

Changes in Mortality Rates and Humanitarian Conditions in Darfur, Sudan 2003–2007

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Abbreviations:

CMR = crude mortality rate
IDP = internally displaced person
U5MR = under-five mortality rate
UN = United Nations
WFP = World Food Programme

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Abstract

The Darfur region of Sudan has been a focus of humanitarian concern since rebellions began there early in 2003. In 2004, the US Secretary of State declared that conflict in Darfur represented genocide. Since 2003, many sample surveys and various mortality estimates for Darfur have been made. Nonetheless, confusion and controversy surrounding mortality levels and trends have continued. For this project, results were reviewed from the highest quality field surveys on mortality in Darfur conducted between 2003 and 2008. Trend analysis demonstrated a dramatic decline in mortality over time in Darfur. By 2005, mortality levels had fallen below emergency levels and have continued to decline. Deaths directly due to violence have declined as a proportion of all of the deaths in Darfur. Declining mortality in Darfur was not associated with other proximate improvements in well-being, such as improved nutrition. Without large-scale, humanitarian intervention, continuing high rates of mortality due to violence likely would have occurred. If mortality had continued at the high rate documented in 2004, by January 2009, there would have been 330,000 additional deaths. With the humanitarian assistance provided through the United Nations and non-governmental organizations, these people are alive today. A focus on excess deaths among non-combatants may draw attention away from other needs, such as establishing better security, improving service delivery to the displaced, and advocating for internally displaced persons to be reached today and to re-establish their lives and livelihoods tomorrow.

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Introduction

The Darfur region of Sudan has been an intense focus of humanitarian concern since rebellions began there early in 2003. In response to these rebellions, the Khartoum government mounted a campaign of aerial bombardment in support of ground attacks by an Arab militia, the Janjaweed.¹ They burned villages and drove an estimated two million people into refugee camps. A reported 10,000 excess deaths per month were estimated in 2003 and 2004.² A larger portion of the population in Darfur has been displaced; more than anywhere else during the world in the last decade.

In 2004, the US Secretary of State declared that the conflict in Darfur represented genocide.³ Systematic reviews estimate that by 2005, the total excess deaths had reached 130,000–180,000.⁴ During 2008, John Holmes, the UN Undersecretary General for Humanitarian Affairs, stated that an additional 100,000 excess deaths must have occurred.⁵ The figure of 300,000 frequently has been used in the press. Also in 2008, the International Criminal Court filed charges of war crimes and genocide against Sudan's President,⁶ Omar al-Bashir.

Since 2003, many sample surveys have been conducted and various mortality estimates for Darfur have been proposed. Nonetheless, confusion and controversy surrounding mortality rates and trends has continued. This is due, in part, to the differing survey methodologies and time periods studied, inac-

Organization	Period for which mortality data were collected	Smallest unit for which sample was designed to be valid	Sample size achieved	Recall period for deaths in the survey	Percent of original sample that that was not reached	Number of staff involved in field work
Epicentre, MSF ⁹	Oct 03–June 04	Camps, mainly in West and North	3,175 households 17,519 individuals	39–193 days	NA	NA
Epicentre, MSF ¹⁰	May 04–Sept 04	Camps, in South	2,693 households 16,082 individuals	20–121 days	1%	NA
WHO, EPIET ¹¹	June 04–Aug 04	Camps, mainly in North and West	3,170 households 20,775 individuals	60 days	70%	NA
CDC/WFP ¹²	Aug 04–Sept 04	By state and residency status	880 households 5,470 individuals	213 days	NA	NA
WHO ¹³	June 05	By state and residency status	3,500 households 26,275 individuals	180 days	5% in north 11% in west 73% in south	80
WFP/FMH/ UNICEF/CDC/FAO ¹⁴	Sept 05	By state and residency status	2,090 households 13,072 individuals	8 months	6% in the north 15% in the west 6% in the south	112
WFP/FMH/ UNICEF/CDC/FAO ¹⁵	Sept 06	By state and residency status	2,155 households 21,900 individuals	214 days	3% in north 3% in west 0% in south	162
FAO/UNICEF/ WFP ¹⁶	Aug 07–Sep 07	By state and residency status	13,396 individuals	7 months	10% in north 13% in west 3% in south	NA

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Table 1—Summary of surveys on mortality in Darfur that met inclusion criteria. The variable period of recall results from the differing periods since arrival in camp. (CDC = Centers for Disease Control and Prevention; EPIET = European Programme for Intervention Epidemiology Training; FAO = Food and Agricultural Organization; FMH = Foedatio Medicorum Helveticorum; MSF = Médecins sans Frontières; UNICEF = United Nations Children's Funds; WFP = World Food Programme; WHO = World Health Organization)

cessibility of target populations in some surveys, and differing sets of surveys included in the reviews. The reviews have failed to make a distinction between estimates generated from epidemiological surveys and estimates based more on assumptions and projections than field data. Further, they failed to draw upon some of the highest quality, but least widely popularized surveys. Most importantly, this includes a series of large-scale, representative household sample surveys carried out by the (US) Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP), and the government of Sudan, which are included in this study.

The results from all field surveys on mortality between 2003 and 2008 that utilized representative, population-based survey methods and involved 1,000 person-months of follow-up were reviewed and analyzed. Quality is defined in this study as being drawn from all geographic areas of interest, utilizing representative, population-based survey methods, and involving large samples. All five surveys included in this review included the majority of their target population, providing representative samples of one or more of Darfur's three states. All five described, in detail, how the sample was collected and the limitations that occurred in the process of data collection or analysis. Comparisons were made across surveys on the proportion of deaths that resulted from violence and changes in

humanitarian access. Access or lack of access was determined by the WFP on the basis of targeted attacks on aid workers and interruptions in geographic access.

Methods

Summary data presented in Table 2 were calculated from published or unpublished reports prepared by the original authors of each report.

Mortality rates are determined in surveys by asking families about deaths of any family member during a defined period of time, and conventionally are presented in a humanitarian context as the number of deaths per 10,000 people per day.

"Excess mortality" was defined as the number of deaths observed above that which would be expected in the absence of some particular health risk(s). These deaths can occur directly from violent causes, or indirectly due to increased vulnerability in the presence of concomitant health risks, such as reduced access to food, water, and health services.⁷ Excess mortality is calculated by subtracting the observed number of deaths from the expected number (calculated by applying a baseline rate to the affected population).

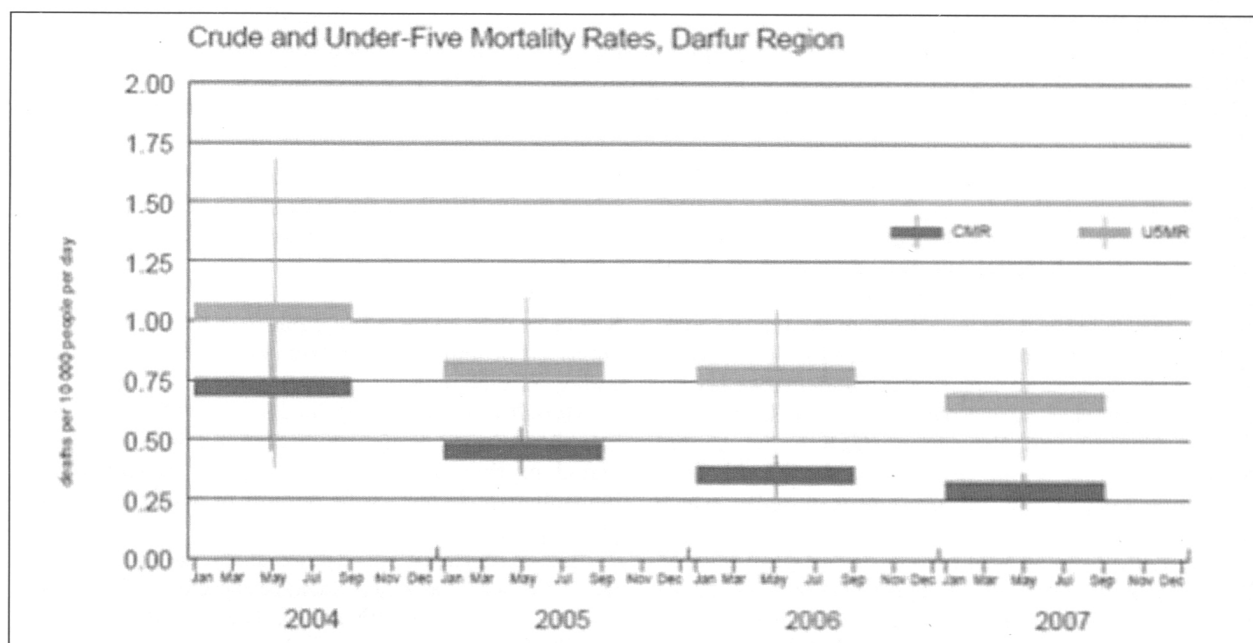
Mortality rates in Darfur prior to 2003 which would provide a baseline with which to compare recent mortality rates, are not known. In the absence of such information, an estimated, region-wide baseline rate, established through surveys, was used. In sub-Saharan Africa, the expected

		January 2004– September 2004	January 2005– September 2005	January 2006– September 2006	January 2007– September 2007
Total population	CMR	0.72 (0.45–0.99)	0.46 (0.36–0.55)	0.35 (0.27–0.44)	0.29 (0.21–0.36)
	U5MR	1.03 (0.38–1.68)	0.79 (0.50–1.1)	0.77 (0.5–1.05)	0.66 (0.42–0.90)
IDPs	CMR	0.88 (0.49–1.27)	0.44 (0.31–0.57)	0.46 (0.33–0.59)	0.38 (0.27–0.49)
	U5MR	1.15 (0.27–2.03)	0.85 (0.53–1.2)	0.78 (0.39–1.16)	0.84 (0.47–1.2)
Non-IDPs	CMR	0.46 (0.21–0.71)	0.41 (0.28–0.55)	0.25 (0.14–0.36)	0.17 (0.10–0.24)
	U5MR	0.80 (0.07–1.53)	0.62 (0.10–1.2)	0.78 (0.38–1.2)	0.44 (0.15–0.74)

		June 2004– August 2004	November 2004– February 2005	January 2005– September 2005	January 2006– September 2006	January 2007– September 2007
North Darfur	CMR	1.5 (1.1–1.9)	0.8 (0.60–1.0)	0.46 (0.36–0.55)	0.15 (0.07–0.22)	0.22 (0.13–0.31)
	U5MR	2.5 (1.6–3.9)	1.5 (1.0–2.1)		0.43 (0.13–0.74)	0.61 (0.24–0.98)
South Darfur	CMR	--		0.40 (0.23–0.57)	0.48 (0.27–0.68)	0.30 (0.15–0.45)
	U5MR	--			0.97 (0.39–1.55)	0.73 (0.29–1.18)
West Darfur	CMR	2.9 (2.4–3.6)	0.6 (0.50–0.80)	0.57 (0.36–0.78)	0.48 (0.30–0.65)	0.38 (0.21–0.54)
	U5MR	3.1 (2.1–4.7)	0.9 (0.60–1.3)		0.95 (0.43–1.48)	0.66 (0.20–1.12)

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Table 2—Data abstracted from mortality/nutrition surveys (CMR = crude mortality rate/10,000 population/day; IDP = internally displaced person; U5MR = under-five mortality rate/10,000 population; mean (95% CI) average)



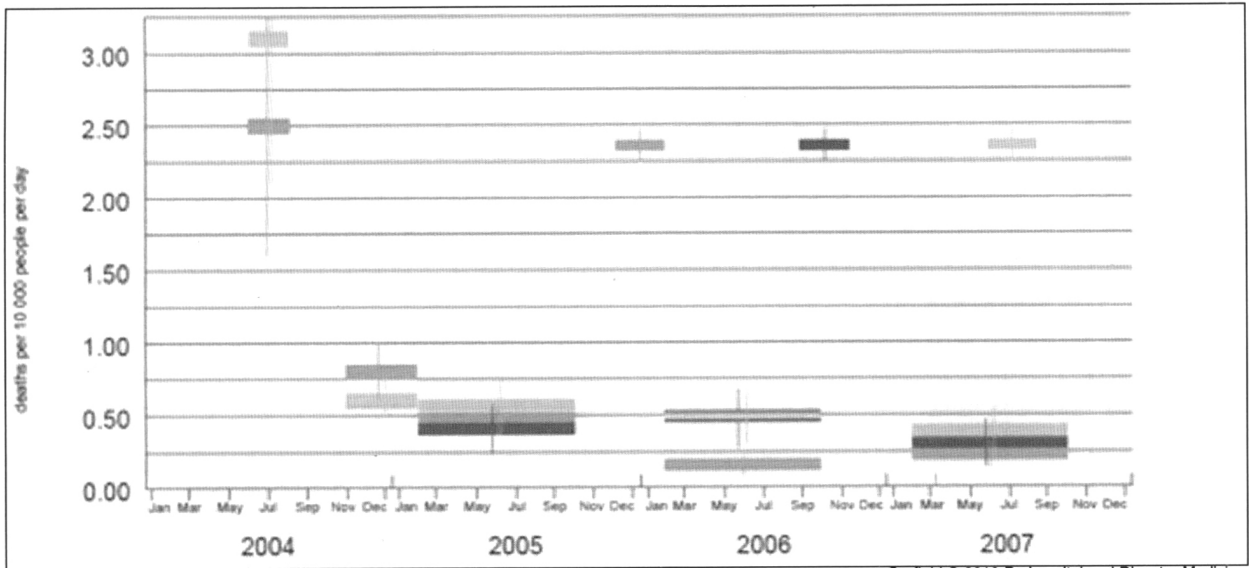
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Figure 1—Crude and under-five mortality rates, Darfur Region (Sphere emergency thresholds for Sub-Saharan Africa CMR = 0.9 deaths per 10,000 persons/day, U5MR = 2.3 children per 10,000 persons/day)

crude mortality rate (CMR) is 0.44/10,000/day, while the expected under-five year mortality rate (U5MR) is 1.14/10,000/day; one definition of an emergency is a doubling of these rates, while an alternative definition is when they reach 1 and 2/10,000/day, respectively.⁸

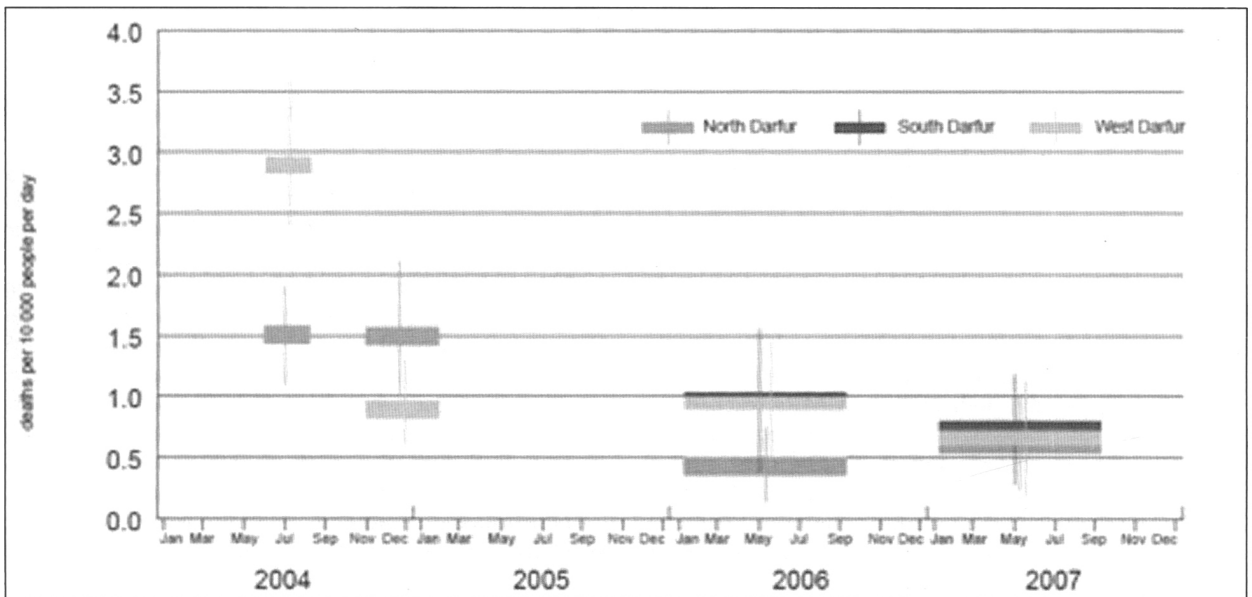
The sample sizes in mortality surveys in 2003 and 2004 were smaller than subsequent surveys reported here.^{9–11}

The first three surveys in 2003 and 2004 were carried out in camps. All were multistage retrospective sample surveys, and included variable recall periods among more than 3,000 households each. The last survey in 2004 was smaller at 880 households and had a longer recall period. The same team that led this survey led annual surveys in each of the next three years.



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Figure 2—Crude mortality rates by state (Sphere emergency thresholds for Sub-Saharan Africa CMR = 0.9 deaths per 10,000/day)^{9–16}



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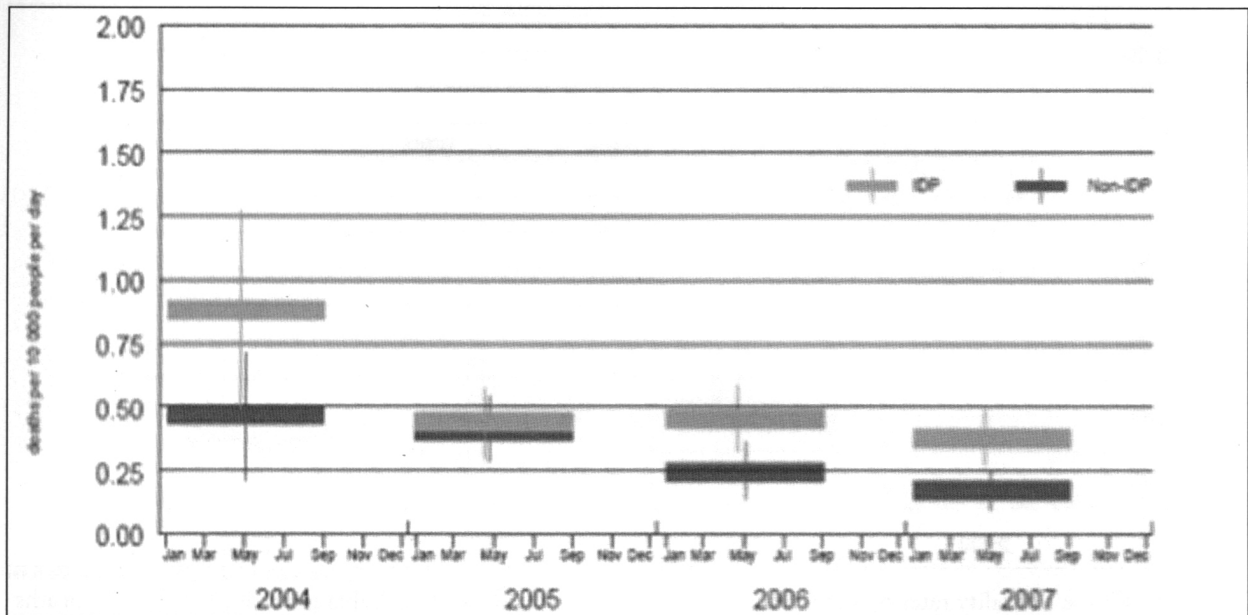
Figure 3—Under-five mortality rates by state (Sphere emergency thresholds for Sub-Saharan Africa U5MR = 2.3 children per 10,000 persons/day)^{9–16}

By 2005, this group carried out repeated large sample surveys using experienced supervisors, more highly skilled interviewers, and with increasing logistical support for achieving better coverage of the target population. These sources provide a more reliable and comparable picture of changing death rates in Darfur over time than did the smaller, single camp-based surveys of 2003 and 2004 (Table 1).¹²

These surveys were carried out using two stage cluster sample, reaching 750 households in each of the three states of Darfur in August/September of 2004. Because they had use of WFP helicopters, they had fewer limitations in reaching the intended sample due to logistic or security constraints. The same group did surveys of improving qual-

ity in 2005, 2006, and 2007. The World Health Organization performed its own survey using a two stage cluster sample survey approach, but with limited logistic support, in 2005. Insecurity resulted in an inability of this study to collect a representative sample in South Darfur.

By 2005, repeated large sample surveys were conducted using experienced supervisors, more highly skilled interviewers, and with increasing logistical support for achieving better coverage of the target population. These sources provide a more reliable and comparable picture of changing death rates in Darfur over time than did small, single camp-based surveys (Table 1).¹²



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Figure 4—Crude mortality rate by displacement status, Darfur Region (Sphere emergency thresholds for Sub-Saharan Africa CMR = 0.9 deaths per 10,000 persons/day)^{9–16}

Results

Mortality Rates

The surveys indicate that crude mortality was higher than the assumed baseline rate for sub-Saharan Africa (0.44/10,000/day) but not higher than the baseline for under-five mortality (1.14/10,000/day) (Table 2). The CMR found in one region-wide survey in 2004 was 0.72 (0.45–0.99), with U5MR of 1.03 (0.38–1.68) (Figure 1). Surveys among displaced people in North and West Darfur in 2004 record much higher CMRs of 1.5 (1.1–1.9) and 2.9 (2.4–3.6), respectively; both of these CMRs reached the threshold for an emergency by Sphere Project standards (0.9 and 2.30, respectively; Figure 2). The same surveys found much higher U5MR rates of 2.5 (1.6–3.9) and 3.1 (2.1–4.7) for North and West Darfur, respectively (Figure 3).

Both CMR and U5MR declined to expected levels in 2005 and fell below these levels in 2006 and 2007. From 2004–2007, the surveys documented a 60% decline in CMR and a 36% decline in U5MR compared to the region-wide survey completed in 2004.

Violence was the reported cause of more than one-third of all deaths in 2004 in the region-wide survey. Forty percent and 42% of deaths were reportedly due to violence in North and West Darfur in 2004. The proportion of deaths occurring as a result of violence declined in subsequent surveys. In 2004, one-third of all deaths were reportedly due to violence. In 2007, less than one-tenth of all deaths were reportedly due to violence. Crude mortality, overall, declined by more than half from 2004 to 2007. Half of that decline was due to the decline in violent deaths.

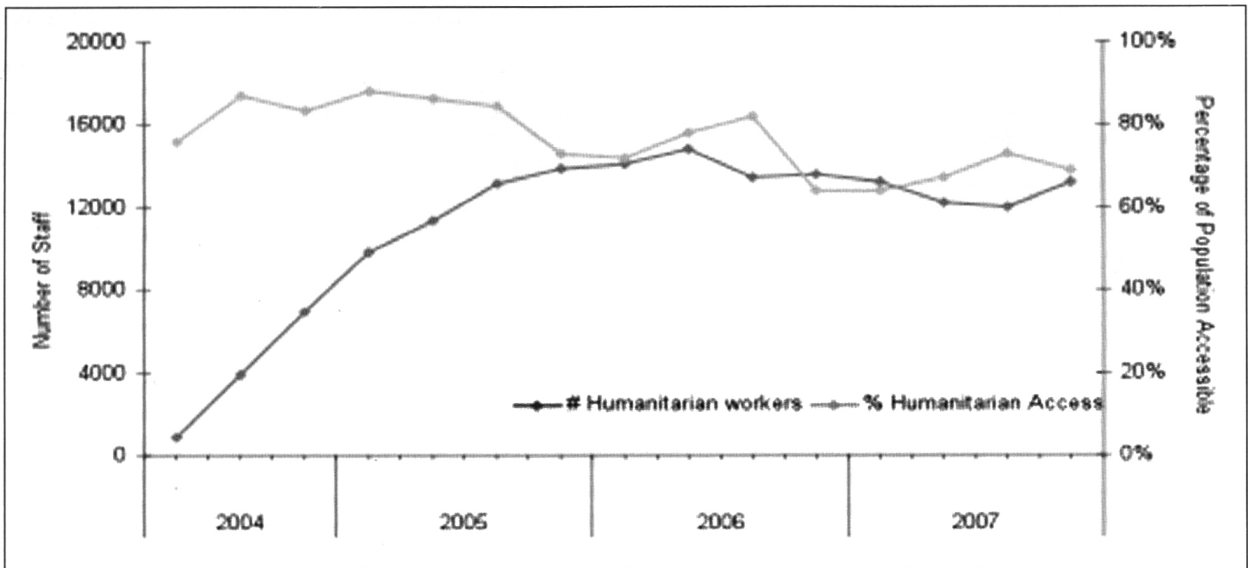
Both CMR (Figure 4) and U5MR were consistently higher among those who were displaced compared than for those not displaced. These rates have tended downward for both groups since 2004.

Crude and under five mortality rates declined in each of the three states in Darfur after 2004. Because of the relatively small sample size, when data were disaggregated by states, not all of the surveys provided statistically reliable data at this level. Still, available samples showed the same overall trend as region-wide data (Figures 2 and 3).

Mortality rates among children, the displaced, and in each state have declined to levels that are no longer higher than expected overall baseline levels. Surveys since 2005 show mortality rates of about one-third as high as the level assumed by those who claim 100,000 additional excess deaths in the last three years.⁵ They provide no basis to suggest that death rates from causes other than violence in the last three years are higher than they were before the conflict began.

Humanitarian conditions, however, have grown more precarious. Malnutrition rates among young children declined by about half from 2004 to 2005. Global Acute Malnutrition has since risen by about one-third and severe acute malnutrition has risen as well, especially in West Darfur. Further, the number of internally displaced persons (IDPs) as well as the number of other people affected by the conflict continue to rise. By 2008, there were estimated to be 2.4 million IDPs and 1.7 million other affected people in Darfur (Figure 5).

The proportion of these people that can be reached and assisted by humanitarian workers declined from 85% in 2004 to 75% in 2007. There are approximately 14,000 humanitarian workers in the region, but about one million people who need help, cannot be reached securely. (These groups were reached for surveys in 2005, 2006, and 2007). In 2007, an additional 150,000 were displaced during the first five months of 2008, 120 humanitarian vehicles were hijacked, and eight staff were killed. This is close to the total for the entire year of 2007.¹³ Humanitarian access was



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Figure 5—Humanitarian access and staff

compromised further by the expulsion of aid workers in February and March 2009.

Discussion

Trend analysis demonstrates a dramatic decline in mortality over time in Darfur. Mortality levels by 2005, fell below “emergency levels” and have continued to decline since. These declines in mortality have occurred despite the high and rising levels of displacement, the high and steady degree of vulnerability among those not displaced, the small decline in access to vulnerable populations, and the high and rising rates of malnutrition among young children. Finally, deaths directly due to violence have declined as a proportion of all deaths in Darfur.

High mortality rates are an expression of a humanitarian crisis, but declining mortality does not necessarily constitute a sign that the crisis is over. In Darfur, success at reducing mortality is not associated with other proximate improvements in well-being, such as improved nutrition. Even less does it suggest a resolution of conflict that could manifest with improved security and re-established livelihoods. These will require a political solution, which is not yet on the horizon. But without large-scale humanitarian interventions, continuing high rates of mortality due to vio-

lence would likely have occurred. If mortality had continued at the high rate documented in 2004, by January 2009 there would have been 330,000 additional deaths. With the humanitarian assistance provided through the United Nations and non-governmental organizations, these people are alive today.

Conclusions

Political actors also may see a need to report high levels of excess death. Some suggest that the high rates of mortality identified in 2003 and 2004 continue unabated today, accounting for a total of up to 450,000 excess deaths.¹⁴ Claims of a mortality crisis may help maintain attention by the international community to continue providing humanitarian assistance and create pressure to resolve the continuing political impasse. But the projection of high mortality is not the only way to do so, and over time may be counterproductive when high quality field data show such claims to be mistaken. A focus on excess deaths among non-combatants may draw attention away from other needs, such as establishing better security, improving service delivery to the displaced, and advocating for IDPs to be reached today and to re-establish their lives and livelihoods tomorrow.

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