

Civil Conflicts in Four African Countries: A Five-Year Review of Trends in Nutrition and Mortality

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Abbreviations: CE-DAT, Complex Emergency Database; CRED, Center for Research on the Epidemiology of Disasters; DRC, Democratic Republic of the Congo; UNICEF, United Nations Children's Fund.

INTRODUCTION

Background

Armed conflicts are defined as political conflicts 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. Globally, the number of armed conflicts has been decreasing since 1995, when it peaked at 44 recorded civil wars (1). By 2003, seven of these conflicts had ended, and in 2003 there were 37 active conflicts in the world. More than 80 percent of these conflicts were in Asia and Africa. The latter continent harbored 42 percent of all conflicts in 2003, involving 28 states and their neighboring countries (2).

Many governmental and nongovernmental organizations, as well as research scholars, evaluate the human impact of civil conflict for operational and policy purposes (3). These evaluations typically measure not only direct casualties due to violence but often indirect casualties among persons affected by the breakdown of the health and social-service infrastructure and its consequences (4, 5).

A World Health Organization report (6) underlined the use of mortality and nutrition as indicators for assessing the severity of a complex emergency; for identifying needs, prioritizing interventions, and monitoring impacts; and for advocacy purposes. While these factors serve as broad indications of the severity and nature of a conflict, an understanding of the process and therefore planning of the response depends on many external variables and constraints that are unique to each emergency situation (6, 7).

Objectives

In this review, we aimed to assess the potential of selected mortality and nutrition indicators for policy and planning of health relief and reconstruction. We examined survey data from four African countries to ascertain the extent to which widely accepted patterns in mortality and vulnerability were supported by field evidence. We also aimed to examine accepted assumptions, such as those regarding combat-related deaths or the vulnerability of children, that might not always be accurate. We had the final objective of promoting evidence-based policy and practice and rationalizing resource allocation for humanitarian aid by analyzing trends and patterns.

Indicators

Mortality rates are indicators that are developed from demographic principles and are commonly used to indicate disease severity, health system performance, or the impact of violent events. However, the various rates and nomenclature are frequently confused. *Mortality rates* indicate the probability of dying before a certain age. These rates are derived from calculations for a virtual birth cohort that is followed over time and include the true population at risk of dying. Mortality rates, therefore, are expressed per 1,000 livebirths. This calculation method is commonly used for infant mortality rates and was recently introduced for other age groups (8). *Death rates*, on the other hand, do not use a virtual birth cohort but use a midterm population count as the denominator. This does not represent the true population at risk, because the number changes within the period considered, due to migration, births, and deaths. Death rates

are expressed per 1,000 or 10,000 population per day, month, or year (9).

Calculation of mortality rates requires more complex methods that are rarely appropriate within a humanitarian field context. Therefore, they are mostly used by academic researchers and United Nations agencies, while the humanitarian community measures the impact of complex emergencies mainly by death rates. Confusion arises when the humanitarian community, including donor organizations, substitutes the term "mortality rates" for the reported death rates.

The crude death rate includes all age groups and indicates the general human impact of an event. Under-5 death rates narrow the denominator to children under the age of 5 years and are more stable because they are less dependent on age distributions within a population.

The infant mortality rate has often been used as a health status indicator as well, particularly by international aid organizations. It is generally recognized, however, that the infant mortality rate is not a valid indicator of the overall health status of a population but is more useful for indicating maternal and infant health. Many factors influence infant mortality rates, such as race, sex, multiple birth, residence, birth weight, and the age of the mother (8).

Nutritional status can be considered a subsidiary aspect of general health status, since the former is a major determinant of the latter. Although a wide collection of nutrition indicators has been developed, few are suitable for assessment of the nutritional consequences of emergency events.

Global acute malnutrition and severe acute malnutrition are indicators based on weight-for-height measurements. These measurements are compared with an international reference value drawn from a normal American child population to evaluate the severity of malnutrition, which is indicated as the number of standard deviations from the median value (z score). Z scores less than two standard deviations from the median ($-2 z$ scores) represent "global acute malnutrition," while z scores less than three standard deviations from the median ($-3 z$ scores) represent "severe acute malnutrition." If edema is present, there is always severe acute malnutrition.

Kwashiorkor can arise among children who shift from breastfeeding to a normal diet during food shortages. It is an indicator of severe malnutrition of which the pathogenesis is not fully understood. It presents with bilateral edema and skin alterations and should be treated in therapeutic feeding centers. Therefore, most reports provide some detail on the presence of edema (10, 11).

The above indicators are used to assess the nutritional status of children under 5 years of age and are not exclusive. Many more indicators for malnutrition exist (e.g., acute malnutrition expressed in terms of percentage of the median, chronic malnutrition indicators, body mass index, mid-upper arm circumference), and all have their own uses; this is discussed elsewhere in much more detail (12, 13).

METHODS

In this review, we used data collected retrospectively for 10 years that we obtained from the World Health Organization's Complex Emergency Database (CE-DAT).

The CE-DAT project is an initiative of the World Health Organization Center for Research on the Epidemiology of Disasters (CRED), located at the Catholic University of Louvain School of Public Health in Brussels, Belgium. CRED conducts research and provides training and services on public health, disasters, and complex emergencies. The CE-DAT project was initiated in 2003 to compile, validate, and standardize data on mortality and nutrition in populations affected by complex emergencies for use by humanitarian actors, donors, and scientists. The goal of the CE-DAT project is to improve evidence-based policy on conflict prevention and response by providing standardized data on the human impact of conflict. These data are triangulated and validated by the CE-DAT staff in consultation with a technical advisory group of experts. Tools have been developed for analysis of the data and for determining trends and patterns in the main indicators. Currently, three key mortality indicators and three nutrition indicators are included in CE-DAT, as well as indicators on morbidity and vaccination status. Results from surveys carried out among conflict-affected residents, internally displaced persons, and refugees have also been included in CE-DAT, and the data are available in a standardized, user-friendly format on the CRED website (<http://www.cred.be>).

We reviewed the complex emergencies generated by conflicts in Angola, Sudan, the Democratic Republic of the Congo (DRC), and Ethiopia. We selected these four conflicts for two reasons. First, the nature and evolution of the wars in these countries are quite different, which provides insight into different settings. Second, these conflicts were among the most thoroughly assessed by the humanitarian community and therefore provided the best available data.

We reviewed six indicators: three commonly used mortality indicators and three nutrition indicators that are used in complex emergency assessments. *Crude death rates* are defined as deaths per 10,000 midterm population per day. *Under-5 death rates* are defined as deaths per 10,000 midterm children under age 5 years per day. *Infant mortality rates* are defined as deaths per 1,000 livebirths per year. *Global acute malnutrition* is expressed as the percentage of children under age 5 with $-2 z$ scores. *Severe acute malnutrition* is expressed as the percentage of children under age 5 with $-3 z$ scores. *Edema* is the percentage of children under age 5 with bilateral edema.

We recalculated the rates reported in surveys in order to standardize formats. If recalculation was impossible, the data were excluded.

RESULTS

For the four countries of Angola, Sudan, DRC, and Ethiopia, we identified and analyzed data from 280 surveys. Most of the available surveys were for Sudan, followed by the DRC and Angola (table 1). However, the scope and details of a survey determined the amount of effective information available for analyses. For example, almost 50 percent of mortality surveys did not report nutrition rates and vice versa. In particular, estimations of levels of infant mortality and edema were underrepresented. Table 2 shows the study and sampling methods reported and the refugee

TABLE 1. Numbers of surveys containing data on indicators of mortality and nutrition in the World Health Organization Complex Emergency Database

Country	Crude death rate (/10,000/day)	Under-5 death rate* (/10,000/day)	Infant mortality rate (/1,000 livebirths per year)	Global acute malnutrition (% of children aged <5 years)	Severe acute malnutrition (% of children aged <5 years)	Edema (% of children aged <5 years with bilateral edema)	Total
Angola	55	64	10	62	59	31	281
DRC†	77	89	42	69	61	48	386
Sudan	58	104	45	245	206	42	700
Ethiopia	50	49	4	73	67	23	266
Total	240	306	101	449	393	144	1,633

* Death rate among children under age 5 years.

† DRC, Democratic Republic of the Congo.

status of the study populations. Mortality assessments were mostly completed retrospectively, while cross-sectional methods were uniquely used in nutrition surveys. The main sampling method used was two-stage clustering. The reported methods correspond to generally accepted standards for mortality or nutrition assessment, but further detail would allow wider comparisons and deeper analysis.

Angola

Angola has been at war since 1956, starting with the war of independence against Portugal. That conflict was followed by protracted civil strife, as indicated in Web figure 1 (posted on the *Epidemiologic Reviews* website (<http://epirev.oupjournals.org/>)). Several peace agreements were eventually signed, and United Nations peacekeepers have been maintaining calm since 1998. Today, the country is facing the consequences of prolonged war in terms of a dysfunctional infrastructure, the presence of land mines, and food shortages.

The complex emergency in Angola occurred mainly in the western-central part of the country. The provinces most affected and surveyed were Cuanza Sul, Bié, Huambo, Benguela, Huila, and Cuando-Cubango.

Figure 1 shows the high mortality levels in 2000 found in surveys carried out among internally displaced persons in camps in Ganda municipality, Benguela. Crude death rates

were estimated at 3.1/10,000 per day, while under-5 death rates were 4.1/10,000 per day. The crude mortality rate is three times higher than the threshold of 1/10,000 per day generally used to define a crisis state, and the latter is twice the critical level of 2/10,000 per day.

These very high rates reflect the increases in intensified fighting entailing foreign military involvement and their effects on the civil population, especially children. Note that these rates were prevalent among internally displaced persons, a group that is highly vulnerable and often neglected by the international humanitarian community because of its complex legal status. On the other hand, studies from Bié and Cuando-Cubango provinces measured slightly lower rates that were below the national averages reported by the United Nations Children's Fund (UNICEF) (14).

Early in 2001, mortality among displaced persons in Bié far exceeded the national average, with crude death rates and under-5 death rates estimated at 3.0/10,000 per day and 5.4/10,000 per day, respectively. This province was under governmental control, while the surrounding areas remained very unstable. Displaced persons crowded into government-controlled cities and towns that were inaccessible to aid organizations. In October 2001, rates improved in Bié, Benguela, and Cuando-Cubango. Under-5 deaths dropped, but not below the national average level of 2.0/10,000 per day. However, rates of wasting were below the national average during this period, indicating that malnutrition may

TABLE 2. Distribution of reviewed surveys of mortality and nutrition from the World Health Organization Complex Emergency Database, according to study methods used

Country	No. of surveys	Study population				Study method			Sampling method				
		IDP*	Residents	IDP and residents	N/S*	Retrospective	Cross-sectional†	N/S	Two-stage cluster	Three-stage cluster	Systematic	Exhaustive	N/S
Angola	58	16	21	1	20	44	7	7	44	3	1	2	8
DRC*	68	7	24	6	31	33	30	5	50	8	0	0	10
Ethiopia	49	19	25	1	4	20	12	17	44	0	0	0	5
Sudan	105	25	24	29	27	41	51	13	78	0	1	10	16
Total	280	67	94	37	82	138	100	42	216	11	2	12	39

* IDP, internally displaced persons; N/S, not specified; DRC, Democratic Republic of the Congo.

† Cross-sectional methods were used only in nutrition assessments, which were performed in 50.6% of the surveys.

measles epidemics that raged through the camps and largely affected the child population. Surveys among internally displaced persons reported severe food security problems as well, with more than 20 percent of children showing wasting, exceeding the already high baseline level of 6 percent in Angola.

After the conflict, in 2003, surveys from Ganda municipality in Benguela once again reported high mortality (crude death rate = 2.9, under-5 death rate = 4.0), while the situation in other provinces improved, as illustrated in Web figure 2. The expected effects of rehabilitation were hampered by the widespread threat and impact of land mines and the damaged infrastructure that have persisted since the end of the conflict.

Sudan

Southern Sudan has known civil strife since 1962, as displayed in the full chronology in Web figure 3. This conflict between the Sudan People's Liberation Movement and the government has directly and indirectly caused an estimated two million deaths among civilians and combatants and has generated one of the largest populations of internally displaced persons worldwide (2 million) (15). Recently, an uprising began in the western region of Darfur; as of October 2004, 50,000 people had died and 1.6 million had been displaced (16).

The states most affected by conflicts are North and West Bahr Al Ghazal, Jonglei, and Upper Nile in southern Sudan and the three states (North, West, and South) of the Darfur region in western Sudan.

Figure 2 displays a gradual increase in mortality that started in 2001 in Jonglei and reached a peak crude death rate of more than 5.0/10,000 per day in April 2002. By then, especially, Bieh state in this province was recognized to be facing a severe food shortage, largely because of violence and erratic rains. Children were particularly vulnerable in this situation. Child mortality was high in Jonglei during 2002 because of epidemics of bloody diarrhea and malnutrition, with a peak of 15.8/10,000 per day in June, while the crude death rate dropped to almost the national average of 0.3/10,000 per day by the end of the year before once again reaching a high value (5.0/10,000 per day) in 2003.

The under-5 and crude death rates displayed extraordinarily high peaks (15.8/10,000 per day as compared with a crisis threshold of 2/10,000 per day), causing, in turn, decreases in mortality during the subsequent period, since susceptible children died within a short period of time.

Extremely high under-5 and crude death rates were reported in Upper Nile in 2002, with values of 25/10,000 per day and 10/10,000 per day, respectively, displaying an 83-fold increase from the national UNICEF average of 0.3/10,000 per day. Large numbers of internally displaced persons had moved to the area in April 2002 following a government army attack in Thangriol. In addition, crop production was very low because of drought, flooding, and bird attacks, which caused the displacement of 40 percent of the population (17).

Most surveys reported rates of global acute malnutrition from 2001 to mid-2003 that exceeded the already-high

national average of 16 percent, rising to almost 35 percent in Jonglei and North Bahr Al Ghazal, while the latter area had death rates below the national average. Rates for Upper Nile in 2003 were lower but nevertheless reached almost 25 percent.

Mortality in both Upper Nile and Jonglei decreased gradually in 2003–2004, while the crude death rate remained high in the former province. During this period, wasting rates below the national average were reported, but they increased again in Jonglei and North Bahr Al Ghazal in July 2004, caused by the movement of internally displaced persons and continuing food insecurity.

All indicators from Darfur showed a largely deteriorated situation in 2003, following the rebel uprising and the resultant displacement in West Darfur, as displayed in the charts in Web figure 4. Malnutrition had already been observed in 2000 and 2001, when 22.5 percent and 24.8 percent of children under age 5, respectively, were reported to be wasted. Both mortality and wasting increased even more in 2004, when ethnic cleansing by government-allied militias commenced. Especially high crude and under-5 death rates were measured in camps for internally displaced persons in Al Guinaina, West Darfur, in May 2004 (5.6/10,000 per day and 7.5/10,000 per day, respectively), underlining the specific vulnerability of internally displaced persons in this setting.

For the communities Azirni, Sanidadi, and Um Tagouk, secure areas in West Darfur, death rates below the national average of 0.3 were reported. This was interpreted as a nonemergency situation by the author of the report (18).

The maps shown in figure 3 underline the high death rates in West and South Darfur, but a high under-5 death rate is also noted in the North, as well as severe malnutrition. The alarming rates of wasting in the North—33.4 percent and 31.1 percent in May and June 2004, respectively—represent mainly the El Fasher camp for internally displaced persons, where, since May 2004, 30,000 people have taken refuge, with minimal health care and epidemics of diarrhea and measles.

Although West Darfur is generally the most affected area in the Darfur region, malnutrition there seems relatively mild at first sight. This paradox is caused by the relatively low rate of wasting measured in West Darfur (~20 percent); most wasted children had probably already died by the time this area was reached by the nutrition surveys.

Democratic Republic of the Congo

A full complex emergency timeline for the DRC is provided in Web figure 5. The conflicts in the DRC originated from ethnic tension and the arrival of a large Hutu population in 1994 that provoked violence in Zaire after the genocide in Rwanda. The post-1998 period was known for its extreme violence, when a civil war led by rebel leader and future DRC president Laurent Desire Kabila eventually would cost the lives of 3.8 million people and the displacement of 3 million (December 2004 estimates). Although a peace process is under way, fighting erupted again in North Kivu in December 2004, causing the displacement of tens of thousands of persons while humanitarian agencies were forced to draw back from the area.

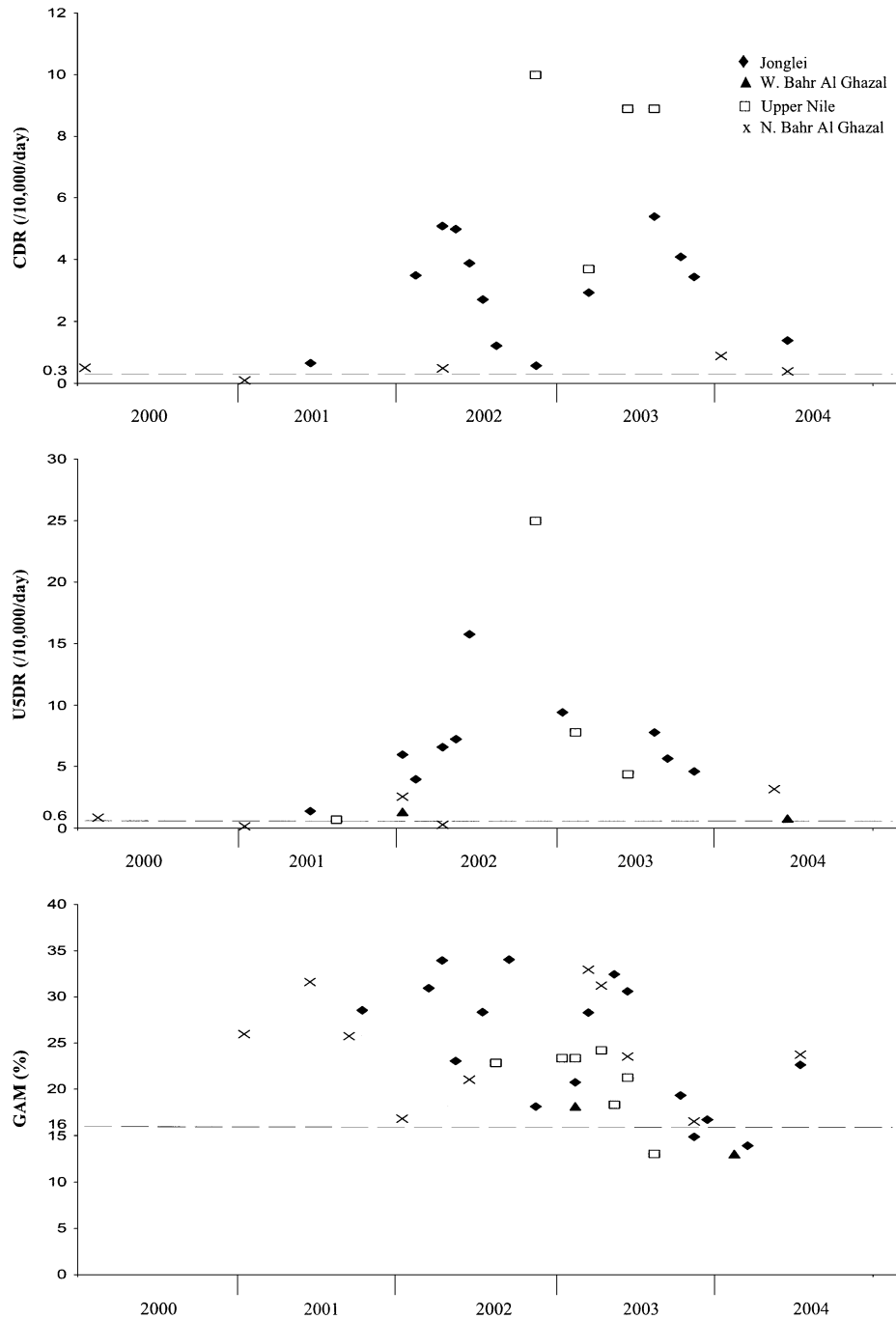


FIGURE 2. Monthly average crude death rate (CDR), under-5 death rate (U5DR) (death rate among children under age 5 years), and prevalence (percentage) of global acute malnutrition (GAM) for the conflict-affected region in southern Sudan, 2000–2004. Dashed line, national United Nations average.

The provinces most affected by the conflict in the DRC were North and South Kivu, Maniema, Kasai Oriental, Orientale, and Katanga. In 2000, death rates far exceeded the national average in Katanga (Moba, Kalemie), in Maniema (Kalima district), and among internally displaced persons in South Kivu. The under-5 death rate increased to 8.0/10,000 per day in Katanga, and surveys from early 2001

reported the same for Maniema, as illustrated by the charts in Web figure 6. Crude death rates around 3.5/10,000 per day were found during this period. Most deaths occurring in this period were caused by infectious diseases, social dysfunction, and poverty and, to a lesser extent, direct violence. High rates of malnutrition (12–18 percent) were found, mainly in 2001, and were observed in all conflict-affected

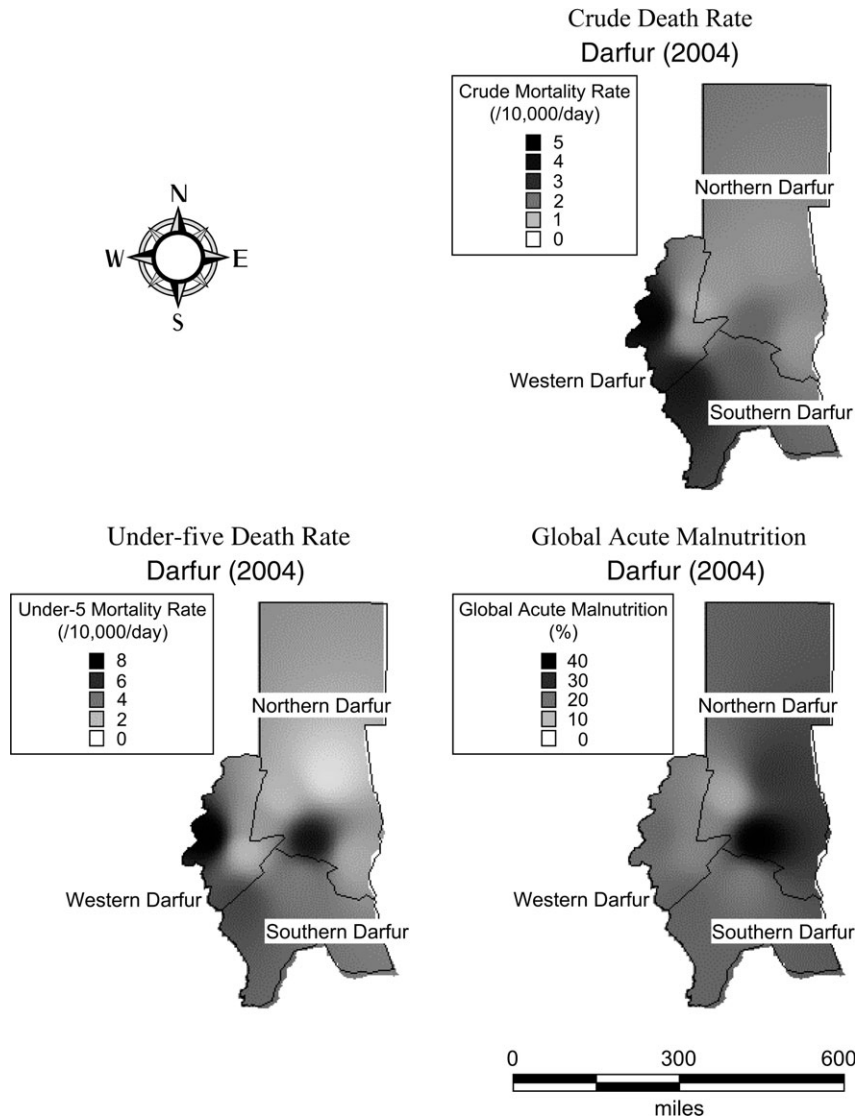


FIGURE 3. Maps showing the average crude death rate, the under-5 death rate (mortality rate among children under age 5 years), and the prevalence (percentage) of global acute malnutrition, by province, in the Darfur region of Sudan, 2004.

provinces. The high national average of 13 percent reported by UNICEF indicates a nationwide food security problem, illustrated by the map in figure 4.

In general, mortality and malnutrition decreased in 2002 because of improvements made after the 2002 cease-fire agreement and the subsequent demobilization process. Improved accessibility was noted for the eastern provinces, and fewer deaths from direct violence were reported. As the maps show (see figure 4), crude death rates increased in Orientale province throughout 2002, when fighting erupted in Kinshasa before it was turned into a nonmilitary zone. Surveys from 2003 reported high mortality in Katanga, with a crude death rate of 1.4–1.9/10,000 per day and a peak under-5 death rate of 5.4/10,000 per day in March.

However, rates of wasting did not drop below the national average in any province. Among residents and internally

displaced persons in Kindu, Maniema, 16.9 percent of the children were wasted as compared with 11 percent in 2001, which indicates an increase after the cease-fire. Heavy fighting continued in this region, and large numbers of persons fled the conflict-affected area.

Ethiopia

Ethiopia is a country torn by conflict and famine, as shown by the timeline in Web figure 7. Somalia invaded Ethiopia in 1977. The Tigrayan People’s Liberation Front launched a war for independence in the same year. A full-scale war started after the independence of Eritrea in 1999, and the worst famine of the decade occurred in 1985. The three main complex emergency situations that presently exist are in the Somali, Southern Nations, Nationalities, and

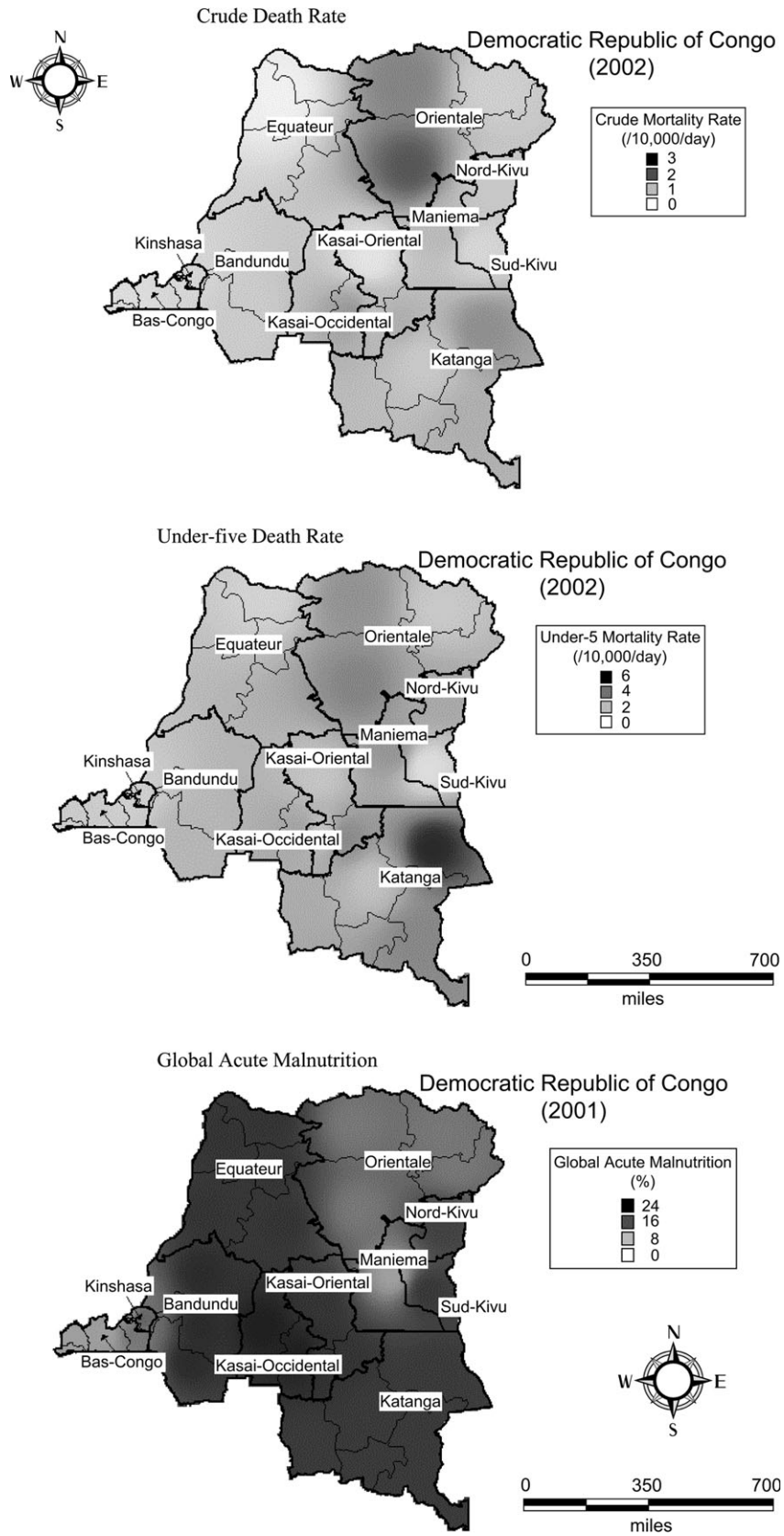


FIGURE 4. Maps showing the average crude death rate in 2002, the under-5 death rate (death rate among children under age 5 years) in 2002, and the prevalence (percentage) of global acute malnutrition in 2001, by province, in the Democratic Republic of the Congo.

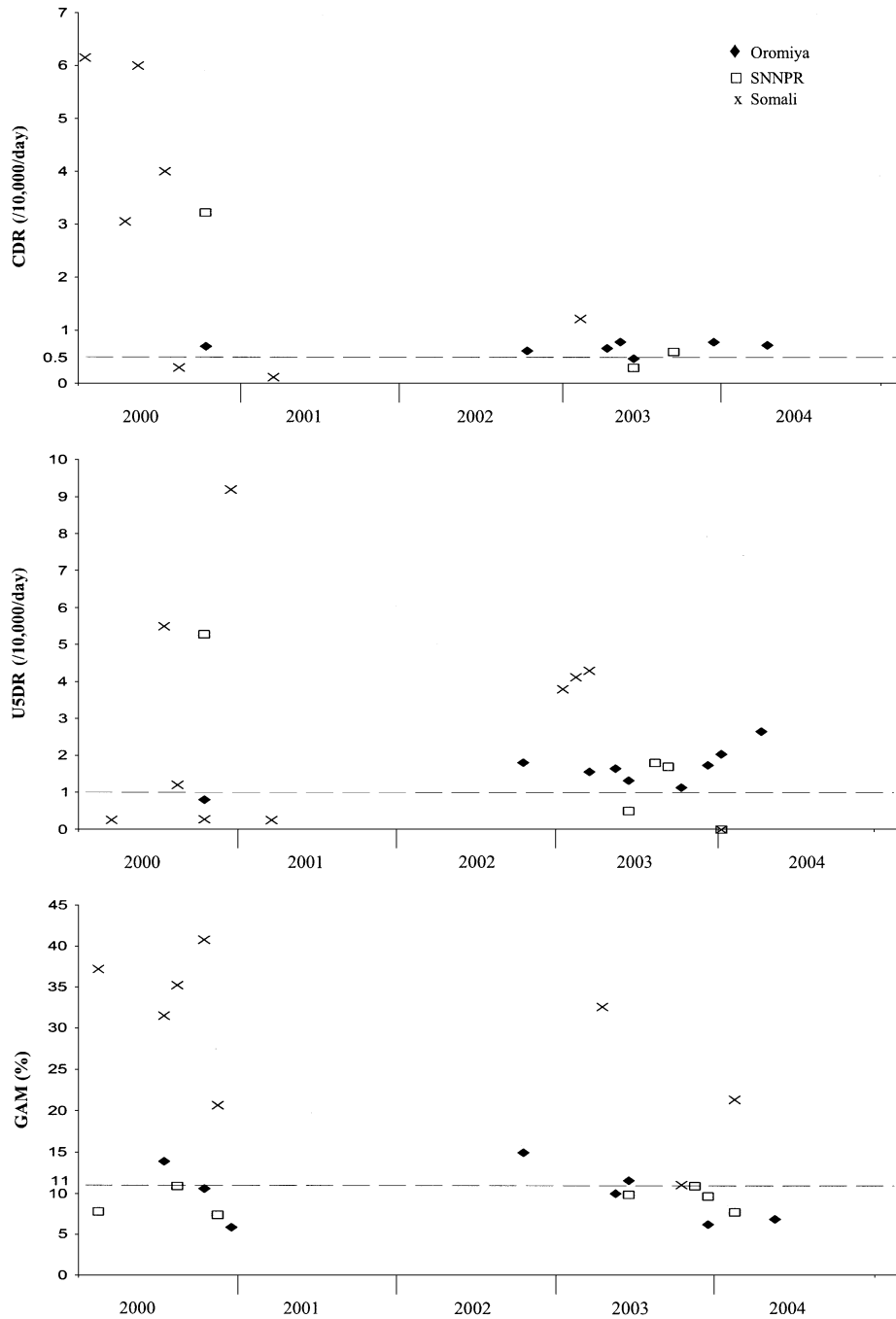


FIGURE 5. Monthly average crude death rate (CDR), under-5 death rate (U5DR) (death rate among children under age 5 years), and prevalence (percentage) of global acute malnutrition (GAM) for the conflict-affected region in Ethiopia, 2000–2004. Dashed line, national United Nations average. SNNPR, Southern Nations, Nationalities, and Peoples Region.

Peoples, and Oromiya regions, where poor agricultural communities are simultaneously being struck by drought and violence.

As figure 5 illustrates, the highest rates of mortality and malnutrition in Ethiopia occurred in Somali in 2000. They represent the consequences of the violence that erupted again in 1999. Mortality largely exceeded the national

average, with crude and under-5 death rates of 6.2/10,000 per day and 9.2/10,000 per day, respectively, while nutrition surveys measured wasting rates of more than 40 percent in the under-5 population. These surveys were completed when the situation finally came to international attention after more than 3 years of famine and war. Media attention started to focus on the Somali town of Gode in April 2000.

This was followed by improvement, but unfortunately most of the deaths had already occurred by then. High child mortality at the end of the year is explained by measles and diarrhea epidemics, in addition to the famine. Besides Somali, the Southern Nations, Nationalities, and Peoples Region showed rather high crude and under-5 death rates (3.2/10,000 per day and 5.3/10,000 per day, respectively) by the end of 2000.

In 2002–2003, high under-5 death rates (4.3/10,000 per day) and global acute malnutrition (32.7 percent) were reported again in Somali, which is also illustrated by the maps in Web figure 8. These high numbers originated from the Fik zone in Somali, which was the zone most affected by the droughts and which hosted approximately 15,000 internally displaced persons. Under-5 death rates in Oromiya, which remained below the national UNICEF average in 2000, reached above 2.5/10,000 per day early in 2004 in the resettlement area of Chewaka, where 67,000 internally displaced persons are almost totally dependent on food aid.

DISCUSSION

Preconceived notions about mortality and nutrition patterns in conflicts are not necessarily borne out by field evidence. Prevailing stereotypes, such as specific vulnerabilities of refugees, internally displaced persons, or certain age groups, do not apply in some situations. For instance, the condition of internally displaced persons is generally expected to be significantly worse than that of the residents in a conflict-affected zone. This was proven to be the case in Huila, Angola, in 2001, when mortality in all age groups among internally displaced persons was twice as high as that among residents in the area. The exact inverse could have occurred if the internally displaced persons had been under the protection of a United Nations or humanitarian agency. Other investigators have also discussed the increased vulnerability of internally displaced persons (5, 19).

The expected vulnerability of children, though a sad truth in most complex emergencies, is not always manifest from the evidence of the survey indicators. In general, the under-5 death rate constitutes the main proportion of the crude death rate. However, the under-5 death rate is sometimes reported to be low in comparison with the crude death rate, which probably indicates a highly violent situation where adults are being specifically targeted. For example, in the Upper Nile province of southern Sudan, the crude death rate remained nearly 10/10,000 per day in 2003 as compared with a significant drop in the under-5 death rate from 25/10,000 per day to 5/10,000 per day. The genocidal aggression directed toward civilian targets in this region clearly contributed to very high adult mortality, which is generally not observed in other conflicts, where children are the most vulnerable. Other studies have revealed surprising patterns of age-specific mortality (20–22).

On the other hand, an increase in the under-5 death rate as compared with the crude death rate indicates adverse child-related events, such as outbreaks of childhood diseases or severe food shortages. For example, in the Somali province of Ethiopia, the crude death rate plunged from 6/10,000 per

day to less than 0.5/10,000 per day, whereas the under-5 death rate shot up from around 5.5/10,000 per day to nearly 10/10,000 per day.

The above examples illustrate the potential danger of intuitively applying general vulnerability precedents in specific situations. Targeting might lose its effectiveness, while early warning and response would be compromised as well.

Analysis of the interaction between mortality and malnutrition rates also reveals interesting lessons. In some cases, high levels of mortality coexist with low levels of malnutrition, such as in the northeastern DRC in 2001–2002. This seemingly contradictory situation may be due to the inability of surveyors to measure malnutrition in these regions, where the malnourished children are already deceased and therefore not included in the nutrition survey. However, determinants other than malnutrition, such as epidemics or poor sanitation, can contribute to high rates of mortality. In situations with such contradictory rates, instead of acting on presumptions, investigators should undertake further research in order to target relief programs to the correct underlying cause.

Causes of death in complex emergencies do not follow easily discernible patterns and tend to be highly dependent on circumstantial factors. In emergencies that involve drought and crop failure, mortality and morbidity will follow a different pattern than in situations of plenty where genocide occurs. For example, North Kivu in the DRC experienced high under-5 death rates but relatively low crude mortality in comparison with the Sudan provinces. This high mortality could easily be attributed to the violent conflict. Evidence shows, however, that the major causes were childhood infectious diseases such as diarrhea and a failing health infrastructure. The importance of preventive measures such as sanitation and measles vaccination has been widely acknowledged; however, there is much room for improvement as far as implementation is concerned.

Finally, strong scientific evidence is hard to develop because of a lack of systematic and sound epidemiologic data. As a consequence, it is difficult to discern correct predictive patterns of expected mortality and nutrition. This compromises early health response and prevention efforts. In many conflict-affected countries, data on essential indicators are not reported for several years. None of the surveys reviewed here reported infant mortality rates, with the exception of those from the DRC. In the absence of this information, the effectiveness of planned perinatal care and reproductive health programs is reduced. Similarly, limited reporting on edema in malnutrition surveys reduces the assessment of kwashiorkor prevalence, resulting in ineffective targeting of feeding programs.

CONCLUSION

Survey data from complex emergencies are often of doubtful scientific quality, and conditions are often considered inadequate for sound academic research. This review illustrates that systematic epidemiologic analysis of key indicators has potential for use in planning, targeting, and policy making.

Reducing mortality and morbidity due to civil conflict requires a sound evidence base. In the absence of minimum standard data on essential indicators, humanitarian aid will be neither effective nor efficient. In this review, we underline the danger of intuitively applying stereotyped beliefs about human vulnerabilities to specific complex emergencies rather than depending on objective evidence.

Special attention should be paid to the development of complex emergency surveillance systems that can accurately depict the reality on the ground. The data generated by such a system can be used for local resource allocation by humanitarian actors and can assist donors in assessing impacts and evaluating trends.

Since 1993, global humanitarian aid has increased to an unprecedented 13 percent of overseas development aid. Our review indicates that the levels of hunger and death in just these four African countries are, by any standard, unacceptable. Humanitarian aid must be distributed far more effectively if rates of hunger and death are to be brought down to acceptable levels. The challenge that scientists face is measuring the extent and severity of the human impact of complex emergencies on civilian populations.

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