



# Documents of war

## Understanding the Syrian conflict

Researchers in Syria are doing their best to monitor the number of people killed in the ongoing conflict. A full and complete count is impossible amid the violence – but the extent to which killings can and cannot be documented reveals much about the nature of the fighting. By **Megan Price, Anita Gohdes and Patrick Ball**

As the conflict in Syria enters its fifth year, it remains unknown how many people have been killed. International press and social media coverage may make it seem that the answer is readily obtainable, but it is not. Different sources quote different numbers, confirming what observers already know: that the process of uncovering the human cost of conflict is never straightforward.

Our team at the Human Rights Data Analysis Group (HRDAG) has spent more than 20 years analysing mass violence in conflict zones, which has made us acutely aware of the enormous difficulties involved in accurately counting casualties of war. The chaos and fear that surround conflict mean that killings often go unreported and consequently remain hidden from view.

In our past work establishing patterns of atrocity in Guatemala, Kosovo, Peru, Colombia, and Timor-Leste, we have repeatedly found that the “dark figure” – people killed whose deaths were never reported – can be surprisingly large. Our estimate for the Truth and Reconciliation Commission of Peru suggested that the long civil war there cost three times as many lives as the number directly counted. Shortly after the end of the conflict in Kosovo in 1999, our team estimated that more than half of all victims were yet to be identified, and it has taken 15 years for activists to corroborate this number with individual names and stories. And in Guatemala, our team’s statistical analysis showed that indigenous people were eight times more likely to be killed by the army relative to their non-indigenous neighbours – though the bodies and names of many of the dead still remain buried in anonymity.

While the dark figure of casualties can be both large and uncertain, it is also vital for understanding conflict dynamics; it can show us how violence plays out over time and space. In the specific case of Syria, we seek answers to a number of questions. Were more people killed in 2013 than in 2012? Is the majority of the violence occurring in rural Damascus or Aleppo? Does violence increase or decrease as control over a territory changes hands between different conflict parties? These are the kinds of comparative questions that can drive policy decisions, resource allocation and, eventually, transitional justice and accountability mechanisms such as truth commissions and war crimes trials.

### The limits of observational data

We cannot answer these key questions simply by looking at the documented numbers of violent acts. Without additional statistical modelling to estimate the unobserved violence, it is impossible to determine whether observed patterns in the documented numbers accurately reflect underlying patterns of violence, or are an artefact of the access and resources the documentation groups had available at each time and place.

Recording lives lost through conflict in the chaos of fighting is extremely challenging, and despite careful and systematic assembly, the existing data are convenience samples. Though far from convenient to collect, the data represent what is observable – which is an unknown subset of the full population of conflict-related violence in Syria.

Inevitably, some acts of violence remain hidden: they may leave behind no witnesses,

or witnesses who do not feel sufficiently safe to report what they have seen, or witnesses who do not know to whom to report what they have seen. This means that some acts of violence are more likely to be documented than others. Factors affecting the “visibility” of violence include where the event occurred (in rural or urban areas), victim demographics (young/old, male/female, soldier/civilian), and perpetrator characteristics, as well as aspects of the event itself (e.g., how many people died). The variable probability of reporting means that these data are biased with respect to these variables.

In this article, we present an analysis of how the dark figure of violence has fluctuated over the course of the conflict, specifically focusing on examples from two conflict centres, Homs and Hama, for the period between December 2012 and March 2013. To obtain a measure of variation in the documentation patterns, we estimate the total population of victims.

The estimates we present should be understood as an analysis of a snapshot of the conflict, based on data that were shared with us in 2013. The documentation groups update their data on an ongoing basis, adding records for newly documented and/or verified victims and removing records when people mistakenly reported as killed are found alive, or when people reported as killed are found to have died by natural causes. Analyses presented here do not reflect the updates groups have made to their records since 2013. Additionally, most records are missing information about the age and civilian status of victims; many



records also lack information about sex, or include a recorded sex that contradicts local interpretation of the recorded name. Therefore analyses could not be stratified by these demographic measures of interest.

## The dark figure

We begin by estimating the number of individuals killed in the Syrian conflict between December 2012 and March 2013 using multiple systems estimation (MSE) – also called capture–recapture – which describes a family of statistical techniques to quantify hidden populations.<sup>1</sup>

Multiple groups are documenting victims killed in Syria. For our estimation, we rely on historical data from four sources: the Syrian Center for Statistics and Research (csr-sy.org), the Syrian Network for Human Rights (sn4hr.org), the Syria Shuhada website (syriansshuhada.com), and the Violation Documentation Center (www.vdc-sy.org).

We can match each casualty record in each group's list to the other lists to arrive at a single list of documented killings, using a technique called record linkage. In a series of reports commissioned by the United Nations Office of the High Commissioner for Human Rights, our team established such a matched list of documented, identifiable victims.<sup>2</sup>

However, MSE estimates the total number of victims – not just the documented victims – by comparing the size of the overlap(s) between lists to the sizes of the lists themselves. If the overlap is small, this implies that the population from which the lists were drawn is much larger than the lists. If, on the other hand, most of the cases on

### A note on the method

MSE depends on key assumptions, including that the overlap of victims between different sources has been correctly established (sometimes referred to as perfect matching), and that there is no migration into or out of the population during the time of study (closed population; alternative methods exist for open populations). Additionally, in the case of three or more lists, different individual inclusion probabilities and potential correlations between sources must be appropriately accounted for in the modelling step (in the simplified two-list case we must assume homogeneity of capture probabilities and list independence). In these analyses we stratified the data by time and region because inclusion probabilities tend to be more homogeneous in smaller strata, and we used log-linear models to explicitly account for possible interdependencies between different sources.

the lists overlap, this implies that the overall population is not much larger than the number of cases listed.

Figure 1 shows how this works in a simplified way. On the left, list A has 10 individuals, two of whom are also on list B. List B has eight individuals, two of whom are also on list A. We know from probability theory that the probability of being in a random list of size  $A$  from a population of size  $N$  is  $A/N$ . Similarly, the probability of being in a list of size  $B$  is  $B/N$ , and the probability of being in a list of size  $M$  is  $M/N$ . We also know that if lists A and B are independent, the probability of being in both A and B is the product of the individual probabilities:  $A/N \times B/N$ . But “A and B” is the same as  $M$ , so we can write:  $A/N \times B/N = M/N$ . From there, we can solve the equation for the unknown total population size,  $N$ :  $N = A \times B/M$  (This is known as the two-system Lincoln-Petersen estimator. See box above for a note on assumptions in the MSE method, and [hrdag.org/mse-the-basics/](http://hrdag.org/mse-the-basics/) for additional blog posts on MSE by Amelia Hoover Green).

## Homs and Hama

The outputs of MSE analyses are estimates of the total number of victims, both documented and undocumented. In other words, MSE estimates what is missing from the list of observed, identifiable victims. Results presented here are highly preliminary, but Figure 2 shows the reported and estimated killings for the months between December 2012 and March 2013 in Homs and Hama. There were 1554 documented casualties in Hama during this period, and 2037 in Homs, but MSE analysis suggests there were as many as 3793 and 4246 total victims in each governorate (upper bounds).

The different colourings of the bars indicate how many times a victim was reported: the lightest colour represents those who were reported by all four sources, the next darkest represents those who were reported by three sources, and so on. The darkest blue section at the top of each bar describes the estimated dark figure, that is, those killings not reported in any source (including the bootstrapped 95% confidence interval shown by the vertical black line).

Figure 2 clearly shows how widely the dark figure varies from month to month, and between Homs and Hama. In Hama, more victims were reported in December 2012 than in the following January, but the dark figure in January far exceeds the dark figure in December. Documented data would suggest that violence slightly decreased from one month to the next, while the estimate tells the opposite story.

During this period, Hama was under contested control between rebel groups and the Syrian army. Rebel units were described as launching an “all-out assault on army positions across Hama” in mid-December

### Equations for deriving unknown population $N$ , two systems

$$\frac{A}{N} \times \frac{B}{N} = \frac{M}{N}$$

$$\frac{AB}{N^2} = \frac{M}{N}$$

$$ABN = MN^2$$

$$AB = MN$$

$$\hat{N} = \frac{AB}{M}$$

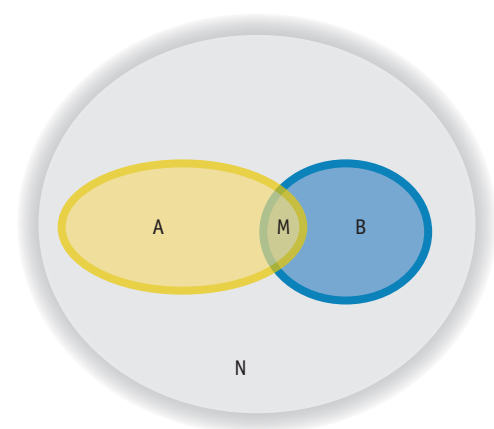


Figure 1. How to use multiple systems estimation (MSE) to derive an unknown population from known samples

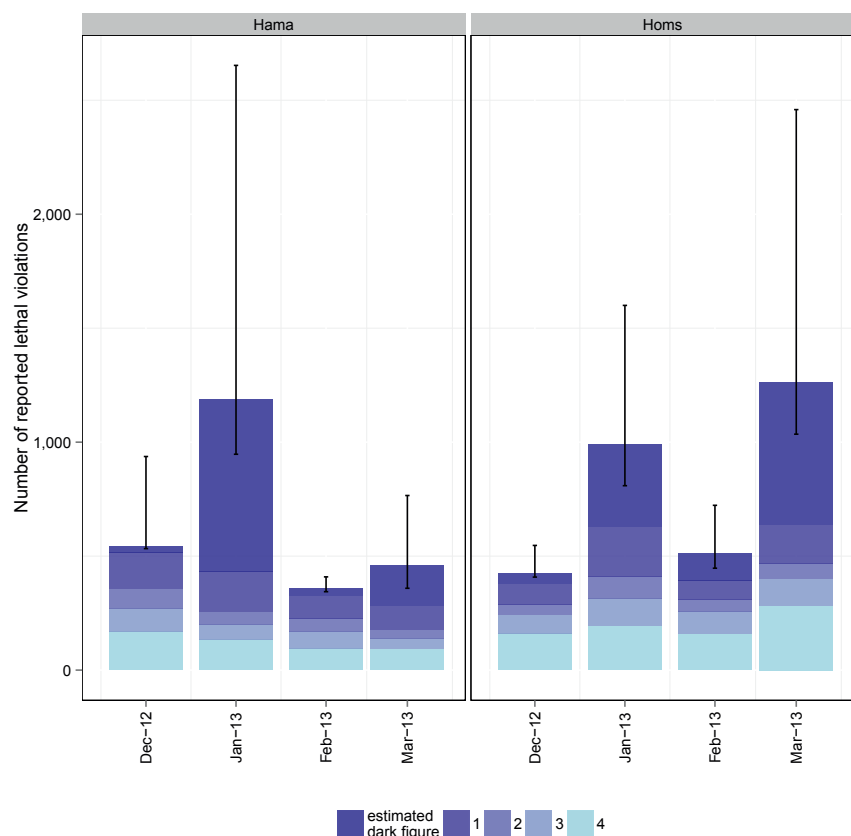


Figure 2. Reported and estimated killings in Hama and Homs, December 2012 to March 2013

2012 ([bit.ly/1Kd3mcC](http://bit.ly/1Kd3mcC)), whereas by February 2013 McClatchy was describing a “wave of displacement ... when the government, seeking to reverse rebel gains, began a heavy-weapons assault” ([bit.ly/1Kd3tor](http://bit.ly/1Kd3tor)). Similarly, January and March in Homs display a comparable level of documented violence, but the estimates suggest that March may have been more violent than January. This period corresponds to the beginning of what was ultimately a multi-year siege in Homs.

Future truth commissions and war crimes trials will examine patterns of violence during times of contested control such as these. Their conclusions may hinge on precisely these kinds of comparisons, and failing to take the dark figure into account would mean drawing the wrong conclusions.

In highlighting the discrepancies between documented victims and estimated total victims, we are not seeking to criticise any of the data collection groups. Indeed, they themselves transparently report the incompleteness of their records. For example, reports from the Syrian Network for Human Rights frequently conclude that there are many instances where “we were unable to

reach and document, particularly in the case of massacres and besieged areas, where the Syrian government frequently blocks communication”.

Many individuals and groups are conducting meticulous yet very dangerous work collecting as much information

as possible on the victims of violence in Syria. This information is invaluable. But by themselves, these incomplete data are not suitable for statistical analysis because what the documentation groups are able to record constantly changes. Such raw data are therefore inappropriate for testing the kinds of hypotheses that can guide the international community toward policy decisions and evaluations of intervention strategies.

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## Documentation dynamics

Most studies of mass violence focus on conflict dynamics, but we can also study documentation dynamics – by which we mean the extent to which human rights observers have been able to document killings – to see how the latter informs and relates to the former. Estimating changes in the dark figure is a crucial step towards



Syrian refugees in Za'atari, Jordan, by Jeff J Mitchell/Getty Images News/Thinkstock

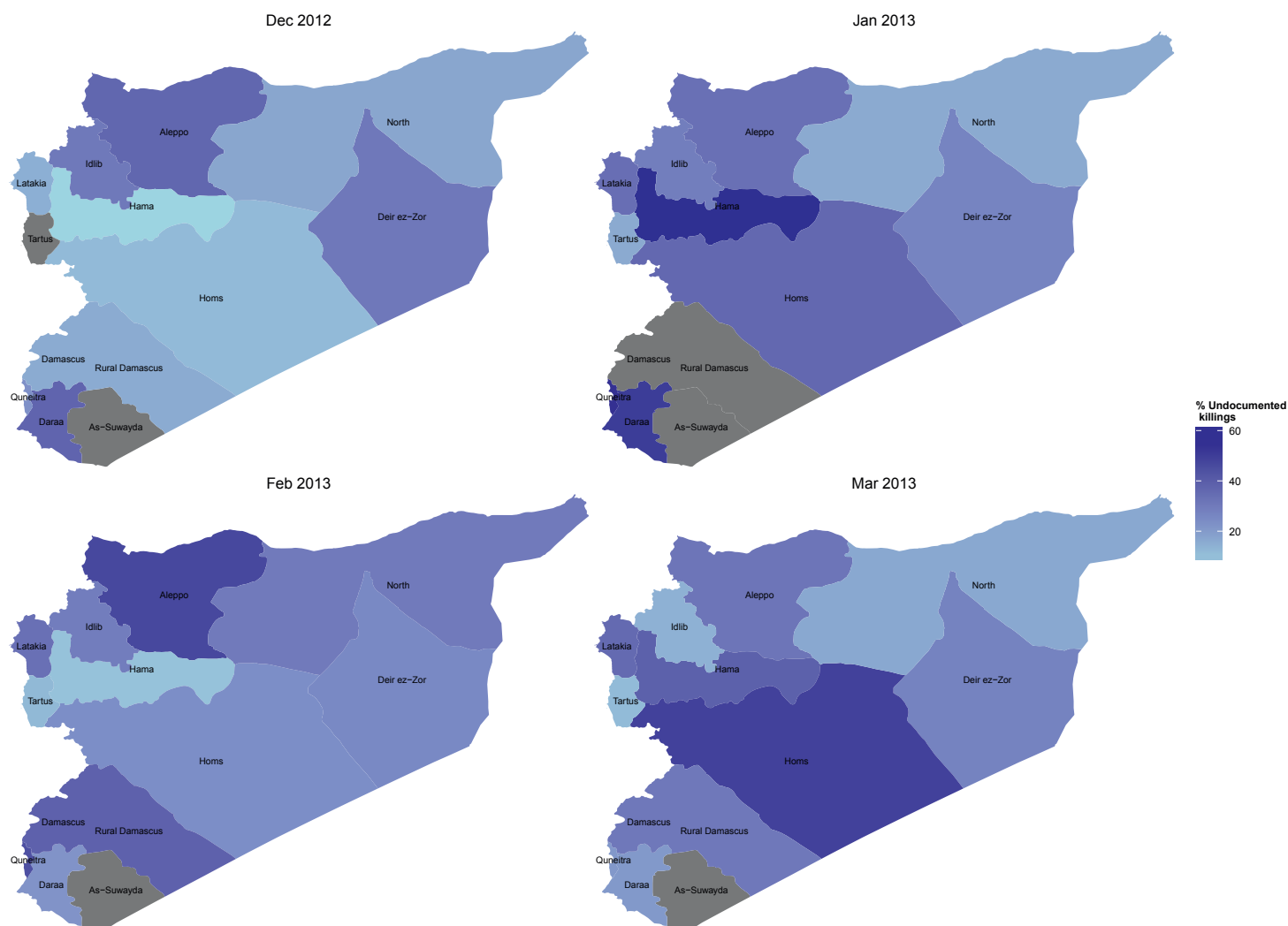


Figure 3. Documentation patterns by region and month in Syria from December 2012 to March 2013

answering the questions of interest described at the outset of this article, and in identifying the relationship between documentation and conflict dynamics.

Figure 3 maps the documentation coverage rate for the entire country of Syria for four months, from December 2012 to March 2013. The coverage rate is calculated from MSE estimates for each month and governorate or, in one case, a combination of two governorates (Al-Hasaka and Ar-Raqqa) into a single region. Darker regions indicate a relatively larger dark figure – that is, a higher rate of undocumented violence (grey regions in each map indicate times and locations where it was not possible to calculate MSE estimates due to data sparsity). Figure 3 indicates a high level of variability both across geographic regions and within a single geographic region over time. We are highlighting two examples in

Hama and Homs, but Figure 3 shows that documentation rates vary widely across the entire country.

Figure 3 also provides another way to consider the information in Figure 2. For example, Figure 2 showed much higher estimated dark figures in Hama in January and March 2013 as compared to December 2012 and February 2013. Indeed, in Figure 3, Hama alternates between a very low dark figure of 5% (95% bootstrapped interval: [3%, 45%]) in December 2012 and 9% [6%, 21%] in February 2013, and a very high dark figure of 64% [54%, 84%] in January 2013 and 39% [22%, 63%] in March 2013. During the well-documented months of December 2012 and February 2013, the observed numbers of victims may be close to the truth. But during the months of January and March 2013 we may be missing more than half of the true amount of violence.

This leads to the contradictory patterns between a documented decrease in violence and an estimated increase in violence described previously.

Figure 3 also shows a steadily darkening shade in Homs. During this period – the start of the aforementioned siege – the estimated dark figure in Homs dramatically increases from 11% [7%, 31%] to 50% [39%, 74%].

At this point, we can only speculate about reasons for these observed variations in documentation rates over time and geographic area. But it is certainly plausible that, for example, while Homs was a city under siege, it was more difficult both for outsiders to access the community within that governorate and for victims and witnesses to get their stories out. As a result the observed data may be underreporting the true amount of violence that occurred in Homs during this time period.



## Sources of bias

Our analysis highlights how the relative completeness of casualty recording – the documentation dynamics – varies for different locations and periods. Changes in the recorded data may reflect the documentation dynamics rather than the conflict dynamics they seem to represent.

From our experience studying other conflicts, human rights documentation groups are often freer to work in areas under the control of one party to the conflict (A) than they are in areas under the control of the other party (B). Therefore, areas under control of party A are likely to have much more complete documentation of violence than areas under control of party B. The changing pattern of control in Hama provides a controlled experiment for this hypothesis. As control was disputed between the rebels and the government in Hama between December 2012 and January 2013, estimated total killings increased sharply, but reported killings actually declined.

Whether or not violence increases when control of a region changes hands among different armed groups is among the most important statistical questions we ask about conflict. In this case, and others, quantitative analysis of the observed data alone may get the answer exactly wrong. To get the answers right, we need to adjust for biases and incompleteness in the raw data by statistically modelling what is hidden from view.

In Syria, we do not yet know if the documentation dynamics are consistently correlated with which institutions are perpetrating killings, or with which groups are in operational control of a region. We know that there are other biases present in the data on Syria: elsewhere we have shown that events with a larger number of victims are more likely to be reported by more sources,<sup>3,4</sup> and in a report last year, the Oxford Research Group described how documentation groups struggle to reach areas where electricity and internet connections may be unavailable.<sup>5</sup> There are undoubtedly other biases that have not yet been identified.

We are especially worried about the interplay between documentation dynamics and conflict dynamics because of the rise of the Islamic State (ISIS, or Daesh) in Syria in the second half of 2014. In some databases we have reviewed, there are substantial



Syrian refugees in Mafraq, Jordan, by Jeff J Mitchell/Getty Images News/Thinkstock

declines in the number of reported killings during this period. We suspect that the relatively lower number of killings reported in regions under Daesh control reflect changes in documentation dynamics, not in conflict dynamics.

Because of these uncertainties, we have not presented an estimate of the total number of victims to date. We are still exploring the challenges of modelling so many unknown killings in a documentation context as complicated as the ongoing war in Syria.

In other countries where we have estimated total killings, the data were collected primarily after the conflict's end, when witnesses and researchers could be relatively safer as they speak up and collect evidence. In contrast, researchers from the documentation projects studying the Syrian conflict are working while an intense conflict is raging.

Before we venture an estimate of the total killings, we must confer more closely with the documentation groups and study in more depth how their teams are operating in the midst of horrifying violence.

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**Megan Price** designs strategies and methods for statistical analysis of human rights data for projects in a variety of locations, including Guatemala, Colombia, and Syria. She is the lead statistician and author on reports commissioned by the Office of the United Nations High Commissioner for Human Rights on documented deaths in Syria. She co-founded HRDAG with Patrick Ball in 2013, and is a Research Fellow at the Carnegie Mellon University Center for Human Rights Science

**Anita Gohdes** has been working for HRDAG as a field consultant since 2010. She is a post-doctoral researcher at the University of Mannheim, Germany, where her research focuses on political violence, communication technology and state repression, and the measurement of human rights. She will be a Research Fellow at the Harvard Belfer Center for 2015/2016

**Patrick Ball** has spent more than 20 years conducting quantitative analysis for truth commissions, non-governmental organisations, international criminal tribunals, and United Nations missions around the world. He has appeared as an expert in international and domestic war crimes trials, including the trials of two former heads of state. He co-founded HRDAG with Megan Price in 2013, and he is a Fellow of the American Statistical Association