and Harf (2001); Project Ploughshares (2008); Lacina (2006); UCDP (2006d); UCDP and PRIO (2007); Kreutz and Eck (2005a; 2005b)

- High difference: the minimum is less than 30 per cent of the maximum value.

Determining final ranges and point estimates

For those cases with no, low, and medium differences, the GBAV–DCD estimate is based on the lowest and highest points of the range. The point estimate is the average of these. For cases with high differences, contextual information provided by a range of cross-country databases was used to clarify the reasons for competing estimates. Figures that produce outliers were not included in the estimation procedure.

The GBAV–DCD estimate includes information from micro-level country datasets whenever such data was available[6] and when there were no major reported differences. The GBAV report also includes micro-country database figures when these figures were higher that the GBAV–DCD estimate. In this way, a new round of high, low, and point estimates was produced.

Each database registers important differences in the definition of armed conflict and conflict deaths. These can sometimes explain why a given database may feature data that is distinct from those in other databases. From among all eight databases, for example, IISS provides the highest number of upper limits (43 per cent), followed by Project Ploughshares (21 per cent). UCDP has the highest number of lower limits (49 per cent).

Chapter Two

The Many Victims of War: Indirect Conflict Deaths

Two different mortality rates are commonly used by humanitarian agencies such as the World Health Organization (WHO), the United Nations High Commissioner for Refugees (UNHCR), the Centers for Disease Control and Prevention (CDC), Médecins Sans Frontières, and the Sphere Project.

The first is the crude mortality rate (CMR), which expresses the total number of deaths that occurred in a population whose size is known and which was at risk of death during a certain period of time. The CMR is composed of three elements: the number of deaths, the population size, and the time period.

The second is the under-5 mortality rate (U5MR), which is an age-specific mortality rate that expresses the number of deaths that have occurred among a population of children under five years of age for a population whose size is known and and which was at risk of death during a certain period of time. While CMR makes no distinction by age, U5MR includes only children below five years of age (0–59 months old).

CMR and U5MR are calculated using the formulas below:

- CMR = (number of deaths) / (midterm population at risk × duration of time period) × 10,000 persons
- U5MR = (number of deaths of U5s) / (midterm population of U5s at risk × duration of time period) × 10,000 persons

The use of a midterm population accounts for changes in the population composition over the time period measured, by adding half of the indi-

viduals who leave the population (due to deaths and emigration) and by subtracting half of the individuals who enter the population (due to births and immigration) to the population at the end of the period.[7] The calculation implies that the rate of change is constant over the entire recall period, a condition that does not always hold.

The terms 'death rate' and 'mortality rate' are used in different ways by demographers and epidemiologists. U5MR is defined by demographers as the probability of dying before the age of five. Its unit is 'per 1,000 live births'. Epidemiologists define U5MR as the number of deaths of children under five years of age per unit of time divided by the under-five population. Its unit is typically 'per 10,000 persons per day'. This last indicator is known by demographers as an age-specific mortality rate, abbreviated 5m0. The GBAV report uses the epidemiological definition of the U5MR indicator.

Chapter Three

Armed Violence After War: Categories, Causes, and Consequences

There is no methodological information for this chapter.

Chapter Four

Lethal Encounters: Non-conflict Armed Violence

Sub-regional estimates presented in this chapter were calculated from national-level homicide estimates for 201 countries or territories for the year 2004. The process first involved a comprehensive search for all available national-level data for the period 1998 to 2006 inclusive. Data sources consulted included:

- The United Nations *Survey of Crime Trends and Operations of Criminal Justice Systems* (UNCTS)[8]
- The European Sourcebook of Crime and Criminal Justice Statistics[9]
- Eurostat publications on criminal justice statistics[10]
- UNICEF TransMONEE database[11]
- Police-recorded crime statistics collected by Interpol[12]
- World Health Organization mortality database, European detailed mortality database, causes of death database 2002, and death by violence estimates 2004[13]
- Personal communication with experts at the United Nations Office on Drugs and Crime (UNODC)
- Pan American Health Organization (PAHO) Basic Indicator Data Base[14]
- Web sites of national statistical offices, police services, and ministries of the interior[15]
- Academic and open-source literature on homicide.[16]

Collected information was entered into a database organized by country and year. Information was usually encountered in the form of absolute homicide counts. Rates provided per 100,000 population were converted to absolute counts in the database using, where possible, a population figure provided by the original data source. In addition to count and rate figures, supporting information—including the applied definition of homicide and whether the data was derived from police or public health sources—was entered into comment fields in the database.

Table 2 shows the number of countries or territories for which count or rate homicide data was found, summarized by region and sub-region. It also shows the average number of data sources encountered per case and the average maximum number of years over the period 1998 to 2006 covered by any single data source in the database. In addition, the table shows the percentage population of the region or sub-region covered by the relevant data, based on population data from the Population Division of the United Nations Department of Economic and Social Affairs (UNDESA).[17]

As Table 2 demonstrates, data coverage is highest for West and Central Europe and North America, with eight or nine sources per country and at least one source with continuous data for seven or eight years. Data coverage is lowest for Oceania and East, West, and Central Africa, with an average of three sources per country covering only an average maximum of two or three years with any single source. Data coverage is intermediate for Asia and Latin America, with an average of five or six data sources covering an average maximum of four years.

For any particular country or territory, results from available data sources differ from each other to varying degrees, both with respect to individual years and the overall trend. Data sources for Europe and the Americas show a reasonably high degree of consistency, while variations were generally greater for Africa, Asia, and Oceania.

TABLE 2 Homicide data coverage

Region or sub-region	Number of countries/ territories for which data is available	Average number of data sources per case	Average maximum number of years covered by a single data source	% regional/sub-regional population covered by country/ territory data
Africa	**53**	**4**	**2**	**99.9**
East Africa	13	3	3	100
North Africa	6	4	3	99.9
Southern Africa	10	5	3	99.2
West and Central Africa	24	3	2	100
Americas	**38**	**6**	**4**	**99.8**
Caribbean	16	4	3	96.5
Central America	7	8	4	100
North America	3	9	8	100
South America	12	7	5	99.9
Asia	**49**	**5**	**4**	**100**
Central Asia and the Caucasus	8	7	7	100
East and South-east Asia	19	4	3	100
Middle East and South-west Asia	16	5	3	100
South Asia	6	5	5	100
Europe	**47**	**8**	**7**	**100**
Eastern Europe	4	9	8	100
South-east Europe	9	6	6	100
Western and Central Europe	34	8	7	100
Oceania	**14**	**3**	**2**	**97.9**
WORLD	**201**	**5**	**4**	**99.5**

Calculation of sub-regional homicide estimates

In order to generate regional and sub-regional data for the GBAV report, methodology was developed for the production of one single homicide estimate for each country or territory for which data had been collected.

The year 2004 was chosen as the year for the estimates due to the maximum global availability of data for that year. Crime and public health data may take a significant amount of time to be collated and made available by states. While a number of regions, such as Europe and the Americas, have wide availability of more recent data, a global estimate requires a standardized point in time. The year 2004 represents the most recent year for which country/territory data sources were consistently available globally.

Following completion of data entry into the database, logical decision flowcharts were created for the calculation of individual country/territory estimates from the multiple sources available for each country/territory. Six different logical decision flowcharts were designed: for Africa, the Americas, Europe, Oceania, Central Asia and the Caucasus, and the rest of Asia. Each region required a different logical decision process due to differences in the coverage and quality of data available. As shown in Table 2, for example, significantly more data was available for Europe and the Americas than for Africa or Asia. Different flowcharts were required for Central Asia and the Caucasus and the rest of Asia due to a higher availability of reliable police and law enforcement data in Central Asia and the Caucasus than the rest of the region.

The logical decision flowcharts applied a series of operations to arrive at the final country/territory estimate. The use of flowcharts ensured that country/territory estimates were calculated in a methodologically consistent way within each region. The flowcharts applied a 'preferred source' method based on source reliability characteristics. They were designed to ensure that, where possible, an equivalent source was used consistently within the region to allow maximum comparability. Table 3 below summarizes the applied operations.

In regions where police-recorded homicide data is scarce, such as Africa, WHO death-by-violence estimates derived from mortality data were used as the preferred data source. Comparability of WHO estimates within the Africa region is appropriate on the basis of the international nature of the source and prior standardization efforts already inherent in the data. In the light of large differences encountered between police-recorded data and public health data in Africa, police-recorded statistics were not included in country estimates for Africa, with the exception of one country. Public health data was also chosen as the preferred source for the Americas region, based again on prior standardization within this data source. Comparison was made, however, to police-recorded data and, in a number of instances, average or extrapolated values were estimated where significant differences between public health and police data were found. In the Caribbean sub-region, police data was used directly when differences between police and public health data were greater than 50 per cent. Police-recorded data sources formed the backbone of estimates in Asia, Europe, and Oceania. Priority was given to international sources that contain a degree of prior standardization of definitions. If comparatively high numbers of sources were available, such as for Europe, a hierarchy of sources was used for the generation of country/territory estimates.

Table 3 Summary of logical decision flowcharts applied

Region	Preferred data source for 2004	Logical operation	Alternative data source
Africa	WHO		All national homicide values for Africa derived from WHO with the exception of one country.
Americas	PAHO	If PAHO not available for 2004 →	(1) Use of closest available year from PAHO (if within three years); or (2) Extrapolation/interpolation from PAHO trend data.
		If difference between PAHO for 2004 and police sources 2004 >50% →	Calculation of average of data sources for 2004 or (for Caribbean) use of police data.
Central Asia and the Caucasus	UNCTS	If UN CTS not available for 2004 →	(1) Use of latest available UNCTS figure (if within three years); or (2) Use of alternative source for 2004 data in priority order.
		If difference between UNCTS for 2004 and police sources 2004 >50% →	Calculation of average of data sources for 2004.
Rest of Asia	UNCTS	If UNCTS not available for 2004 →	(1) Use of latest available UNCTS figure (if within three years); or (2) Use of alternative source for 2004 data in priority order (European Sourcebook, WHO, Interpol); or (3) Calculation of average of data sources for 2004.
Europe	Eurostat	If Eurostat not available for 2004 →	(1) Interpolation of Eurostat 2003 and 2005 figures; or (2) Use of alternative source for 2004 data in priority order (European Sourcebook, UNCTS, Interpol, national data).
Oceania	UNCTS	If UNCTS not available for 2004 →	(1) Use of latest available UNCTS figure (if within three years); or (2) Calculation of average of data sources for 2004.

All data entered into the database together with the country/territory estimates was subject to external academic verification by an expert criminologist from the University of Lausanne, Switzerland. All individual country/territory estimates were produced in the form of absolute homicide counts for the year 2004. These were then converted to rates per 100,000 population using population data from UNDESA (2006).

Regional and sub-regional averages presented in this report were calculated by adding the total estimated homicide counts for all countries/territories in the regions/sub-regions and converting them to a rate per 100,000 population based on the total population sum of those countries/territories for which estimates were available. As shown in Table 2, this method yielded more than 97 per cent coverage for each region, by population. The 16 sub-regional estimates were aligned with the countries/territories making up each sub-region and presented using mapping software, applying the categories of 0–3, 3–5, 5–10, 10–20, 20–25, 25–30, and ›30 homicides per 100,000 population.

It should be noted that this method of calculating regional/sub-regional averages corresponds to a population-weighted average. This was considered the most representative form of presenting data at the sub-regional level. However, the method is prone to the heavy influence of large countries with particularly high homicide levels in the overall regional/sub-regional figure. Presentation of homicide levels consolidated across countries may also be achieved through the use of median values. The median represents the middle value when all numbers are ordered sequentially. As such, it is less susceptible to the influence of particularly high or low outliers. For the sake of completeness, Table 4 presents median calculations alongside the population-weighted averages:

Table 4 Comparison of regional/sub-regional population-weighted average and median values

Sub-region	Population-weighted average	Median
East Africa	20.8	15.9
North Africa	8.1	2.3
Southern Africa	31.7	22.3
West and Central Africa	21.6	17.2
Caribbean	18.1	13.9
Central America	29.3	21.3
North America	6.6	5.4
South America	25.9	13
Central Asia and the Caucasus	6.6	4.8
East and South-east Asia	2.8	3.8
Middle East/South-west Asia	4.4	2.2
South Asia	3.4	4.8
Eastern Europe	15.7	8.1
South-east Europe	3.2	2.4
Western and Central Europe	1.5	1.4
Oceania	4	1.3
WORLD	**7.6**	**5.4**

As Table 4 shows, the median value does not differ significantly from the population-weighted average for sub-regions such as South-east Europe or Western and Central Europe. It does, however, differ quite significantly for Southern Africa, South America, and Eastern Europe. This is indicative of a wider range of homicide rates within these countries with the resulting potential for individual countries to heavily influence the overall sub-regional figure.

Calculation of homicide trends

Whereas data from multiple sources—both police-based and public health-based—was identified

and recorded in the course of the data collection process, analysis of *changes* in homicide rates over time was limited to the trend described by one *single source* for each country. This approach was taken because different sources may measure subtly different phenomena (such as the difference between police- and public health-derived information) and may apply different counting and recording rules, which may themselves change with time. As a result, homicide trend analysis began with the identification of countries with data available from a single source for a continuous period of at least four years or more. While at least one such country could be identified in each of the 16 sub-regions, insufficient countries met these criteria to allow reliable trend analysis in Africa, Oceania, and Asia, with the exception of Central Asia and the Caucasus countries. In the remaining eight sub-regions, sufficient national-level data was available for trend analysis between 1998 and 2002 in the Americas, and between 1998 and 2005 in Europe and Central Asia and the Caucasus.

Where possible, the single source used for trend analysis was the same as that chosen as the 'preferred source' for sub-regional homicide rate estimates. Where this was not possible (due to insufficient time-series data from the preferred source), an alternative source was chosen based on the logical flowcharts described above and availability of time-series data by source. Homicide rates from all available sources were additionally plotted against time, by individual country, in order to ensure the validity of the chosen single source as compared with all other available information. Table 5 summarizes the single national-level sources chosen for trends analysis, by sub-region.

To classify trends in homicide rates over time, an exponential growth curve was fitted to the homicide data for each of the 68 countries in Table 5 using SPSS statistical software. The equation used was:

Table 5 Data sources chosen for national-level trend analysis

Sub-region	Number of countries/ territories in sub-region	Number of countries/ territories for which trend data is available	Period covered by data	Data source(s) for national-level trend analysis
Caribbean	16	5	1998–2002	PAHO (2007)
Central America	7	5	1998–2002	
North America	3	3	1998–2002	
South America	13	9	1998–2002	
Central Asia and Caucasus	8	8	1998–2005	UNICEF (2008)
Eastern Europe	4	4	1998–2005	UN (1998; 2001; 2002; 2004; 2006); Eurostat (2007; 2008)
South-east Europe	9	7	1998–2005	Eurostat (2007; 2008)
Western and Central Europe	34	27	1998–2005	
TOTAL	**94**	**68**		

$Homicides\ per\ 100{,}000\ population = ae^{bt} = a(1+(r/100))^t$

where t is time (in this case the year), a is a constant (the number of homicides per 100,000 population at $t=0$), b is the growth constant and r is the growth rate (average percentage increase per year). From the above equation, the annual percentage growth rate, r, is given by $100(e^b-1)$. The exponential growth model was deemed to provide an acceptable description of the overall trend in the homicide data if the coefficient of determination (R^2) was greater than 0.4. Provided that the value of b was statistically significant (so that the 95 per cent confidence intervals do not include $b=0$), an increasing trend was defined as $r \geq 1\%$ and a decreasing trend by $r \leq 1\%$. A 'flat' trend was defined by a non-significant value of b, or where $-1\% < r < 1\%$ (provided that R^2 was greater than 0.4 in either situation).

The exponential model does not, however, fit well in the situation where homicide levels consistently increase and then consistently decrease (or vice versa). In order to deal with cases of such 'single dominant change' (bell- or inverted bell-shaped trends) a quadratic equation was fitted to homicide trends that could not be described by the exponential growth model, using the form:

$Homicides\ per\ 100{,}000\ population = ct^2+dt+e$

where c, d, and e are constants. This equation was used to classify a trend as showing a single dominant peak or trough when R^2 was greater than 0.4, c and d were statistically significant, and where the magnitude of the peak or trough (measured as the percentage difference between the data point peak and the average base line) was greater than ten per cent.

Finally, countries that could not be classified by either the exponential or quadratic equations were classified by visual inspection. These countries showed large fluctuations in rates of up to 50 per cent from year to year but with no overall upward or downward trend. These countries were included in the 'flat' trend category on this basis.

Exponential and quadratic equations were fitted, as required, to the 68 individual countries/territories for which trend data was available. Sub-regional trend data was calculated by adding the homicide counts for available countries/territories in the sub-region, year-on-year, and converting these to a rate per 100,000 population based on the total population sum of those countries/territories for which data was available. The same set of countries/territories was used for each sequential year in order to ensure that values for each year in the series were directly comparable. Where data was not available for a particular country/territory for every year in the time series examined, the country/territory was excluded from the sub-regional trend in order to avoid the introduction of false trend points.

Calculation of major city/rest-of-country homicide ratios

A comprehensive search of the multiple sources listed above was undertaken for information on the number of homicides occurring in the largest available cities. Data for the largest available city in some 67 different countries/territories could be identified: 4 in Central Asia and the Caucasus, 5 in East Asia, 3 in North America, 9 in South America, 6 in Central America, 28 in Western and Central Europe, 4 in Eastern Europe, and 8 in South-east Europe. Insufficient data was available for countries in Africa, Oceania, South Asia, East and South-east Asia, and Middle East/South-west Asia. Data sources for homicide counts in the 67 largest available cities identified are shown in Table 6.

Table 6 Data sources for homicide counts in the 67 largest available cities

Data source	Number of cities
UN (2006, variable 2.4)	24
Eurostat (2007; 2008)	34
National police data[18]	6
Other international organization or non-governmental organization report[19]	3

In order to compare the homicide rate in the identified cities against that in the rest of the country on a sub-regional basis, the following formula was used:

$$\textit{Homicide ratio largest available city to rest of country (for countries in sub-region)} = \frac{\Sigma (h_c) / \Sigma (p_c)}{\Sigma (h_t - h_c) / \Sigma (p_t - p_c)}$$

Where h_c is the number of homicides in the largest available city, p_c is the population of the largest available city, h_t is the total number of homicides in the country, and p_t is the country population. In each case, the city population (p_c) was derived from the same source as the number of homicides in the largest city, in each case. The tenth edition of the United Nations *Survey of Crime Trends and Operations of Criminal Justice Systems,* for example, requests the largest city population, in addition to data on numbers of reported crimes in that city (UN, 2006). Similarly, Eurostat crime and criminal justice statistics report city populations together with city homicide counts. The total country population figure used was from UNDESA (2006), which provides the relevant year of homicide city data.

For 60 countries, the largest city homicide count (h_c) was for the year 2005. For five countries, the data related to the year 2004, and for the remaining two, the year 2006. For each country, the value of h_t, the country homicide total, was selected from an identical source and for the same calendar year, wherever possible. All largest city homicide data derived from the tenth UNCTS, for instance, was compared against total country homicide data from the same survey. An internal consistency check was also carried out for the value of h_t, the country homicide total used, against the homicide estimate figure for that country selected by means of the logical flowcharts (see Table 3).

Calculation of percentage of homicides committed with firearms

All data on homicide committed with a firearm was derived from the UNCTS for the year 2004 or the closest available year. Data on homicide committed with firearms was found for 50 countries/territories: 5 in Central America, 7 in South America, 5 in the Caribbean, 3 in the Middle East/South-west Asia, 3 in North America, 3 in Central Asia and the Caucasus, 6 in South-east Europe, and 18 in Western and Central Europe. For each sub-region, the overall percentage of homicides committed with firearms was calculated as the sum of homicides with firearm for those countries available, divided by the sum of total homicides × 100. For consistency, the total homicide figure for each country was taken from the tenth UNCTS for the same year and cross-checked with the country-level estimate figure for that country selected by means of the logical flowcharts (see Table 3).

Chapter Five

What's in a Number? Estimating the Economic Costs of Armed Violence

Growth costing of conflict

Much of the economics of conflicts literature holds that civil conflicts have negative impacts on economic growth. Growth is understood in mainstream economics as a by-product of (physical and human) capital accumulation and innovations that bring about changes in productivity. Conflicts destroy (physical and human) capital and deter innovation and productivity by deviating resources to non-efficient uses (depredatory, offensive, and dissuasive) and by increasing transaction costs.

Hoeffler and Reynal-Querol, using a dataset for 211 countries for the period 1960–90, find that a civil war of five years reduces the annual average growth rate by approximately two per cent (Hoeffler and Reynal-Querol, 2003). In this work they estimate an ordinary least squares (OLS) regression where the dependent variable is the growth rate of GDP per capita and the explanatory variables are: the percentage of time during which the country experienced a civil war, GDP per capita in the initial year of each period, the ratio of real government consumption to real GDP, the number of revolutions or coups per year, the proportion of assassinations per million population, the deviation of the inflation from the sample mean, the ratio of real domestic investment to GDP, and changes in secondary school enrolment rates.

Collier finds that the annual growth rate is reduced by 2.2 per cent using a sample of 92 countries for the period 1960–89 (Collier, 1999). Collier arrives at that finding by estimating an OLS regression where the dependent variable is the decade average per capita GDP growth rate of each country. In this work, Collier uses three variables to capture the effects during the war and the first five subsequent years. The control variables included in this regression are: dummies for the decades, continent dummies, the secondary schooling level, the per capita income level, the degree of ethno-linguistic fractionalization, and whether the country is landlocked.

Using a common economic growth framework, this chapter of the GBAV report estimates a standard neoclassical growth equation, taking into account the impact of the presence of a civil war on the observed growth rate. In this way it is possible to test the stated hypothesis that civil wars negatively affect the growth rate of an economy and to estimate the scale of that impact on the long-term growth rate. Similar results were found regarding the impact of conflict on growth when comparing with previous studies. Besides improving on the estimation procedure, and the data used, this chapter presents results from updated databases, including information up to 2004.

Model

The neoclassical growth model assumes that all economies produce a given amount of output with human and physical capital. Growth is a by-product of capital accumulation and productivity growth. All economies face the same technological possibilities frontier but have different amounts of capital. Economies converge in the long run to a common growth rate, conditional on the presence of historical, cultural, and other idiosyncratic factors. The representative economy is thus modeled by a growth process in which $\dot{g} = \dot{k} + \dot{l} + \beta + \varepsilon$, where per capita gross domestic product growth rate $\dot{g}$ is composed by the growth in physical and human capital $\dot{k}$, $\dot{l}$, respectively, productivity growth β, and a stochastic growth term ε. In

modeling such a growth equation, conditional terms were added and, in order to control for convergence, the initial GDP level for each variable was added. In general, such a model requires mild assumptions: decreasing returns to scale in both production factors and compliance of the Inada conditions.[20]

A conditional growth equation was estimated, taking into account initial value of real GDP per capita, capital accumulation, changes in education enrolment rates, and controlling variables. One of these controlling variables (which condition the growth equation) is the presence or absence of a civil conflict. The estimated parameter of this equation, if significant, provides the measurement of the cost (or potential benefit) of capital accumulation. The estimation technique is performed with annual data from 1970 to 2004.

The use of annual data allows for the identification of the effect of war on GDP without recurring to arbitrary aggregated periods, as has been the rule in the literature of this field, possibly due to the limitations on data availability. Another advantage of this approach over existing ones is that it considers a widely accepted growth equation framework and includes widely used proxy variables for human and physical capital accumulation.

The model to estimate is:

$$g_t^i = \beta_0 + \beta_1 y_0 + \beta_2 W_t + \beta_2 X_t + \beta_3 D_t + \varepsilon_t^i$$

where g_t^i is the annual real GDP per capita growth rate in the period 1970–2004 for each country, β_0 is a constant term, and W is a dummy variable taking the value of 1 if there is a civil war starting or ongoing in that given year for each country. The country's i annual growth rate is calculated as the difference of the logarithms of the country's i real GDP in period t (y_t) and country's i real GDP in period t-1 (y_{t-1}) , where t is the year:

$$g_t^i = Ln\left(\frac{y_t^i}{y_{t-1}^i}\right)$$

X is a set of variables that includes investment as a percentage of GDP; the index of education enrolment changes; the agricultural exports as percentage of GDP; and the index of ethnic polarization and religion polarization. Agricultural exports are included as a proxy variable for the presence of a primary-led non-industrialized exporting economy; polarization indexes are included to take into account the degree of social conflict in the society. D is a set of dummies that includes regional dummies, a time dummy, and a landlocked variable dummy.

Data

This research uses the real GDP per capita growth rate of 180 countries for the period 1970–2004. This data was taken from the International Monetary Fund (IMF) monetary statistics compilation (IMF, 2007a). The conflict variable data was taken from the Sambanis database for the period 1970–98 (Sambanis, n.d.). This data was complemented with compatible data provided by UCDP and PRIO for the period 1999–2004 (UCDP and PRIO, 2007). The share of agricultural exports to GDP was taken from the World Trade Organization (WTO, 2008). Ethnic polarization and religious polarization indexes were taken from Reynal-Querol (n.d.). Finally, landlocked variable data was taken from the New York University Development Research Institute (NYUDRI, n.d.).

Results

A pooled equation was first estimated by ordinary least squares with robust standard errors to correct for potential heteroscedasticity. A panel data estimation was run using maximum likelihood estimation in order to test for the presence of

significant unobserved effects. Using the Wald statistic for model misspecification, the null hypothesis was rejected in favour of the pooled model. Nevertheless, the random panel data results are presented for completeness and to show the robustness of findings. The fixed effects panel data model was rejected according to the Hausman test results.[21]

Results are shown in Table 7. The first column—marked with (1)—shows the pooled regression OLS estimation; the second—marked with (2)—shows the maximum likelihood random effects panel data model. The pooled estimation shows that the presence of a civil conflict decreases the growth of GDP of an average economy by 2.17 per cent, which is the preferred estimation. This result is statistically significant and very similar in the pooled and in the random effects panel data model (see the coefficient of the *atwarns* variable in Table 7).

In the random effects model, the percentage by which GDP growth decreases is slightly higher at 2.53 per cent. The Wald test for the null hypothesis of model misspecification by the inclusion of the country-specific effects cannot be rejected,[22] generating a preference for the pooled over the country-specific effects panel data model. For completeness and to show the robustness of the results, Table 7 includes the model with random effects. No significant presence of autocorrelation problems on residuals was encountered, nor was there any non-normality.

Estimating potential gains in life expectancy

Before calculating the lost product due to violent deaths (LPVD), it is important to render an estimate of the potential gains in life expectancy due to armed violence. First, one can extend 'survivorship'

Table 7 Data sources for homicide counts in the 67 largest available cities

Dependent variable: growth rate of GDP per capita		
	(1)	(2)
atwarns	-0,0217	-0.025398
	(-2.74)	(-3.12)
	[0.0079406]***	[0.0081277]***
dtime	-0.0003726	-0.0002331
	(-0.56)	(-0.37)
	[0.0006632]	[0.0006283]
lngdp 1970	-0.0309164	-0.0344336
	(-1.62)	(-1.02)
	[0.0190513]	[0.0338288]
investment	0.0979699	0.1449966
	(1.6)	(1.73)
	[0.0610916]	[0.0083575]*
enrollment	-0.0002098	-0.0002156
	(-1.03)	(-1)
	[0.0002034]	[0.0002162]
ethpol	-0.0668643	-0.0652628
	(-2.46)	(-1.27)
	[0.027224]***	[0.0511984]
relpol	0.0094871	0.012109
	(0.49)	(0.33)
	[0.0194917]	[0.0364034]
landlocked	0.018664	-0.0187493
	(-1.03)	(-0.97)
	[0.0181437]	[0.0192689]
agriexpo	0.1947794	0.1887363
	(1.56)	(1.28)
	[0.1249454]	[0.1469684]

africa	0.0157263	0.014596
	(0.84)	(0.51)
	[0.0186728]	[0.0283979]
asia	0.0631867	0.0596551
	(2.99)	(1.82)
	[0.211349]***	[0.0327164]*
northamerica	-0.0444551	-0.0400782
	(-2.24)	(-1.25)
	[0.0198108]***	[0.0319644]
southamerica	0.0548479	0.0603694
	(2.29)	(1.37)
	[0.0238994]	[0.0442044]
europe	[0.076362]	0.0783763
	(3.52)	(2.16)
	[0.0216703]	[0.0363565]**
_cons	0.2616011	0.2762978
	(1.57)	(0.94)
	[0.1668606]	[0.2943659]
Rsquared	0.1998	0.1978
Obs	285	285

Notes: OLS regression with robust-statistics in parentheses and standard errors in brackets.
* Significant at the 10 per cent level.
** Significant at the 5 per cent level.
*** Significant at the 1 per cent level.

Source: GBAV estimates

from the terminal 80+ age group to a hypothetical age group of 100+ using a method proposed by Coale and Guo (Coale and Guo, 1989). It is then possible to employ a multiple-decrement life table to measure the extent to which homicidal violence affects life expectancy at birth in a selection of countries.[23]

The probability of dying can be denoted by cause *i* in the interval (x,x + n) as ${}_nq_x^i$. The probability of mortality can be calculated directly from the master life table by multiplying this master probability by the ratio of the observed number of deaths in cause *i* to the total number of deaths for the age interval: d_x^i

$${}_nq_x^i = {}_nq_x \frac{{}_nD_x^i}{{}_nD_x}, \qquad \text{Equation 1}$$

assuming the period mortality rate, ${}_nM_x$ is a reasonable approximation of the cohort mortality rate ${}_nm_x$.

The focus then turns to the more tangible quantity of l_x^i , the number of individuals of exact age x who will ultimately exit the population via cause *i*. This value is the sum of the number of exits from cause *i* at all ages greater than *x*:

$$l_x^i = \sum_{y=x}^{\infty} {}_nd_x^i, \qquad \text{Equation 2}$$

where ${}_nd_x^i = l_x\,{}_nq_x^i$.

From a multiple-decrement life table, it is possible to calculate the associated single-decrement life table (ASDLT), where cause of death *i* is removed. The ASDLT allows for the calculation of difference in life expectancy that would arise in the hypothetical situation of entirely removing cause of death *i*.

Chiang's proportional hazards method is employed in order to calculate the ASDLT (Chiang, 1984). Following this approach, the key calculation converts ${}_np_x$, the overall probability of surviving from age *x* to age *x* + *n* to ${}^*_np_x^{-i}$ the (hypothetical) probability of surviving the interval if cause *i* were eliminated. To make this conversion in the proportional hazards framework ${}_np_x$ is raised to the power of R^{-i}, where R^{-i} is the complement of the proportion of deaths arising from cause *i*:

$${}^{*}_{x}p^{-i} = {}_{n}p^{R^{-i}}_{x}, \qquad \text{Equation 3}$$

$$R^{-i} = \frac{{}_{n}D_{x} - {}_{n}D^{i}_{x}}{{}_{n}D_{x}}. \qquad \text{Equation 4}$$

Calculating the ASDLT also requires an assumption for the ${}_{n}a_{x}$ schedule, the average number of years lived by people dying in the interval x to $x + n$. When a force of decrement in an interval is high, the age distribution of deaths in that interval will be young, so care must be exercised in specifying this schedule. The ${}_{n}a_{x}$ schedule is critical in order to move from observed rates to the probabilities that comprise the life table. A mixed strategy for specifying ${}_{n}a_{x}$ is adopted here. In areas where violent death is relatively rare, for ages below 15 and above 75, and for women more generally, the ${}_{n}a_{x}$ schedule of the master life table is used. For all other ages and classes the quadratic graduation suggested by Preston and others is used (Preston, Heuveline, and Guillot, 2001).

Attempting to graduate the ${}_{n}a_{x}$ schedule for populations experiencing very low levels of violent death or in age classes where the number of deaths is changing very rapidly causes the values of ${}^{*}_{n}a^{-i}_{x}$ to be very unstable due to the very small numbers in the denominator of Equation 1. When the number of decrements from cause i is a very small fraction of the total observed deaths, the assumption that cause i has the same within-age-class age pattern is not unreasonable.

Estimating lost product due to violent deaths

The following steps were followed to estimate the lost product to violent deaths:

a. An estimation of the average growth rate of GDP per capita in purchasing power parity (PPP) was carried out. The data comes from the IMF Web site in PPP for the year 2004 (IMF, 2007b). The base year was then changed to 2007 according to the following formula:

$$y_t = \frac{y_0 \times PPP_0}{PPP_t} \qquad \text{Equation 5}$$

where y_t is the GDP per capita in 2004 in PPP of 2007; y_0 is the GDP per capita in PPP in 2004; PPP_0 is the PPP in 2004; and PPP_t is the PPP in 2007.

b. The annual GDP per capita growth rate was calculated according to Equation 6, for each one of the years in the period 1980–2004.

$$g_t = Ln\left(\frac{y_t}{y_{t-1}}\right) \qquad \text{Equation 6}$$

c. The average growth rate for each country was then calculated taking an average of the growth rates for the period 1980–2004. These average growth rates were then used to estimate GDP per capita in PPP (y) for the following 100 years. For countries with a negative average growth rate for the period 1980–2004 it was assumed that these countries' average growth rate is equal to the world's average growth rate.[24] For China, Malaysia, South Korea, Thailand, and the United Kingdom, the average growth rate was estimated relying on the convergence theory. The average growth rate was calculated based on the assumption that these countries would have the same GDP level as the United States in the year 2100.

d. The estimation of LPVD from homicides in 2004 was calculated according to the following formula:

$$LPVD_{t,i} = y_{t,i} \times H \qquad \text{Equation 7}$$

where $LPVD_{t,i}$ is the lost product due to violent deaths in the year t, H is the number of people

(male and female) who died by homicide in the year 2004 and who otherwise according to the life expectancy without homicides at normal societal levels would still be alive in the year *t*, and $y_{t,i}$ is the country's *i* GDP per capita in PPP 2007 of the year *t*.

e. To bring the values of the $LPVD_{t,i}$ of each year into present net value, three different scenarios were considered. The first with a discount rate of 3 per cent, the second with a discount rate of 5 per cent, and the third with a discount rate of 10 per cent.[25] The horizon for the calculation is 100 years, which is relatively close to an annuity to infinity given those discount rates.

f. For the regional estimates of the (*LPVD)*, seven regions were considered: Africa, North America, Latin America and the Caribbean, Europe, the Eastern Mediterranean, South-east Asia, and the western Pacific. The (*LPVD)* of the region *i* in the year *t* was calculated by adding the $LPVD_{t,i}$ of each one of the countries that belongs to that region. Then these values were brought to the present value for the three different scenarios mentioned above.

g. Finally, the estimation for the world's (*LPVD*) was carried out. It was calculated as the sum of the (*LPVD*) of the seven regions and the three different scenarios were also considered.

Chapter Six

Armed Violence Against Women

There is no methodological information for this chapter.

Chapter Seven

Other Forms of Armed Violence: Making the Invisible Visible

Table 8 Countries with more than 100 transmitted cases on enforced disappearances, 1964–2007

	Countries	Total transmitted cases (cumulative)	Outstanding cases (cumulative)	No. of persons dead at date of clarification	First three years with highest number of transmitted cases (year of recording)					
					No. of cases	Year 1	No. of cases	Year 2	No. of cases	Year 3
1	Iraq	16,517	16,387	9	11,553	1988	2,444	1983	849	1980
2	Sri Lanka	12,085	5,516	6,444	4,770	1989	4,673	1990	626	1996
3	Argentina	3,445	3,303	n/a	1,392	1976	1,181	1977	322	1978
4	Guatemala	3,155	2,899	63	522	1982	490	1983	424	1984
5	Peru	3,006	2,368	103	451	1989	433	1983	413	1984
6	El Salvador	2,661	2,270	20	652	1982	535	1983	481	1980
7	Algeria	1,973	1,952	7	643	1995	614	1994	386	1996
8	Colombia	1,225	957	87	100	1988	88	1984	86	1990
9	Chile	908	816	90	429	1973	258	1974	111	1976
10	Philippines	774	615	29	149	1984	84	1985	63	1988
11	Nepal	531	320	1	168	2002	117	2004	57	2003
12	Iran	530	513	9	136	1989	116	1988	66	1981
13	Timor–Leste	501	425	2	242	1991	45	1983	45	1984
14	Russian Federation	468	457	n/a	147	1999	144	1992	56	2000
15	India	390	331	22	63	1992	42	1991	41	1989
16	Sudan	381	172	n/a	253	1995	52	2003	24	2005
17	Mexico	379	208	61	51	1977	40	1974	38	1994
18	Lebanon	320	312	n/a	201	1982	51	1983	18	1985
19	Morocco	248	63	45	79	1976	26	1987	24	1975
20	Nicaragua	234	103	75	60	1979	56	1982	42	1983
21	Honduras	207	127	18	61	1981	29	1985	28	1984
22	Turkey	181	70	21	63	1994	30	1993	26	1992
23	Indonesia	162	159	n/a	58	1998	30	2000	22	1999
24	Yemen	150	n/a	73	101	1986	11	1994	8	1978
25	Ethiopia	119	112	n/a	47	1994	13	1993	8	1974
26	Pakistan	116	92	n/a	41	1995	23	2006	11	1996
27	China	114	31	2	23	1988	14	1995	11	2001
28	DRC	114	114	n/a	107	1999	7	1998	n/a	n/a

Source: Human Rights Council (2008)

List of abbreviations

ASDLT	associated single-decrement life table
CDC	Centers for Disease Control and Prevention (US)
CMR	Crude mortality rate
DCD	Direct conflict deaths
DRC	Democratic Republic of the Congo
GBAV	*Global Burden of Armed Violence*
GDP	Goss domestic product
IISS	International Institute for Strategic Studies
IMF	International Monetary Fund
LPVD	Lost product due to violent deaths
OLS	Ordinary least squares
PITF	Political Instability Task Force
PPP	Purchasing power parity
PRIO	International Peace Research Institute, Oslo
UCDP	Uppsala Conflict Data Program
U5DR	Under-5 death rate
U5MR	Under-5 mortality rate
UNCTS	United Nations *Survey of Crime Trends and Operations of Criminal Justice Systems*
UNHCR	United Nations High Commissioner for Refugees
WHO	World Health Organization

Endnotes

1 See Bibliography for database details.

2 Altogether, 19 databases and reports were examined: Aguirre Tobón (2008); Center for Systemic Peace (2004); Center for Systemic Peace (2007); CIDCM (2005); COW (2007); CRED (2008a); CRED (2008b); Gleditsch (2007); Human Security Centre (2006); ICG (2008); IISS (2008); PITF (2008); Project Ploughshares (2007); PTS (2008); SIPRI (2007); UCDP (2006a); UCDP (2006b); UCDP (2006c); UCDP and PRIO (2007).

3 The cases included by this criteria are Afghanistan, Algeria, Angola, Burundi, Central African Republic (CAR), Chad, Colombia, Côte d'Ivoire, the Democratic Republic of the Congo (DRC), Ethiopia, Georgia, Guinea, Haiti, India, Indonesia, Iran, Iraq, Israel (and the Palestinian Territories), Kenya, Liberia, Myanmar, Nepal, Nigeria, Pakistan, Philippines, Republic of the Congo, Russian Federation, Rwanda, Senegal, Sierra Leone, Somalia, Sri Lanka, Sudan, Thailand, The former Yugoslav Republic of Macedonia, Turkey, Uganda, Armenia–Azerbaijan , Ethiopia–Eritrea , India–Pakistan (Kashmir), and International Fundamentalist Terrorism.

4 The intensity criterion calls for the addition of seven cases to those identified by criterion 1, namely: Egypt, India–Nagaland, Lebanon–Syria, Mexico, Spain, Uzbekistan, and Yemen. The criterion calls for the following cases to be dropped: Armenia–Azerbaijan, Georgia, Guinea, Ethiopia–Eritrea, FYROM, Liberia, Republic of the Congo, and Sierra Leone.

5 Seven conflicts are ongoing but do not fulfil the previous criteria: Bangladesh, China, France, Mali, Peru, Timor–Leste, and the United Kingdom.

6 This information includes sources such as media and NGO reports.

7 See Checchi and Roberts (2005).

8 For responses to all UN *Surveys on Crime Trends and the Operations of Criminal Justice Systems*, see UN (1998; 2001; 2002; 2004; 2006).

9 See Council of Europe (1999) and WODC (2003; 2006).

10 For crime and criminal justice statistics, see Eurostat (2007; 2008).

11 See UNICEF (2008).

12 In 2006, Interpol decided to discontinue producing crime statistics (Resolution AG 2006-RES-19).

13 See WHO (2002; 2008; n.d.a; n.d.b).

14 See PAHO (2007).

15 A list of national statistical office Web sites is available at ‹http://unstats.un.org/unsd/methods/internatlinks/sd_natstat.asp›.

16 Literature databases searched include LexisNexis, IngentaConnect, SwetsWise, PubMed, JSTOR, ProQuest, ScienceDirect, EBSCO host, and Project MUSE.

17 For details, see UNDESA (2006).

18 National police data was accessed from national police Web sites for six countries.

19 See UNDP (2007); UN (2006); Provea (2006).

20 The Inada conditions are mathematical assumptions about the shape of a production function that guarantee the stability of an economic growth path.

21 The Hausman Test for non-systematic difference in the coefficients for the random and fixed effects is rejected (with a *p*-value of 0.7542). This result indicates that it is preferable to use panel data with random effects.

22 The Wald test indicates that the *p*-value is 0.4718. This result indicates that the null hypothesis cannot be rejected, i.e. all country-specific effects are jointly equal to zero.

23 Multiple-decrement life table analysis allows 'removal' of deaths due to a particular cause (cause attribution), such as deaths attributable to external injuries or intentional external injuries.

24 The countries for which the global average rate was used are: Afghanistan, Belarus, Cambodia, DRC, Kazakhstan, Liberia, the Russian Federation, Serbia, Ukraine, and Uzbekistan.

25 The highest discount rate signifies the lowest economic loss.

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