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Counting the Deaths in Darfur: Estimating mortality from multiple survey data

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1 Introduction

The exact number of deaths in the Darfur region due to the conflict will probably never be known. However, most certainly, it is far too many. Estimating mortality in conflicts is a notoriously difficult exercise, even more so in Darfur where the conditions causing death are extremely variable. Malnutrition, epidemics and violence occur sporadically, claiming many lives in some areas and none in others. Recognising the importance of tracking mortality and estimating deaths, humanitarian aid agencies working in the region have undertaken mortality surveys among their beneficiaries at different times to assess the condition of their status and the severity of the crises. These are based on sound statistical and epidemiological techniques and provide insights into the varying levels of mortality over the entire region.

Estimating numbers of deaths from surveys depends on representativeness of the sample, double counting of deaths, under or over-reporting by respondents. Another key concern is that intensity of the conflict varies over time and in different areas of Darfur and therefore a blanket application of rates from a few surveys will invariably distort results.

The humanitarian assistance, although slow in early stages, since the first half of 2004 in Darfur has been massive and is widely acknowledged to have saved many lives. As humanitarian needs continue to grow the situation today is deteriorating again and it is clear to the authors that humanitarian aid has to be increased and important international measures to end the aggression must be taken.

From a majority of deaths being caused by military/violence in the wars in the first half of the 20th century, armed conflicts over the last 20 years have taken their toll among the civil populations. Disease and malnutrition have been the main causes of deaths among civilians in most of the major conflicts of the past two decades. These include deaths due to lack of access to health care, to food or harvests leading to starvation, dehydration and disease during displacement. Direct war-related violence on civilians leading to death (massacres, shootings), while heinous, contributes a small part of the total deaths, but remains the only direct evidence of the blunt hostility of armed groups on unarmed inhabitants.

In summary, we estimated approximately 134,000 total deaths in Darfur and Eastern Chad over the 17 months from September 2003 to January 2005. Of these deaths, 120,000 were excess deaths directly attributable to the conflict, 35,000 of which were violent deaths.

2 Other conflict related mortality estimates for Darfur and eastern Chad

The conflict in Darfur has given rise to a wide range of estimates, from precise numbers of dead such as 396,563 persons [1] to more general statements such as the UN Office for the Coordination of Humanitarian Affairs' (OCHA) figure of 180,000.[2] Regardless of the levels of mortality reported, we assume that none of these sources may be considered as having generated politically motivated or deliberately biased results to make a point. The validity of estimates instead is dependent on methodological rigour and soundness of the assumptions on which they are based. Lower estimations, if indeed valid, do not necessarily diminish the severity of the humanitarian situation or express callousness to the suffering and death in Darfur.

3 Recent history

The following brief narrative [3] illustrates the complex and evolving nature of the Darfur conflict through four phases and illustrates the vastly differing conditions specific to each time frame and region. The varying periods are also used as a framework for disaggregating mortality accordingly.

3.1 Initial outbreak of violence (March-September 2003)

The conflict between the government and two rebel groups in Darfur began in February 2003. On April 25th, 2003, the Sudan Liberation Movement/Army (SLM/A) and the Justice and Equality Movement (JEM) carried out the first major attack against a government airport in North Darfur.

The government and its local militia allies responded; the conflict then spread to other areas of North Darfur, including Malha and Kabkabiyah as well as parts of West Darfur. In the early stages, the conflict was relatively limited in scope and resulted in about 110,000 IDPs in North Darfur and an additional 30,000 IDPs in West Darfur by September 2003. The first Sudanese refugees began to arrive in Chad during this time.

3.2 Breakdown of cease-fire/escalation of conflict (October 2003-March 2004)

Failure to implement the September 2003 cease-fire agreement among the SLM/A, JEM, and the government was followed by a swift intensification of the conflict and increased attacks on civilian villages by Janjaweed and government troops. Large-scale displacement occurred and refugees began to arrive in Chad in large numbers. The fighting in South Darfur was relatively light during this period.

3.3 Second cease-fire agreement (April-June 2004)

The April 8th cease-fire agreement among the SLM/A, JEM, and the government, though often violated, led to a significant decrease in the level of violence in Darfur. The decline in violence was brought about by increased international pressure, a greater humanitarian presence in Darfur, and the retreat of rebel forces following a series of battlefield defeats. Violence as a cause of death therefore decreased, but mortality rates among displaced populations in both Darfur and Chad remained elevated because of the increasingly weakened condition of persons arriving at camps and deficient humanitarian assistance. Populations in West Darfur and Chad suffered the highest mortality and morbidity rates because of their inaccessibility from humanitarian aid workers. The conflict and violence spread south and the IDP population of South Darfur doubled in June.

Though region-wide mortality rates dropped, a high number of deaths occurred because of an increase in the affected population throughout Darfur and higher mortality rates in South Darfur. Non-displaced populations hosting large numbers of displaced persons also began to experience elevated mortality rates as their water and food resources became strained and they became more vulnerable to infectious diseases. Major battles, resulting in a large loss of combatants on either side, sharply declined.

3.4 Increased international humanitarian response (July 2004-January 2005)

Following increased international pressure, the government gradually lifted most restrictions on access to Darfur for international aid organizations starting in June 2004. The number of humanitarian workers in Darfur increased from 200 in March 2004 to nearly 10,000 (local and international) by March 2005. South Darfur and parts of North Darfur continued to experience fighting and new displacement. Stabilization of humanitarian conditions began first in North and then started in West Darfur. Low-level violence and widespread insecurity have continued throughout the region, with another

surge in fighting in November and December 2004. Because of greater humanitarian assistance, mortality rates gradually decreased in mid- to late 2004 and early 2005, but pockets of higher mortality remain, particularly in South Darfur.

4 Statistical background

According to the estimates in April 2005 of the Darfur Humanitarian Profile approximately 2.6 million people were affected by the conflict in Darfur. On top of this, there were some 200,000 Sudanese refugees in Chadian camps. (Table 1)

The total population in the three Darfur states was estimated to be 5.6 million in 2001. Bearing in mind an increase of the population, we can assume that the population in 2005 was approximately 6 million. This means that at that moment almost half of the total population of Darfur was affected by the conflict.

Prior to the conflict, the nutritional and mortality situation in Darfur was comparable to other states in Sudan. The Multiple Indicator Cluster Survey 2000 (MICS 2000) of UNICEF reported figures of child mortality showing Darfur to be in the middle group. (Table 2)

The numbers on malnutrition show some major differences between the different states. North Darfur seemed to be the most affected state by acute malnutrition but had the lowest numbers of chronic malnutrition. West Darfur on the other hand was the opposite.

5 Materials and methods

5.1 Materials

We collected data from 24 surveys conducted during the period April 2004 – January 2005. Taking the mortality recall period into account, the covered period was September 2003 – January 2005. (Table 3)

13 surveys reported crude mortality rate (CMR), under 5 mortality rate (U5MR) and the % of deaths attributable to violence. Two of them reported figures for subperiods, which were used in the analyses. Therefore, the total number of datapoints used in our estimation is 15.

A 14th survey conducted in Muhajiria showed a significantly different trend compared to the first 13 surveys. This survey was assumed to be an outlier and excluded from some analyses. A possible explanation is the presence in South Darfur of “clusters of violence” which cannot be considered representative for the entire Darfur region.

Additionally, 8 other surveys also reported mortality rates, however without reporting cause-specific deaths. The overall mortality figures match the trends showed by the 13 previously mentioned surveys. Nonetheless, since no detailed cause-specific analysis was possible, they have been excluded from the calculations.

Data from the different surveys was compiled from the Complex Emergency Database (CE-DAT (www.cred.be/cedat)). This CRED project aims at improving evidence-based policy on conflict prevention and response by providing standardized and comprehensive data on the human impact of conflict. The project involves producing an online, publicly accessible database that is a compilation of quantitative and qualitative information from numerous credible sources on several countries, including Sudan.

5.2 Method

5.2.1 Non-violence related mortality (Figure 1)

Based on 13 surveys providing data on non-violence related deaths, we analyzed the non-violence related mortality rate for which most surveys give a rather stable figure with a maximum of $\pm 1.1/10,000/\text{day}$ except for mid 2004. During the months June - August, the non-violence related mortality rate increased significantly. Therefore, we decided to use the figures by state from the WHO survey, which covered those months. We subtracted the given proportion of violence in order to obtain a rate that would account for non-violent deaths. This gave us for North and West Darfur respectively 1.19 and 2.55/10,000/day. The high value for West Darfur also covers a possible epidemic outbreak in El Geneina during June (MSF/Epicentre El Geneina non violent-related mortality rate: 5.04/10,000/day).

For South Darfur, WHO only surveyed Kalma camp. However, an MSF survey covering the same period in Muhajiria showed a lower mortality rate. In order not to

underestimate the mortality in this state, we decided to use the highest value of both, namely 3.42/10,000/day (non-violence related mortality rate in Kalma).

5.2.2 Violence-related mortality (Figure 2)

Using the same 13 surveys that were used for the non-violence-related mortality, we analyzed the violence-related deaths during the period from December 2003 to January 2005, which covers a considerable part of the months with heavy violence.

An exponential regression over time was performed using all surveys except for the one conducted in Muhajiria, showing a significantly different pattern than the other ones. We considered it an outlier and did not include it in the regression.

Since the period September 2003 - November 2003 was not included in the regression, we applied the proportion of violence we obtained for December, which is the closest value in time we have.

After September 2004, the same proportion of violence has been applied to South Darfur as to North and West Darfur. However, there is no survey giving any information on the level of violence in South Darfur for that period. Therefore, we decided not to make any unfounded assumptions and to leave the possible higher proportion of violence related deaths due to outbreaks of violence in South Darfur during that period out of our calculations.

5.2.3 Crude mortality rate

We considered the CMR to be the sum of the violence-related and non-violence-related mortality. Since an approximation of the proportion of violence-related deaths was available using the regression and that the non-violence-related mortality rate had been estimated to be rather stable except for the period around harvesting, we were able to calculate a probable CMR, using the following equation:

$$\text{CMR} = \frac{\text{non violence related mortality rate}}{1 - \text{proportion violence related deaths}}$$

5.2.4 Reference values

The value that was used to calculate the expected number (without the conflict) of deaths was the crude mortality rate of 2003. According to UNICEF [4] this was, for the

entire country, 11/1,000/year or 0.3/10,000/day. As described in the section on Statistical background, the under 5 mortality rate (U5MR) in Darfur was similar to the country average. Therefore, we assume that the national data on CMR is applicable to the Darfur region.

5.2.5 Universe

The Darfur Humanitarian Profile provides monthly estimations of the affected population and the number of IDPs in Darfur since September 2003, but not of refugees. The affected population started with a regional total of less than 500,000 in September 2003, increased steadily from then and reached some 2.4 million in January 2005. (Figure 3)

6 Results

The regression showed a high level of correlation ($R^2=0.70$). (Figure 4)

Applying the approximated violence and non-violence related mortality rates (Figure 5-Figure 6) to the affected population as mentioned in the Humanitarian Profile from September 2003 until January 2005, we arrive at a total estimated number of deaths of 121,582 among the conflict-affected people only. This is the number of people that died during this period in Darfur. It does not take refugees into account. Figure 7 shows the calculated monthly CMR and number of deaths.

There are $\pm 200,000$ refugees in Chad, accounting for approximately 10% of the affected population within Darfur (2,300,000). Assuming that these refugees present comparable rates of mortality, we can add 10% to our subtotal arriving at 133,740 deaths for September 2003 – January 2005 (Table 4).

We excluded the number of those who would have died without the war in any way using an expected death rate of 0.3/10,000/day (UNICEF 2003). This number was subtracted from the $\pm 134,000$, which gave us **111,759**. These deaths may be attributed directly as a consequence of the war.

Using the rates of violence-related mortality we calculated through regression analysis, we estimate the number of violence-related deaths to be $\pm 35,000$.

As mentioned before, these figures do not take into account:

- the number of people killed before September 2003
- deaths from isolated areas with high violence rates in South Darfur after September 2004

Previous studies suggest the evolution of mortality rates could be expected to gradually return to normal levels four to six months after an effective humanitarian response.[5] Exceptions, such as Ethiopia in 1999-2000 where mortality rates increased following aid interventions, were a result of widespread outbreaks of infectious diseases, in this case measles.[6] (Figure 8)

The absence of large-scale infectious disease outbreaks such as measles and diarrhoeal disease and their associated mortality, across greater Darfur, likely contributed to lower mortality rates than previously projected.[7]

Application of this historical trend to the Darfur crisis is not uncomplicated due to the plodding nature of gearing up an effective aid intervention and the progression of the conflict to certain regions, particularly the South. Nevertheless, taken individually, the regions of Darfur were found to generally follow historical patterns with the exception of South Darfur, which has been a mixture of continuing sporadic conflict and new displacement coinciding with progressively more effective humanitarian assistance. [8],[9]

7 Discussion

We have attempted to go beyond simply calculating deaths, by uniformly extrapolating rates derived from limited populations and/or time periods to the total Darfur population and duration of the conflict. Instead, this method endeavoured to use every reliable available estimate along with contextual information to arrive at the soundest possible approximation of the reality for various periods and geographic locations.

There are several limitations to our estimations.

First, the variability of mortality across the vast Darfur region as well as the variability in different periods of the year is far from completely captured in our estimates. The design effect for surveys representing state or Darfur-wide populations indicate that mortality was significantly clustered. We attempt to capture this variability down to the state and month levels, increasing the accuracy of the study. Still, we were not able to evaluate the mortality in the entire Darfur region during the period February

2003 – September 2003 and in some pockets of high violence in South Darfur during the second half of 2004.

Second, biases regarding under- or over-estimations are worth examining.

We have systematically retained the higher values when multiple rates were available for a specific area at a specific time. In certain circumstances, this could lead to over-estimations.

There has been much debate over inaccessible populations and how to represent them in mortality estimates. The Humanitarian Profiles of the UN Office in Darfur includes affected populations, in secure and insecure areas. Our estimations of mortality rates have been applied to both these accessible and inaccessible communities and they are therefore captured in our estimates.

Finally, some of the surveys used in these analyses used recall periods that were limited largely to the time that populations were in IDP camps. This could be a source of underestimation of deaths, particularly during earlier periods of the conflict.

Third, the issue of the denominator and its validity.

The estimations of affected population could have been lower than in reality, or experienced a lag in identification by aid organizations, particularly when the international presence in Darfur was still limited. This again is a potential source of underestimation. If the number of affected was assumed to be 20 percent higher for the September 2003 – August 2004 period in North and West Darfur and through October 2004 for South Darfur, approximately 5,000 – 19,000 total deaths and 4,000 - 18,000 excess deaths could be added to the total estimate. This is one of the important reasons why rates are a more reliable and valid indicator than absolute numbers, which will vary according to the denominator used.

UN population estimates are primarily based on WFP figures for food rations. They are likely to be inflated in some areas due to double registration or registration of non-affected populations. This will result in overestimation of recent deaths. UNHCR has lowered its registered refugee population in Chad by nearly 30,000 after similar verifications were conducted.

The surveys utilized in our estimates, although statistically and epidemiologically sound, have their own limitations that are therefore present in our calculations. For example, “missing persons” is vaguely defined in complex emergencies. Family members may be temporarily away, left behind and some may have died. It is very difficult in sample survey situations to correctly assess the contribution of this category to total deaths. Sample household surveys also do not account for deaths of whole families.

A final methodological issue is related to the use of baselines. Excess deaths can only be calculated against a “normal” threshold. The lower this threshold is, the higher the excess deaths are. We compared the Infant Mortality Rate and >5 mortality rate from the UNICEF Multiple Cluster Survey (MICS 2000) in Darfur to national averages of that year. The UNICEF Darfur regional survey values were not significantly different from the national values and hence the national CMR of 11/1000/year or 0.3/10000/day was used as a baseline. Failure of many other estimates to account for baseline mortality results in total death estimates being tens of thousands higher than a more accurate count that only includes deaths attributable to the conflict.

Mortality in Darfur, like in most other complex emergencies today, is largely caused by infectious diseases and malnutrition, not direct violence. A well-known study in the Democratic Republic of Congo estimated from a direct household survey, that 200,000 out of 1.7 million excess deaths were attributable to acts of violence. The majority was due to the war-related collapse of the region’s health infrastructure and of the delivery of health and nutrition services. [10] Population surveys in Somalia determined that 4 to 11% of deaths over ten months during 1992-93 were caused by war-related trauma. [11]

Our estimates demonstrate enormous loss of life in the Darfur population. Overall deaths also do not reflect the sum-total of the widespread sexual violence against girls and women and torture since much of these did not terminate in death. Our approach taking into account a wide variety of surveys undertaken by professional staffs specialised in statistical and epidemiological methods, is most likely the nearest approximation to the truth possible based on current available information.

Violence related deaths have occurred over short intervals and generally in concentrated areas. Separating out the two broad causes of death not only helps to understand the pattern of the war but also provides very useful indicators for operational approaches in that region. High violence-related death rates indicate the need for surgical

interventions, blood transfusions and other trauma-related health care. On the other hand, high CMRs without high violence-related deaths will require services for children, including nutritional and vaccination programmes. The non violence-related mortality suggests that the period from May-July is a very vulnerable period for people in Darfur. Loss of livelihoods has a tremendous effect on a delicate situation, as was the case in Darfur before the conflict.

8 Conclusion

Today, the people of Darfur are some of the very poorest in the world. Among these, a third has been driven from their homes or lives amidst terror, aggression and violence. Nearly 30 countries in sub-Saharan Africa are listed by the World Health Organization to be in conflict. Among the affected populations, children do not go to school, vaccination coverage drops, progress in otherwise successful polio eradication campaign declines, epidemic outbreaks remain unnoticed and the entire development is compromised for this region.

Our estimation method relies both on reliable survey data adjusted by contextual information from the field offices of WFP, UN, OCHA and others.

Using a mix of these approaches, we arrive at an estimated 135,000 deaths for the period September 2003 - January 2005 of which approximately 112,000 are in excess of the number of deaths expected and can be attributed to the conflict. Our estimations indicate an order of magnitude and indicate trends in mortality rather than a precise number of deaths.

Furthermore, our research has shown that high mortality in complex emergencies can be attributed to essentially two broad cause categories: malnutrition and disease in opposition to violence. Although both may co-exist side-by-side, typically one will be the dominant cause. For humanitarian and peace building purposes, it is important to establish the dominant cause since intervention policy will be fundamentally different.

Malnutrition and disease related mortality requires rapid food aid, clean water supplies in the very first instance. If there is mortality clustering over time or space, then outbreak investigations will be required before launching a disease control action.

Violence related mortality requires a different approach. This can be identified also by using the CMR/U5MR ratio as a broad indicator of the mortality profile in a community. [12] High violence related mortality is also more common among adults in contrast to disease related mortality and therefore policies both for care and for rehabilitation require a different approach. Deaths occur among the revenue earning members of families, leaving behind highly vulnerable women headed households with little source of income. This situation will also engender larger numbers of children without mothers whose mortality risk is often higher than those with mothers even after controlling for poverty. Morbidity is likely to be injuries leading to permanent disabilities in high violence periods rather than life threatening infectious diseases.

Understanding of mortality, its patterns and trends are a revealing and essential piece of information for goals as varied as resource allocation to peace negotiations. Household surveys should be done more frequently and with greater methodological rigour in complex emergencies to identify the main causes of mortality and morbidity.

Our study indicates that violence tends to be concentrated over time and space. Short spurts of intense violence characterises most chronic and protracted conflict situations. Although violence related deaths are rarely very high in absolute numbers, it establishes a pernicious state of collective fear and insecurity— frequently the purpose of the violence. In rural areas, it leads to farmers reluctant to plant their fields, women to go for water or children to search for firewood.

There are few solutions for this situation except highly reinforced security measures whose rules of engagement are sufficiently strong-armed to discourage violence and provide for the affected population the essentials for living until peace.

Finally, conflict and post conflict programming are no longer issues that are marginal to development. In Africa and in some other countries such as Colombia, Haiti, Myanmar, it is quintessentially a development issue, albeit a thorny one. Our research indicates that good data especially on mortality and morbidity can be very useful on policy and programme fronts.

International development agencies have recently recognised this and have launched an effort referred to as the Humanitarian Tracking System. This initiative should provide aid decision makers with the necessary statistical backup to make choices in resource

allocation, to track evolution and change strategies in the field. In the absence of this, humanitarian aid is doomed to remain ad hoc, unsustainable and out of sync with future development.

9 References

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**Table 1: Estimation of affected IDP and resident population in Darfur
(UN Darfur Humanitarian Profile No. 13 - 01 April 2005)**

State	Total number	IDPs	Residents
North Darfur	754,789	479,342	275,447
South Darfur	918,985	770,808	148,177
West Darfur	948,714	715,708	233,006
TOTAL	2,622,488	1,965,858	656,630

Table 2: Child mortality rates and malnutrition for the 3 Darfur states and country average (MICS 2000)

	U5MR (/1000 live births)	Underweight (%)	Chronic Malnutrition (%)	Acute Malnutrition (%)
North Darfur	101	47.4	44.3	22.5
South Darfur	98	39.4	46.7	12.4
West Darfur	104	37.4	51.2	8.8
Country	104	40.7	43.3	15.7

Note: Since the MICS survey cited covered the non-rebel held part of Sudan, the country figures in Table 2 reflect the situation in the northern part of the country.

Table 3: Mortality surveys conducted in Darfur and refugee camps in Chad from CE-DAT database (April 2004 - January 2005)

Location	Period	CMR	U5MR	Violence Related	Conducted by
Surveys that were used for the analyses					
Darfur region	Feb – Sep 2004	0.7 (0.4-1.0)	1.0 (0.4-1.7)	35 %	CDC, WFP
North Darfur					
Entire Province	Jun – Aug 2004	1.5 (1.1-1.9)	2.5 (1.6-3.9)	21 %	WHO, Epiet
Serif Umra	Sep – Oct 2004	0.8 (0.4-1.3)	1.8 (1.0-3.0)	4 %	Epicentre, MSF
West Darfur					
Zalingei	Oct 2003 – Apr 2004	2.2 (1.8-2.7)	1.8 (1.1-3.0)	49 %	Epicentre, MSF
Murnei	<i>Oct 2003 – Jan 2004</i>	<i>5.1 (4.5-5.8)</i>	<i>1.5 (0.8-2.4)</i>	<i>87 %</i>	Epicentre, MSF
	<i>Feb 2004 – May 2004</i>	<i>1.7 (1.3-2.1)</i>	<i>1.7 (1.0-2.8)</i>	<i>35 %</i>	MSF
Azirni, Sanidadi, Um Tagouk	Sep 2003 – Sep 2004	0.3 (NA)	NA	35 %	CIEDRS, World Relief
Niertiti	Feb – Jun 2004	1.5 (1.2-1.9)	2.1 (1.5-3.0)	27 %	Epicentre, MSF
El Geneina	May – June 2004	5.6 (4.1-7.6)	14.1 (9.7-20.1)	10 %	Epicentre, MSF
Entire Province	Jun – Aug 2004	2.9 (2.4-3.6)	3.1 (2.1-4.7)	12 %	WHO, Epiet
Murnei	Oct 2004 – Jan 2005	0.8 (NA)	1.2 (NA)	14 %	Concern
South Darfur					
Kass	May – Sep 2004	3.2 (2.2-4.1)	5.9 (3.8-8.0)	18 %	Epicentre, MSF
Kalma	Feb – Sep 2004	1.6 (1.2-2.0)	2.9 (2.0-3.9)	28 %	Epicentre, MSF
	<i>Aug – Sep 2004</i>	<i>2.0 (1.3-2.7)</i>	<i>3.5 (1.5-5.7)</i>	<i>7 %</i>	MSF
Kalma	Jun – Aug 2004	3.8 (2.9-5.0)	11.7 (7.4-18.1)	10 %	WHO, Epiet
Data in italic represents a subperiod of the entire survey period.					
Surveys that did not report the % violence related deaths					
North Darfur					
Abu Shok	May – Jun 2004	2.2 (NA)	6.8 (NA)		ACF-F
Kabkabiya	Jul – Aug 2004	1.2 (0.7-1.8)	2.9 (1.5-5.3)		Epicentre, MSF
West Darfur					
Mukjar, Wade Saleh	Feb – Apr 2004	3.6 (2.7-4.6)	5.2 (1.8-2.6)		MSF-H
Habilah	Jun – Aug 2004	2.6 (1.8-3.6)	6.7 (1.2-11.0)		Epicentre, MSF
Fur Baranga	Oct 2004 – Jan 2005	0.9 (0.5-1.3)	1.8 (0.8-2.8)		SCF-US
Chad					
Iridimi, Touloum	Aug – Oct 2004	1.3 (0.8-1.8)	2.2 (1.2-3.1)		MSF
Bahai, Cariari	Nov 2003 – Jun 2004	1.1 (1.0-1.2)	0.4 (0.3-0.6)		UNHCR, CDC, CNNTA
		0.6 (0.5-0.7)*			
Iridimi, Touloum, Kounoungo	Nov 2003 – Jun 2004	2.6 (2.4-2.7)	1.6 (1.5-1.8)		UNHCR, CDC, CNNTA
		1.6 (1.4-1.7)*	1.5 (1.3-1.6)*		

* CMR without including missing people.

Survey that was not included in the analysis (see text for justification)

South Darfur					
Muhajiria	Feb – Sep 2004	1.2 (0.9-1.4)	0.7 (0.3-1.1)	46 %	Epicentre, MSF
	<i>Aug – Sep 2004</i>	<i>2.3 (1.2-3.4)</i>	<i>1.0 (0.03-1.9)</i>	<i>72 %</i>	
Data in italic represents a subperiod of the entire survey period.					

Table 4: Summary table of mortality statistics among affected population in Darfur

Total number of deaths among affected populations in Darfur and refugees in Chad (Sep 2003 - Jan 2005)	133,740
Affected populations in Darfur	121,582
Refugees in Chad (=10% of affected populations in Darfur)	12,158
Number of expected deaths among affected populations in Darfur and refugees in Chad (Sep 2003 - Jan 2005) (0.3/10,000/day)	21,981
Number of excess deaths among affected populations in Darfur and refugees in Chad (Sep 2003 - Jan 2005)	111,759
Number of violence related deaths among affected populations in Darfur and refugees in Chad (Sep 2003 - Jan 2005)	33,672

Figure 1: Non-violence related mortality rate in Darfur (July 2003 - January 2005)

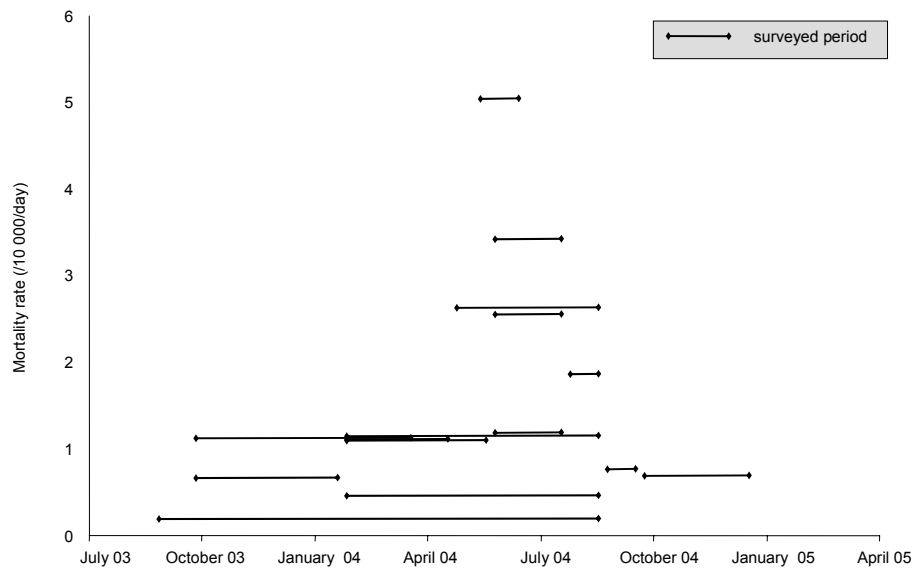


Figure 2 Violence related mortality rate in Darfur (July 2003 - January 2005)

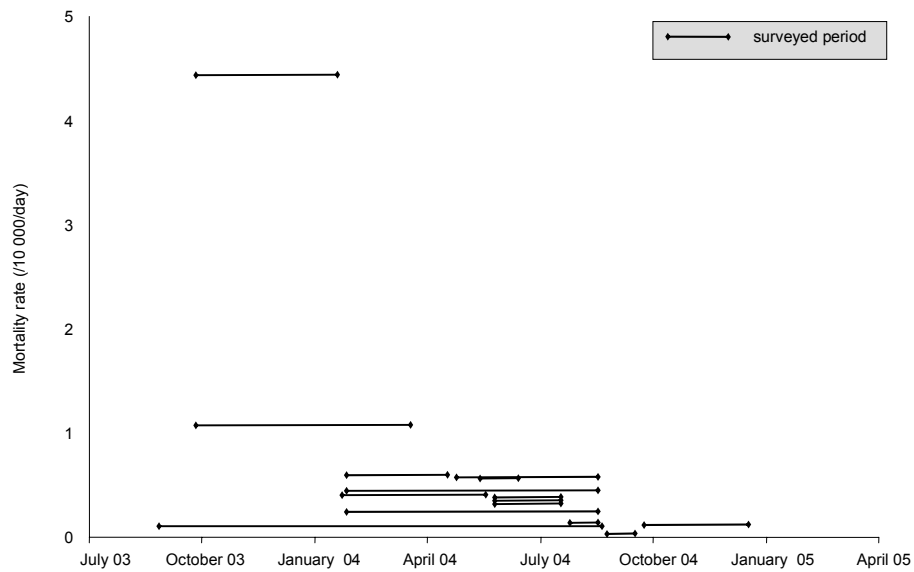


Figure 3: Affected population in Darfur (Sept 2003 - Jan 2005)

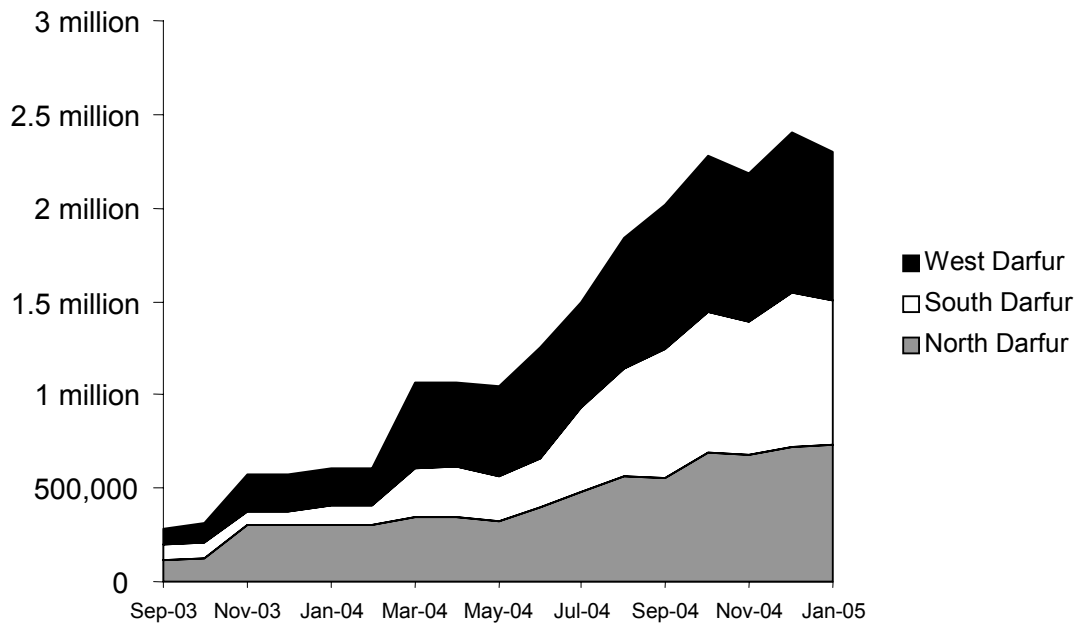


Figure 4: Proportion violence related deaths in North and West Darfur (July 2003 - January 2005)

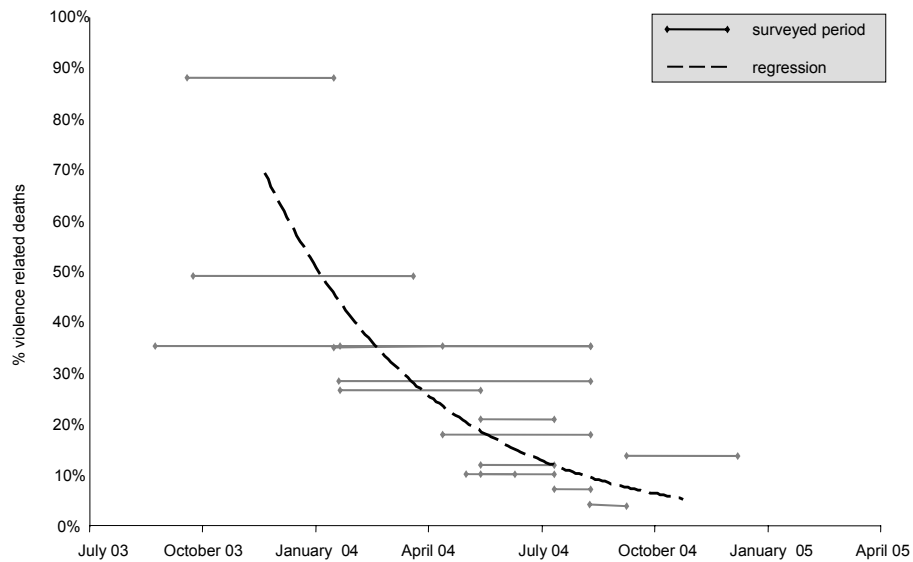
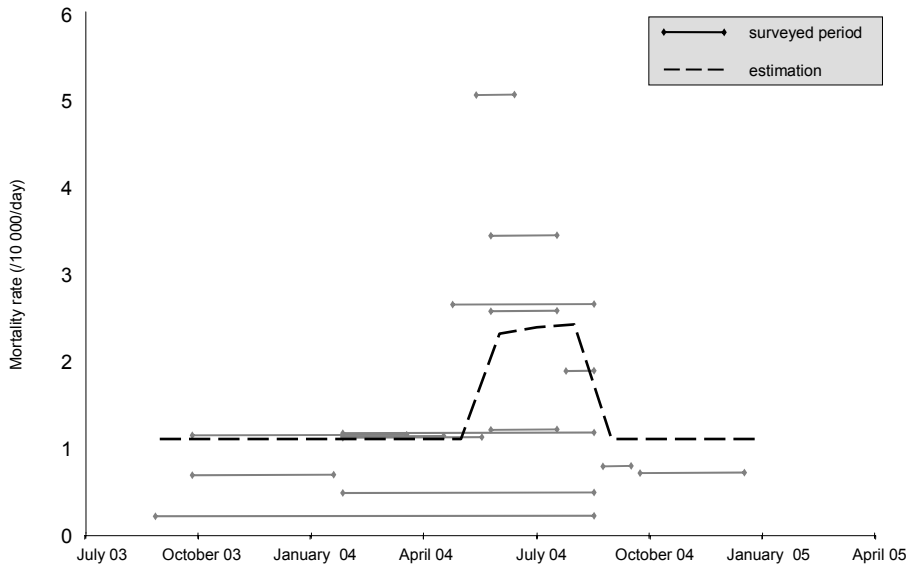
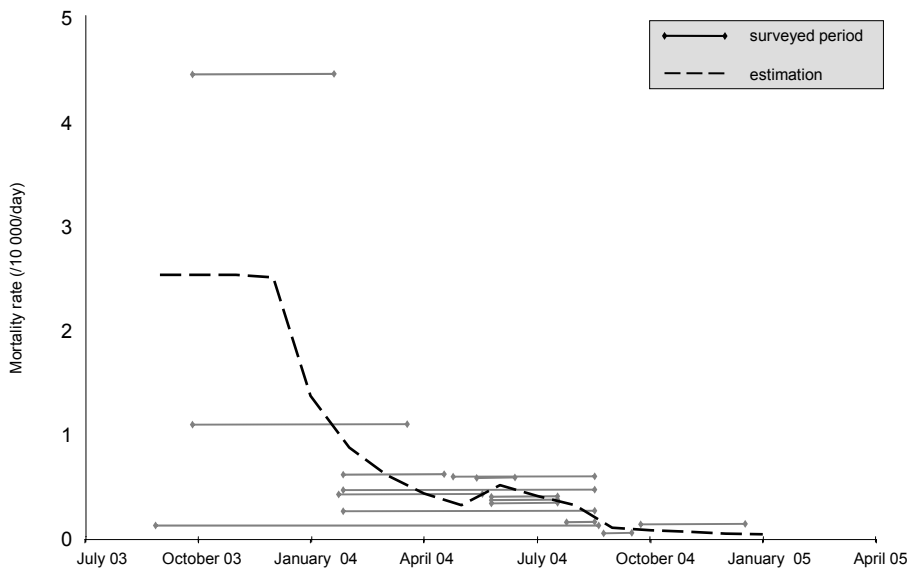


Figure 5: Non violence related mortality rates in Darfur (15 surveys and estimations) (July 2003 – January 2005)



The extremely high rate during May 2004 in El Geneina is likely to be due to an epidemic outbreak that had not been picked up. (personal communication with the author)

Figure 6: Violence related mortality rates in Darfur (15 surveys and estimations) (July 2003 – January 2005)



The 4.5/10,000/day figure is the rate in IDP camps in Murnei during the period October 2003 – January 2004. This was undoubtedly the most violent period and Murnei is located in one of the epicenters of the conflict. This explains the extremely high rate

Figure 7: Estimated number of deaths and CMR (September 2003 – January 2005)

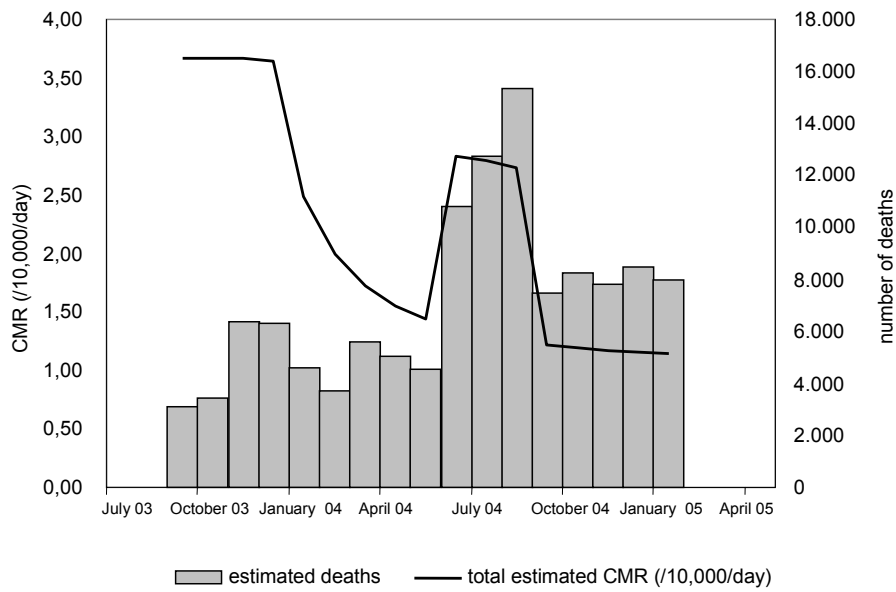


Figure 8: Mortality rate trends in selected displaced populations [13]

