



A survey of internally displaced persons in El Geneina, western Darfur

Final Report

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Summary

A nutritional, mortality and general household status survey was conducted between 26 and 29 June 2004 among internally displaced persons (IDPs) living in twelve camps in or around the city of El Geneina, capital of West Darfur State, Sudan.

The IDP population in question had begun arriving in El Geneina in November-December 2003, but little humanitarian assistance had been made available to them as of June 2004, aside from food distributions based on a single registration in March 2004 (arrivals continued up to May).

The IDP population in each of the camps (Abu Zahr, Ardamata, Durti, Kirinding, Medinat el Hujjaj, al Mustaqbal, Riad, Sultan House, el Tadamon, al Thura, al Zahra, and Zalingei University) was estimated through a combination of hand tally counts and area sampling. A classic two-stage cluster survey was then performed, with a sample size of 900 children 6-59 months old for the nutritional assessment, 900 households for the mortality assessment, and 210 households for the general household status assessment.

An estimate of 80 277 IDPs was obtained for the twelve camps in and around El Geneina. This estimate exceeds the previous World Food Programme working figure, but is considerably lower than counts provided by camp chiefs. Serious overcrowding was a pattern in almost all camps.

Main findings of the survey included:

- A 5.5% (95%CI 4.1-7.3) prevalence of severe acute malnutrition expressed as Z-score deviation from the reference mean. The global malnutrition prevalence was 25.8% (95%CI 22.9-28.8).
- A crude mortality rate of 5.6/10 000/day (95%CI 4.1-7.6) in a retrospective recall period of 39 days from the first yearly rainfall (20 May 2004).
 - Under 5 mortality rate was 14.1/10 000/day (95%CI 9.7-20.1).
 - Diarrhoea was the leading cause of death.
 - Only 17.4% of dead persons received care in hospital.
- A diarrhoeal morbidity rate of 50.2 cases/1000/week among under 5 children, of which only 26.3% received treatment.
- 59.5% of households had access to pump or tap water, but only 40.0% owned a jerrycan.
- Only 36% of households used a latrine, and 5% owned soap.
- Only 40% of shelters had a roof protecting against the rain.
- Only 35% of households stated that they owned a food distribution card (card ownership was not visually verified).

A massive increase in assistance to these IDP camps is necessary now to reduce morbidity and mortality, and prevent a further deterioration in health and nutritional status. Principal recommendations include:

- Re-registration of IDPs, and supplementary distribution of food cards.
- Establishment of primary health care clinics in the main camps, and serving smaller camps.
- Expansion of inpatient capacity, and establishment of a clear referral system.
- Opening of therapeutic feeding programmes.
- Timely and comprehensive food distributions.
- Continued non-food item distribution.
- An increase in water quantity and water points, coupled with monitoring of water quality.
- Construction of latrines so as to reach acceptable sanitation standards.

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We are grateful to Concern Worldwide and the World Food Programme for sharing their population figures, and, last but not least, to the displaced communities for their warm reception and understanding. We hope very much that their situation improves substantially in the upcoming months.

Abbreviations

CMR	Crude mortality rate
GFD	General food distribution
IDP	Internally displaced person
MSF	Médecins Sans Frontières
MUAC	Middle upper arm circumference
NGO	Non-governmental organisation
SFC	Supplementary feeding centre
TFC	Therapeutic feeding centre
U5MR	Under 5 mortality rate
UNHCR	United Nations High Commissioner for Refugees
WFP	World Food Programme
W/H	Weight for height

1 Background

Violence in Darfur, western Sudan has so far led to the displacement of more than one million persons, and driven 200,000 over the border to Chad. Beginning in November-December 2003, internally displaced persons (IDPs) began flooding into El Geneina city (estimated population: 100 000) from surrounding areas, which, like much of western Darfur, were greatly affected by militia activity (Figure 1).

In El Geneina, the capital of western Darfur, IDPs settled within the town with relatives, or, alternatively, into twelve camps located either inside or on the outskirts of the town (Figure 2). The World Food Programme (WFP) carried out a single registration of the IDP population in March 2004, from which a working estimate of 54 731 was derived (arrivals, however, continued into June).

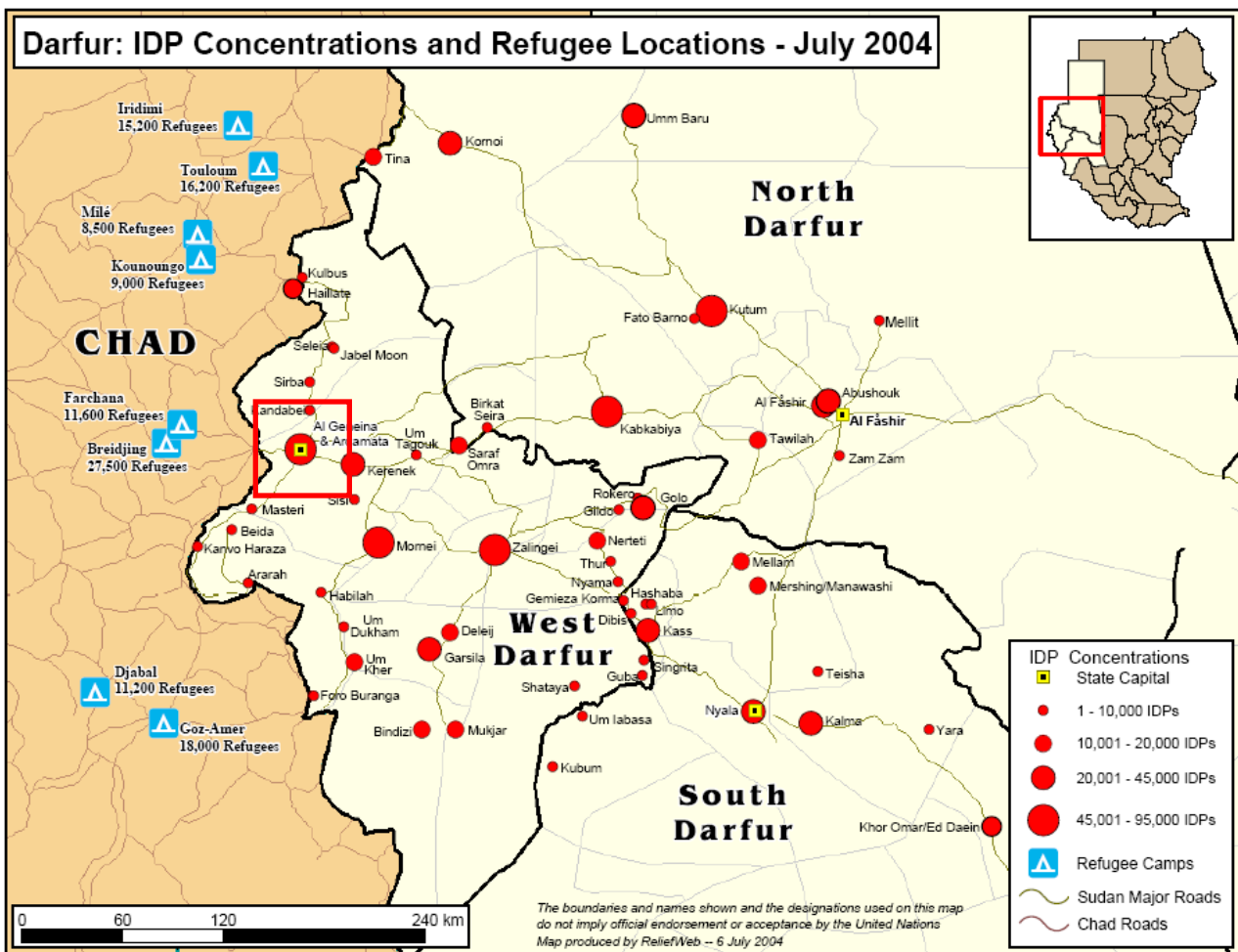


Figure 1. Location of El Geneina in Western Darfur (map accessed from www.reliefweb.int on July 26 2004).

During the first six months of these camps' existence, extremely little humanitarian assistance was available, the exceptions being WFP/Sudanese Red Crescent general food distributions, very limited non-food item distributions by local organisations, and small, irregular health posts established by Medair in a few of the camps (Abu Zahr, Ardamata, Durty). There was no camp

management, and settlement occurred without site planning. Shelter, water provision, and sanitation were, until recently, largely left in the hands of IDPs.

Starting in early June 2004, non-governmental organisation (NGO) presence in the El Geneina camps has been progressively increasing, partly thanks to eased restrictions on international staff visas. Major relief activities have since included: a re-registration of some of the camps, leading to non-food item distributions; limited programmes to rehabilitate hand pumps and encourage IDP construction of latrines; and the gradual establishment of camp clinics. The French section of Médecins Sans Frontières (MSF), already active in several other sites of western Darfur (Murnei, Zalingei, Niertiti, Kerenik), opened a therapeutic feeding centre (TFC) within El Geneina hospital. At the time of writing, MSF-Switzerland is establishing health centres in several of the largest IDP camps, and other NGOs plan interventions in the domains of water, sanitation and outpatient nutrition.

This survey was conducted so as to provide baseline information about the IDP population in El Geneina camps, and to verify the gravity of their situation.

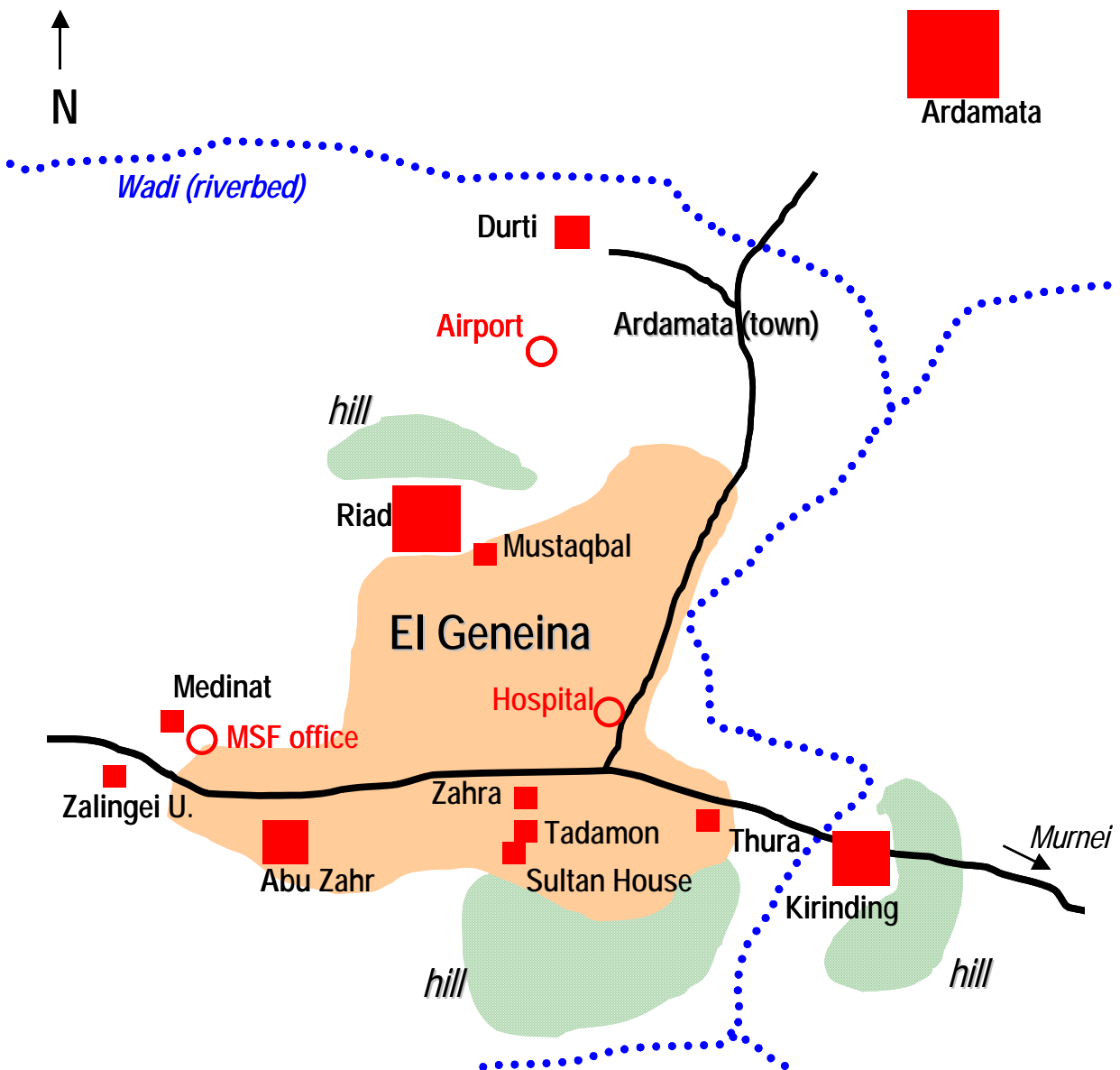


Figure 2. Approximate map of El Geneina town with location of IDP camps (Epicentre, June 2004).

1.1 Objectives

1. To estimate the population of IDPs currently living in camps around El Geneina town, by camp of residence.
2. To evaluate the status of IDP households in camps around El Geneina town, in terms of access to water and sanitation, registration for food distributions, shelter, and non-food items;
3. To estimate diarrhoeal morbidity among under 5 IDP children, and access to treatment among these cases;
4. To measure the prevalence of malnutrition (severe and moderate), expressed as deviation from Z-score and median, among under 5 IDP children.
5. To estimate measles vaccination coverage among the same group of children.
6. To measure retrospectively crude and under 5 community mortality, and rank major causes of death.

2 Methods

2.1 Population estimation

While a majority of the IDP population in El Geneina has clearly settled in identifiable “camps” (ranging from open spaces to unutilised or abandoned buildings), a significant number have found refuge with relatives living permanently in the town, or simply erected an isolated structure in abandoned spaces.

We estimated the IDP population living in the camps by using two different estimation methods, as detailed below¹. Due to the high mobility of IDPs during the daytime, both methods relied on the reported number of persons occupying individual shelters at night, and not on a count of IDPs present in the camp at the time of the estimation.

These estimations were carried out between 17 and 23 June 2004.

2.1.1 Shelter count

In all 12 camps but two, an exhaustive, direct hand count of shelters was performed. All shelters were included in the count, irrespective of whether they seemed occupied or abandoned. Within occupied buildings, the help of local chiefs (sheiks) or elder women was sought to clearly identify individual households.

The mean number of persons per shelter was estimated from a sample of 30 shelters, selected in the following way: (i) at the centre of the camp, a pen was spun, and an imaginary line drawn in its direction towards the edge of the camp; (ii) each third shelter encountered whilst walking along this direction was selected; (iii) once the camp’s edge was reached, the team returned to the centre and selected a new random direction, until the sample of 30 was completed. For each shelter selected, the following systematic question was asked of any adult person present inside: “how many persons slept in this shelter last night?” If the shelter was empty and occupants could not be traced, immediate neighbours were questioned about the shelter’s occupancy: if the shelter was abandoned, a result of “0 persons” was recorded.

Estimated population was the product of *total number of shelters* and *mean number of persons per shelter*.

2.1.2 Area sampling

Estimation by area sampling was performed in Ardamata and Riad camps because the very large number of shelters precluded a hand count given our time constraints. This method comprises two steps: (i) drawing of a map of the camp, enabling a calculation of total surface area; (ii) counting persons living within squares of known surface area, and extrapolating this population density to the total camp surface area.

Mapping was performed through a compass. The surveyor walked along the edge of the camp, stopping each time direction changed so as to record angle deviation from North (in degrees). The distance in steps between each angle point was also recorded. Steps were later converted to metres (to do this, a 25 m distance was walked four times by the surveyor with a pause in between; results were 31, 31, 32 and 31 steps respectively, giving a conversion of 0.80 steps/m).

Maps were drawn, and surface area calculated, by use of a software tool (Mapping version 1.2, Epicentre, 2002). In Ardamata, a well-delimited camp without significant empty spaces within its borders, a single map was constructed. In Riad, a fragmented, uneven camp intersected by large breaks, seven maps, covering corresponding inhabited sections, were drawn so as ensure that the

¹ Epicentre/Médecins Sans Frontières (1999). Rapid health assessment of refugee or displaced populations. MSF, Paris.

total surface area did not comprise large uninhabited portions. Total surface area was thus obtained from a sum of these seven maps.

In Ardamata, population density was estimated through random selection of ten squares of 50 m x 50 m within the camp's surface area. Starting points for each square were selected at random in the Mapping software. At each square starting point, the first side of the square was mentally drawn by proceeding due North for 50 m (63 steps), and the remainder by 90° increments. Local assistants were recruited to help mark corners of each square. Within each square, surveyors visited every shelter and inquired about the number of persons having slept within the shelter the previous night, as described above.

In Riad, because of the smaller surface area, ten squares of only 25 m x 25 m were selected. Square starting points were chosen within each of the seven inhabited sections previously mapped in the following way: (i) a pen was spun at the centre of the section, and the team counted the number (n) of shelters encountered in this random direction until the edge of the camp was reached; (ii) the serial number on a bank note was used to select a random number x between 1 and n; (iii) the shelter corresponding to random number x provided the square starting point. Squares were then constructed and shelters within them visited as described above. The three largest sections were allocated two squares each so as to reach a total of ten.

In both camps, *estimated population density* (persons/m²) was calculated as the *total number of inhabitants in the sampled squares*, divided by the *total sampled area* (10 x 50 m x 50 m = 25 000 m² in Ardamata, and 10 x 25 m x 25 m = 6250 m² in Riad). Estimated population was the product of *total surface area* and *estimated population density*.

In addition to Ardamata and Riad, two other overcrowded camps (Abu Zahr and Madinat al Hujjaj) were also mapped so as to provide an estimate of population density.

2.2 Survey

2.2.1 Overall design

General household status, nutritional and vaccination status of children aged 6 to 59 months, as well as overall crude and under 5 retrospective mortality were assessed simultaneously within the same survey design. A standard two-stage WHO/Expanded Programme of Immunisation 30-cluster design was used², as systematic sampling of the camps was judged unfeasible given the lack of an easily constructed individual household sampling frame.

Sample sizes were as follows:

- General household assessment: 30 clusters of 7 households (total 210)
- Nutritional assessment: 30 clusters of 30 children 6 to 59 months old (total 900)
- Mortality assessment: 30 clusters of 30 households (total 900)

At the **first stage of sampling**, 30 clusters were allocated to the 12 IDP camps proportionately to their estimated population. To do this, a list of the camps was drawn, with a cumulative running total of population ($p_1 + p_2 + \dots + p_{12} = p_{tot}$). A sampling rate (r) was obtained by dividing the total population in the 12 camps (p_{tot}) by the number of clusters (30). The first sampling point (cluster) was determined by a random number x (of the same number of digits as r, and comprised between 1 and r), with subsequent points (clusters) falling at (x+r, x+2r, ..., x+10r). Accordingly, clusters were

² Henderson RH, Sundaresan T (1982). Cluster sampling to assess immunization coverage: a review of experience with simplified sampling method. *Bulletin of the WHO* 60:253-60.

located in Abu Zahr (n=4), Ardamata (8), Durti (2), Kirinding (5), Madinat el Hujjaj (1), Riad (8), Sultan House (1), and al Thura (1).

At the **second stage of sampling**, shelters (households) within each cluster were selected. To do this, teams spun a pen at the centre of the camp, and walked along the imaginary line indicated by the pen until the edge of the camp, counting the number of shelters (n) encountered along the way. A random number x between 1 and n was then selected from a table, and the shelter corresponding to this number became the first shelter (household) visited in the cluster.

From this point forward, teams advanced by following a criterion of proximity, i.e. the shelter closest to the first became the second shelter visited in the cluster, and so on until the required sample in the cluster was completed for the general status, nutritional and mortality assessments. In case of equidistant shelters, teams systematically moved to the shelter on the right. Empty shelters (or shelters where children eligible for the nutritional assessment were missing at the time of the survey) were re-visited within the same day, and the help of neighbours or elders was recruited to locate absentees.

Households were defined as groups of persons who had slept together in the same place the previous night. Respondents were responsible adults living in the household. In each cluster, all households answered a mortality questionnaire (see below), irrespective of whether they contained children eligible for the nutritional assessment, and until a total of 30 households was reached. The first seven households in the cluster, however, also answered a general status questionnaire. Any children 6 to 59 months old were included in the nutritional assessment, until 30 such children had been assessed in the cluster.

2.2.2 Household status

The general household status questionnaire (Annex 1) was designed to obtain the following information for each household:

Based on the respondent's account:

- use of a water pump or tap as main source for water procurement
- use of a latrine
- possession of a food distribution card (note: during the trial session it was ascertained that many households were reluctant to show their cards, or kept it with relatives in town; it was therefore decided for this question to rely on the respondent's verbal report only)
- completeness of the food card (did it cover all household members?)
- number of children under 5 who, in the past 7 days, had experienced a serious episode of diarrhoea, defined as "3 or more liquid stools within the same day"
- number among these children who received treatment for their diarrhoea in a clinic

Based on the surveyor's observation:

- presence of a roof which protected against the rain (clear criteria for this were discussed with the teams during training)
- possession of plastic sheeting
- number of jerrycans
- number of blankets
- possession of soap

2.2.3 Nutritional and vaccination status

Eligibility for the nutritional assessment (Annex 2) was based strictly on a height criterion, as the correct age was deemed difficult to ascertain. Accordingly, only children taller than 65 cm and smaller than 110 cm (roughly corresponding to the age group 6 to 59 months) were included.

Weight was recorded to the nearest 0.1 Kg on a Salter scale, readjusted before each measurement. Due to local custom, families were reluctant to take off all children's clothes; therefore, occasionally light undergarments were kept on. Similarly, height was measured on height boards, and reported to the nearest 0.1 cm (children below 85 cm were measured lying down, whereas taller children were measured standing). Middle upper arm circumference (MUAC) was also recorded by use of arm bands. Presence of bilateral oedema was assessed by three seconds' thumb pressure on the dorsum of both feet.

We also inquired whether the household owned a food distribution card. In theory, children reported to be currently admitted in the Médecins Sans Frontières therapeutic feeding centre (TFC), or at the hospital inpatient department, were to be surveyed there (however, in practice no such case was encountered).

Measles vaccination status was assessed:

- by observation of a vaccination card if produced
- by verbal history based on a yes/no answer to the following question: "did your child receive a shot in the upper arm?"

2.2.4 Retrospective mortality

A recall period of 39 days average was defined, starting on the first day of rain in El Geneina in 2004 (20 May 2004, with a precipitation of 23.9 mm according to the Airport Weather Bureau). It was judged that IDPs would easily recall this date, especially since at the time the vast majority did not have plastic sheeting to cover their shelters.

The present structure of the household was established by asking respondents about the number of persons having spent the night in the shelter, their sex and the number among them aged less than 5 years (Annex 3). Respondents were then asked about any deaths occurring since the first rainfall of the year among household members living in their shelter. The age and sex of any dead person was recorded. An open question about the cause of death was asked; and surveyors classified the answer into one of the following categories: 'diarrhoea', 'fever', 'cough', 'hunger', 'violence', and 'other'. Surveyors also inquired whether the dead person had received treatment in hospital.

2.2.5 Survey implementation

Four teams of two or three surveyors, drawn from the IDP population, were constituted, and trained on the survey tools during a two-day session. Surveyors were all highly literate in Arabic, but not medically trained. Each team also had an English-speaking supervisor possessing more in-depth training about the survey methods and its objectives (two of these supervisors were expatriate).

Standardised questionnaires were translated into Arabic and independently back-translated into English so as to verify accuracy of translation. A trial implementation of the survey was performed in a limited number of households (about five per team) before starting the survey in earnest. For the sake of consistency, teams were instructed to read out the questions exactly as formulated in the questionnaire forms. The survey took place between 26 and 29 June 2004.

2.2.6 Data entry and analysis

Data were recorded on questionnaire forms in Arabic (as numbers or abbreviations), and entered in English by the supervising epidemiologist on EpiData version 3.0 (EpiData Association, Odense, Denmark). Analysis was on EpiInfo version 6.04 (CDC, Atlanta). Design (cluster) effects were calculated for each parameter, and applied so as to obtain 95% confidence intervals (95% CI).

Prevalence of acute malnutrition was expressed both as Z-score deviation from the reference population mean, and as percent of the reference median. Accordingly, the following classification system based on weight-for-height (W/H) was used:

Acute malnutrition in terms of W/H Z score:

- **Severe:** W/H <3 Z scores *and/or* bilateral oedema
- **Moderate:** W/H <2 Z scores *and* ≥ 3 Z scores *and* no bilateral oedema
- **Global:** W/H < 2 Z scores *and/or* bilateral oedema (i.e. severe + moderate)

Acute malnutrition in terms of W/H percent of median:³

- **Severe:** W/H <70% of median *and/or* bilateral oedema *and/or* MUAC <110 mm
- **Moderate:** W/H <80% *and* $\geq 70\%$ of median *and* no bilateral oedema *and* MUAC ≥ 110 mm
- **Global:** W/H <80% of median *and/or* bilateral oedema *and/or* MUAC <110mm (i.e. severe + moderate)

³ The MUAC criterion was added to the W/H as percent of median classification so as to reflect the entry criteria for the current MSF therapeutic feeding centre (TFC) in El Geneina, and thus be able to extrapolate a theoretical number of malnourished children currently eligible for the programme.

3 Results

3.1 Population estimation

Population could not be estimated accurately in Al Mustaqbal camp due to internal incidents. For this relatively small camp, only an “eyeball” estimate is provided, obtained from a rapid tour of the camp.

The proportion of abandoned shelters varied widely from one camp to the next, yielding different estimates of mean persons/shelter (Table 1). Where surface area was calculated, density was in excess of the UNHCR standard of 30 m²/person everywhere except for Ardamata, by far the largest camp with 1.39 Km² surface area.

Table 1. Details of MSF/Epicentre population estimation in IDP camps around El Geneina, West Darfur. MSF IDP survey, El Geneina, June 2004.

Camp	Estimation method	Mean persons/shelter	Population density
Abu Zahr	count	4.3	4.4 m ² / person
Ardamata	mapping	n/a	63.1 m ² / person
Durti	count	4.5	n/a
Kirinding	count	4.1	n/a
Madinat el Hujjaj	count	2.8	18.9 m ² / person
al Mustaqbal	rough estimate	n/a	n/a
Riad	mapping	4.0	3.7 m ² / person
Sultan House	count	5.1	n/a
Tadamon	count	6.0	n/a
al Thura (school and surrounding areas)	count	5.3	n/a
al Zahra school	count	6.0	n/a
Zalingei University	count	7.7	n/a

Population estimates were, in general, considerably higher than those provided by WFP, though lower than figures reported to us by camp chiefs (Table 2). A re-registration by Concern Worldwide, based on household lists provided by participatory IDP committees, yielded a population total of 36 537 for six of the 12 camps (Abu Zahr, Kirinding, Madinat, al Mustaqbal, Tadamon and al Thura). At the time of writing, an NGO re-registration effort was underway in Riad.

Table 2. MSF/Epicentre population estimates for IDP camps, El Geneina, Western Darfur, Sudan (25 June 2004).

Camp	MSF estimate (June 2004)	WFP registered population (March 2004)	Concern registered population (May 2004)	Population according to chiefs (June 2004)
Abu Zahr	10 950	2681	6841	10 600
Ardamata	22 070	23 652	n/a	41 000
Durti	5351	3643	n/a	8500
Kirinding	11 937	14 213	22 249	14 000
Madinat el Hujjaj	2990	1775	2358	3844
al Mustaqbal ⁴	800	not on list	4139	698
Riad	22 666	4392	n/a	37 000
Sultan House	1081	with Tadamon	n/a	1438
Tadamon	312	2791	1206	52 families
al Thura (school and surrounding areas)	793	1584	2102	490 + 311 families
al Zahra school	444	with Tadamon	n/a	155 families
Zalingei University	883	with Medinat	n/a	2000
TOTALS	80 277	54 731		122 273⁵

Overall, 80 277 persons were estimated to live in IDP camps in El Geneina. This figure is 1.47 times higher than the working WFP estimate (54 731) used until now, but only 0.66 times the population reported by IDP chiefs (122 273). The MSF population estimate is used for relevant calculations in the remainder of this report.

3.2 General household status

3.2.1 Water, sanitation, shelter and food registration

Overall, 210 families, corresponding to 1119 persons (of whom 205 under 5 children) provided information on various aspects of their households (Table 3). While 59.5% of households used a water pump or tap for collection of water, a similar proportion did not own a jerrycan.

A minority of households (36.2%) used a latrine, and soap availability was negligible (5.2%). Whenever possible, the number of latrines per camp was counted (all were simple pit latrines): 10 in Abu Zahr (1095 persons/latrine), 50 in Durti (107 persons/latrine), 5 in Madinat (598

⁴ Al Mustaqbal Concern figures were obtained before the camp riot and thus before the departure of an apparent majority of the IDPs.

⁵ To obtain this sum, families were converted to persons by assuming a mean household size of 5.8 (see Section 3.4).

persons/latrine), 2 in Sultan House (541 persons/latrine), 1 in Zalingei University (883 persons/latrine). Tadamon, al Thura and al Zahra had no functioning latrines.

Table 3. Household status information. MSF IDP survey, El Geneina, June 2004.

variable	n	%	95%CI
draw water from a pump or tap	125/210	59.5	43.4-74.0
number of jerrycans	none	60.0	46.9-71.9
	1 or more	40.0	28.1-53.1
use a latrine	76/210	36.2	29.8-43.1
own soap	11/210	5.2	1.3-15.9
roof protects against the rain	84/210	40.0	26.0-55.7
own plastic sheeting	81/210	38.6	24.3-54.9
number of blankets	none	67.6	53.0-79.6
	1 or more	32.4	20.4-47.0
say they have a food card	74/210	35.2	23.3-49.2

Only 40.0% of shelters were rainproof, a proportion highly associated with ownership of plastic sheeting. Expressed with respect to the entire population, blanket coverage was 103 blankets per 1119 persons (9.2%, 95%CI 6.2-13.4).

Of the 74 families who said that they owned a food distribution card, 22 (29.7%) stated that the card did not cover all household members.

3.2.2 Diarrhoeal morbidity among children

Among the 205 under 5 children living in the 210 households surveyed, 103 (50.2%) were said to have experienced diarrhoeal disease (defined as 3 or more liquid stools within the same day) over the past week. This corresponds to an incidence rate of 50.2/100/week (i.e. within two weeks, *all* children under 5 would be expected to have had diarrhoeal disease). Only 27/103 (26.3%) of these suspected diarrhoea cases were reported to have received treatment in a clinic.

3.3 Nutritional and vaccination status

3.3.1 Prevalence of malnutrition

Overall, 896 children were included in the nutritional assessment out of the planned 900 (two clusters were cut short due to a sandstorm, and two children said to be admitted in El Geneina hospital could not be traced). Of children included, 856 were analysable: 36 fell slightly below the height criterion, 1 above, and 3 had non-interpretable (outlier) data that could not be corrected by verification of the questionnaire forms. The male/female ratio was 1.17 (461/395). Only 1 bilateral oedema case was observed in the sample. Oedema (a major sign of kwashiorkor malnutrition) is also rarely observed at the MSF therapeutic feeding centre (TFC) at El Geneina hospital (7/144 admissions, or 4.9%, up to 2 July 2004).

The prevalences of malnutrition in terms of Z-score (Table 3) and percent of median or middle-upper arm circumference (MUAC) (Table 4) differed slightly, with the former yielding more alarming values. Both classification systems, however, provided estimates in excess of 15% global malnutrition, a threshold indicating a serious food and nutrition emergency⁶. Had MUAC been used as the screening tool, however, only 15/856 children (1.8%, 95%CI 0.7-2.8) would have been classified as severely malnourished.

Table 3. Prevalence of acute malnutrition among under 5 children (n=856), expressed as Z-score deviation from the reference mean. MSF IDP nutritional survey, EI Geneina, June 2004.

	Type	n	%	95%CI
Severe	weight/height <-3Z or bilateral oedema	47[†]	5.5	4.1-7.3
Moderate	weight/height <-2Z and ≥ -3Z	174	20.3	17.4-23.3
Global	Severe + Moderate	221	25.8	22.9-28.8

[†] includes 1 bilateral oedema case

Table 4. Prevalence of acute malnutrition among under 5 children (n=856), expressed as percent of the reference median. MSF IDP nutritional survey, EI Geneina, June 2004.

	Type	n	%	95%CI
Severe	weight/height <70% or bilateral oedema or MUAC<110 mm	31[†]	3.6	2.3-5.0
Moderate	weight/height <80% and ≥ 70%	140	16.4	13.9-18.9
Global	Severe + Moderate	171	20.0	17.4-22.8

[†] includes 1 bilateral oedema case

Extrapolating to the estimated population of children 6-59 months currently living in the IDP camps (12 041 assuming roughly 15% of persons fall within this age group – see Section 3.4), 433 cases of severe malnutrition meeting criteria for admission to a TFC using MSF's admission criteria can be projected.

⁶ United Nations High Commissioner for Refugees (2000). Handbook for emergencies. Geneva, UNHCR.

None (95%CI 0.0-11.2) of the 31 children meeting severe malnutrition criteria through a combination of weight/height percent of median, bilateral oedema and MUAC were currently admitted at the MSF TFC. However, it should be noted that this facility has only just begun operating at the time when the survey was conducted, and that indeed the present survey was in great part responsible for augmenting its workload.

Only 296 (34.6%, 95%CI 24.0-46.8) of children in the sample lived in a household claiming to possess a food distribution card. Statistical differences between “children with food card” and “children without food card” in terms of mean W/H Z score (-1.30 vs. -1.43) and mean W/H % of median (88.3% vs. 87.1%) were of borderline significance (p=0.053 and p=0.080 respectively; Student’s T-test).

3.3.2 Measles vaccination coverage

Overall, only 114/856 (13.3%, 95%CI 9.6-18.1) of children produced a card showing that they had been vaccinated against measles, while 577/856 (67.4%, 95%CI 51.5-80.3) were vaccinated according to parental history. However, one survey team systematically reported much lower vaccination coverage than other teams. These results should therefore be interpreted with caution.

3.4 Retrospective mortality

A total of 900 families provided information on deaths in their household occurring since the first rainfall of the year (20 May 2004, namely an average recall period of 39 days). Overall, 5191 persons were found to be living in these families (mean household size 5.8 persons⁷), of whom 936 (17.6%) were aged under 5 years. The male/female ratio was 0.94 overall (2520/2671), 1.16 (476/410) among under 5 children, and 0.90 (2044/2261) among persons 5 years old and above.

Overall, 50/115 (43.4%) of deaths reported occurred among under 5 children, and 27/115 (23.5%) among persons aged 60 years or above. Of the dead, 68/115 (59.1%) were males. Mortality rates (both all age and under 5) were well in excess of the alert thresholds of 1/10 000/day for all age groups and 2/10 000/day for the under 5 (Table 5). They were some 10 times higher than baseline non-emergency levels in Sub-Saharan Africa (0.5-0.6/10 000/day).

Table 5. Retrospective mortality rates. MSF IDP survey, El Geneina, June 2004.

Group	n	mid-period population	deaths/10 000/day	95%CI
all ages	115	5249	5.6	4.1-7.6
males	68	2554	6.8	4.5-9.8
females	47	2695	4.5	3.2-6.2
under 5	50	911	14.1	9.7-20.1

The most important self-reported causes of death were diarrhoea and fever (Table 6), though among children under 5 years fever was named most often. Overall, medical reasons accounted for at least 85/115 (73.9%) of all deaths, and 42/50 (84.0%) of deaths under 5 years.

⁷ Note: a registration carried out by Concern Worldwide in six camps in mid-May 2004 found the same household size of 5.8.

Table 6. Self-reported causes of death. MSF IDP survey, El Geneina, June 2004.

Cause	All ages		Under 5	
	n	%	n	%
diarrhoea	41	35.7	18	36.0
fever	33	28.7	19	38.0
cough	8	7.0	4	8.0
hunger	3	2.6	1	2.0
violence	11	9.6	0	0.0
other	19	16.5	8	16.0
Total	115	100.0	50	100.0

All violent deaths (11/115 or 9.6% of total) occurred among adult males who had wandered outside of the camp to search for wood or other goods. Janjaweed militia were blamed for all of these murders.

Out of all 115 dead persons, only 20 (17.4%) received treatment in hospital before dying, with a similar pattern (9/50 or 18.0%) among under 5 children.

4 Discussion

4.1 Relevance of findings

Approximately six months after the beginning of the IDP influx to El Geneina, we provide here the first quantitative data on the health and nutrition status of this displaced population. This constitutes baseline information for aid agencies currently planning and/or implementing programmes in the IDP camps. This survey also confirms the dramatic extent of the ongoing emergency in West Darfur, and highlights the situation in a large IDP population that had hitherto received very little humanitarian assistance.

The main drawback of this survey is that, as with any cluster design, results reflect the situation in all camps as a whole, and stratification by camp is statistically unfeasible. In addition, the repartition of clusters was based on the MSF/Epicentre population estimates. Had these been incorrect, the sampled population might have been skewed (i.e. more representative of certain camps than others), possibly resulting in some over or under-estimation of surveyed parameters.

4.2 Population estimates

The population estimation exercise proved to be complex due to the chaotic nature of IDP settlement in El Geneina. As with many other sites in Darfur, the underlying problem for correctly estimating population derives from the lack of assistance and access to the IDP populations during the influx phase, which meant that no systematic registration of arrivals took place. In particular, the following complicating factors were noted:

- the camps are extremely disorganised, with no clear space allocation or ordered housing arrangement; sectors are almost impossible to define;
- most shelters consist of approximately 2 m x 2 m boxes constructed from a bamboo frame and barely covered by cardboard, leaves, straw or rags; these shelters share one or more “walls” with other shelters, making it difficult to clearly separate them;
- in some camps (notably Durti and Kirinding), the border between the IDP and resident community is blurred;
- apparently, some IDPs spend most of their time in the resident El Geneina community, but return to the camps (where they maintain a makeshift shelter) when distributions take place;
- sharp differences in population density and type of shelter exist within the same camp;
- given the abysmal lack of services and food aid in these camps, it is possible that some respondents provided incorrect information about the true number of persons living in their shelter. Residents were visibly anxious that their shelter would be included in the count, and may often have perceived the exercise as a registration process. This response bias would have probably resulted in overestimation of population size.

For the above reasons, great care should be taken when interpreting these findings. Nevertheless, we feel that this estimation exercise suggests that **the present population figures for the El Geneina IDP camps are inadequate, and should urgently be updated.**

Overall, our individual camp estimates seem realistic, with the possible exception of the two camps where the area sampling method was utilised. In particular, our estimate for Riad camp may, simply based on visual impression, be somewhat higher than the true population. In general, it should be noted that the area sampling method has not been fully validated for population estimation⁸.

⁸ Brown V, Jacquier G, Coulombier D, Balandine S, Belanger F, Legros D (2001). Rapid assessment of population size by area sampling in disaster situations. *Disasters* 25:164-71.

Presently, registrations and enumerations of IDPs are being carried out by other NGOs (Concern Worldwide, Islamic Relief, etc.). These efforts are very important and direly needed, but their precision will probably also be affected by the chaotic conditions in the El Geneina camps. We feel that working population figures for these camps are best derived by comparison of each agency's estimates, and by careful consideration of the possible biases in each approach.

In addition to IDPs living in camps, a considerable number are said to be dispersed in the resident community. This is evident when driving around El Geneina, whose streets and compounds are dotted with freshly built shelters resembling very much those found in the camps. The numbers of these IDPs may be considerable, and efforts should be placed on identifying and registering them.

With the exception of Ardamata, **extreme overcrowding is the norm at all camps**, with available area per person far below the UNHCR standard of 30 m²/person. This carries obvious risks for disease transmission and rapid spread of epidemics (notably measles, diarrhoeal diseases and meningitis).

4.3 General status of IDPs

While this survey was being carried out, distributions of non-food items (plastic sheeting, jerrycans and blankets) were taking place, or had already been completed, in some of the camps. Therefore, our results represent a still shot of an evolving situation. The unusual width of confidence intervals for estimates of non-food item coverage is explained by a large design effect (i.e. clusters were very homogenous, having either very high or very low coverage). In spite of this, and given the recent arrival of the rains, it is clear that for now most needs regarding shelter and non-food items remain unmet, and that **non-food item distributions, so far carried out only in 4/12 camps, should rapidly be extended to all the other camps so as to prevent a major shelter emergency.**

While the source of water for most IDPs was pumps and taps, water points (not counted systematically) were few and far between. IDPs not accessing pumps (nearly 40%) mostly took water directly from holes dug in the "wadi" (a dry riverbed that is now being flooded by the rains, bringing in wastewater from El Geneina town and from large camps located on its banks). Jerrycans are also direly lacking, probably limiting considerably the effective amount of water available to households; in addition, most storage containers consist of large-necked, unprotected vases. Contamination of the ground source can also not be discounted given that most camps are surrounded by defecation fields, sometimes upstream as in the case of Riad. No water flocculation and/or chlorination effort was witnessed during our evaluation.

Sanitation is also poor, with a remarkable lack of latrines, sometimes entirely absent, and generally far below the standard of maximum 20 persons/latrine. In these conditions, latrine overflow is likely, reversing their beneficial effect⁹. An excessive fly population is evident whilst walking through most camps, and several dozen dead, unburied animals dotted the outskirts of large camps such as Ardamata and Riad. Soap is practically not in use among the IDP population.

In short, **the IDPs of El Geneina are living in extremely sub-standard water and sanitation conditions.** We believe this, in addition to poor nutrition, is greatly to blame for the very high incidence rate of diarrhoeal disease among children measured through our survey (attack rate 100% within two weeks). Our measure of diarrhoeal morbidity, however, relied on parental report, and may be subject to over-reporting.

⁹ Esrey SA, Potash JB, Roberts L, Shiff C (1991). Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bulletin of WHO* 69:609-21.

4.4 Food and nutrition

Our findings on nutrition provide reason for deep concern. **A very serious nutritional crisis is developing in El Geneina's IDP camps.** The malnutrition prevalences described by our survey are already above thresholds defining an emergency. This observation is probably largely explained by the following two factors:

- Although IDPs began arriving in January 2004, the first registration took place only in March, and the first monthly general food distribution (GFD) in April. A second GFD was carried out between 17 and 30 May, and a third one was recently completed (first two weeks of July), some three weeks behind schedule.
- **Serious problems in equity of food card ownership seem to exist.** Our survey shows that less than half of households possess a card entitling them to receive a GFD (we did not rely on visual observation of the cards, leading to possible response bias; however, this finding was consistent in the general as well as nutritional questionnaires). This may in great part be due to the lack of re-registrations after March, despite numerous IDP arrivals since that time. During our camp visits, however, IDPs pointed to other problems, such as cards being assigned to non-IDP El Geneina residents, and double or triple registration of certain IDP families.

Currently, IDPs have limited coping mechanisms and are increasingly dependent on food aid, principally due to loss of livestock and inability to cultivate and work outside of the camps given the ongoing insecurity. **Any further delay in food distributions during the rainy season, coupled with the failure to update food registration lists, will probably lead to a further worsening of the nutritional status.** A remarkably high incidence of diarrhoeal diseases among children will undoubtedly represent a further aggravating factor.

4.5 Mortality

The very alarming mortality rates highlighted by our survey (some ten times the rates expectable in non-emergency conditions in sub-Saharan countries) merit a cautious analysis and interpretation. Our mortality assessment considered a recall period of 40 days, during which the vast majority of IDPs in the camps did not have access to health care. The resulting lack of morbidity and mortality records would have essentially drawn a veil over the main medical problems affecting the camps, such that even **an epidemic could have gone unnoticed.** Several "epidemiological" events could have taken place within this period, including an epidemic's peak. The survey-derived rates may therefore be different from present conditions, and may not be applicable to each camp individually.

Following the survey, a rapid assessment of the present scale of mortality in El Geneina was carried out covering a seven-day period before 4-6 July 2004. This assessment strongly suggested that **mortality rates remained very high up to the first week of July 2004¹⁰.** This re-evaluation also pointed to diarrhoea (one third apparently involving blood in the stool) as the leading killer. Furthermore, it confirmed that the vast majority of dead persons did not access hospital facilities, or were discouraged by admission fees (in theory the El Geneina hospital provides free health care to IDPs according to presidential decree; in practice, however, we witnessed serious drug shortages at the outpatient pharmacy; the paediatric ward consists of a mere eight beds; and entrance fees remain in vigour).

Other methods to rapidly estimate mortality exist. Among them, grave counting seemed problematic for the following reasons:

- About one half of IDPs are carried to El Geneina town or the hospital before dying, and are buried (usually 1-2 hours after the death, and often without large funerals) in town graveyards, alongside residents;

¹⁰ Data available upon request.

- IDPs dying in the camps are buried in a variety of makeshift graveyards, some extremely small, and other mixed with residents;
- Fresh tombs are difficult to identify (we could not find a consensus among locals as to the date of burial of what appeared to be very recent graves);
- The now frequent rains further complicate detection of fresh graves, as these graves consist of simple earth mounds, easily washed off by a strong storm.

What may be responsible for such elevated mortality? The state of relative neglect in which the IDPs have been living so far greatly limited the potential sources of information from which we could generate hypotheses. Nevertheless, we believe that **the spread, possibly on epidemic proportions, of diarrhoeal disease (of one or more aetiology), could have been responsible for this excess mortality.** Risk factors for a diarrhoeal disease epidemic are clearly present: overcrowding, very poor sanitation, insufficient (clean) water availability, and inadequate nutrition. Aggravating factors (accounting for high case-fatality rates) include lack of health care since months and exposure to the sun and high temperatures.

4.6 Conclusions

In the absence of a massive, coordinated relief effort targeting several sectors simultaneously, the situation of the IDPs in El Geneina cannot substantially be improved.

In particular, the striking incidence of diarrhoea must urgently be addressed by expanding health care coverage, improving children's nutritional status, and providing adequate water and sanitation services.

In the upcoming weeks, four factors in particular might contribute to a further increase in mortality rates, especially among children:

1. A further deterioration of the nutritional situation brought about by a delay in food distributions, and by the dire incompleteness of food card registration;
2. A further increase in diarrhoeal disease transmission due to the onset of heavy rains
3. A seasonal peak, or possibly an epidemic, of malaria, to be expected starting from the second half of July;
4. An increase in respiratory infections brought about by decreasing temperatures at night and direct exposure to the elements due to inadequate shelter.

Overshadowing all of these issues lies the question of camp security. Violence still accounts for a significant proportion of deaths among camp residents, and, anecdotally, makes coping difficult by severely restricting movement outside of the camps. Episodes of intimidation and abuse of IDPs leaving the camps to collect water or other items were freely reported to us in all camps we visited. This persistent violence greatly impacts the health and well-being of IDPs, and undoubtedly adds to already existing psychological trauma.

5 Recommendations

Based on the above findings, and other qualitative observations gathered in El Geneina's 12 IDP camps during our three-week assessment, the following recommendations are made:

Population

1. Update registration lists in all of El Geneina's IDP camps, and rapidly distribute food and non-food item distribution cards to all those needing them;
2. Settle upon a consensual working figure of number of IDPs living in El Geneina, based on which programme planning should occur;

Health care

3. Rapidly establish comprehensive, well-staffed, permanent, and free primary health care structures in all of the large camps (Riad, Ardamata, Kirinding, Abu Zahr), with appropriate protocols for treatment of diarrhoeal dehydration, malaria, respiratory infections and other common conditions. These structures should also rely on a network of home visitors (at least 1 per 2500 IDPs, ideally 1 per 1000 IDPs). Home visitors should also be posted in smaller camps, and should refer patients to the nearest clinic. An ambulance service should be organised to transport severe cases;
4. Consider establishing oral rehydration points (1 per 5000) staffed by health workers trained to recognise signs of dehydration and severity, and thus able to refer patients to the clinic;
5. Create inpatient capacity so as to cater to the working figure of IDPs. Priority should be given to paediatric beds (currently there are 8 in the hospital, serving the entire city, IDPs excluded; at least 40-50 paediatric beds should be available for IDPs only). Establish an isolation ward. Primary and referral structures should coordinate so as to handle transfers efficiently;
6. As soon as possible after the establishment of health clinics, establish camp surveillance of mortality through the network of home visitors. This prospective surveillance system should collect information on the age group of the deceased (under 5 or 5 years and older), on the reported cause of death, and on whether the deceased received treatment;
7. Once proper health structures are established, monitor weekly clinic-based trends in morbidity and mortality, by age group (under 5 years and others) and disease (a list of max. 10 diseases, including the category "other", should suffice);
8. Coordinate with WHO and other health agencies on the issue of epidemic preparedness and control; advocate for availability of appropriate treatments (ex. artemisinin-based combinations for malaria);
9. Systematically check vaccination status of patients in nutritional centres and health clinics, and vaccinate as needed.

Food and nutrition

10. Do everything possible to perform general food distributions with no further delay, and based on realistic population figures derived from a consensus among aid agencies intervening in the camps;
11. Consider blanket feeding distributions for children, especially if general distributions are delayed again;

12. Rapidly open TFC and SFC structures. Capacity for at least 1000 severe malnutrition cases and 4000 moderate malnutrition cases should be planned for. Ambulatory TFCs can be considered for uncomplicated malnutrition cases as a strategy to maximise coverage and avoid excessive defaulter rates;
13. Repeat a nutritional survey in the El Geneina camps by the end of September 2004, or earlier if signs of a worsening food crisis are evident.

Non-food items, water and sanitation

14. Continue to distribute non-food items, notably jerrycans, plastic sheeting, soap and blankets, until 100% coverage is achieved. Simple random surveys of 30 or more households can be done after distributions to evaluate coverage;
15. Monitor water quantity (both output and availability at household level) and quality (mainly through the indicator of coliform bacteria concentration; standard: < 10 coliforms/100 mL).
16. Increase water availability (standard: minimum 20 L/person/day), as well as the number of protected water points, 1 water point/250 persons);
17. Increase the number of latrines and encourage their correct use (standard: maximum 20 persons/latrine). Seal off latrines deemed unsanitary;
18. Distribute soap along with other non-food items, and promote handwashing.

6 Annexes

Annex 1: General household status questionnaire

Note: Arabic version available upon request

MSF El Geneina IDP Survey		June 2004					General		
Cluster:		Date:			Team:				
Family number:		1	2	3	4	5	6	7	
Water and Sanitation									
do you collect water from a pump?									
do you use a latrine?									
Food distribution									
do you have a food distribution card (check!)?									
does the card cover all persons living in this house?									
Non-food items									
does the house have a roof against the rain?									
is there plastic sheeting?									
how many jerrycans does the family own?									
how many blankets in the house?									
is there soap in the house?									
Access to health: under 5 children only									
in the past week, how many children had 3 or more loose stools in the same day?									
of these, how many received treatment in a clinic?									
Remarks									

Annex 2: Nutrition and vaccination status questionnaire

Note: Arabic version available upon request

MSF EI Geneina IDP Survey		June 2004											Nutritional status			
Cluster:		Date:									Team:					
Child:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Age	years, months															
Sex	M/F															
Oedema	Y/N															
MUAC	mm															
Weight	Kg															
Height	cm															
TFC	Y/N															
Measles vaccination	card Y/N															
	history Y/N															
Does family have a food distribution card?																
Child:		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Age	years, months															
Sex	M/F															
Oedema	Y/N															
MUAC	mm															
Weight	Kg															
Height	cm															
TFC	Y/N															
Measles vaccination	card Y/N															
	history Y/N															
Does family have a food distribution card?																

Annex 3: Mortality questionnaire

Note: Arabic version available upon request

MSF El Geneina IDP Survey										June 2004		Mortality			
Cluster:				Date:						Team:					
Household:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
How many persons slept here last night?															
how many males?															
how many females?															
How many under 5 year															
how many male under 5?															
how many female under 5?															
Since the first rain, has anyone in house died?			Cause of death: D=Diarhoea F=Fever C=Cough H=Hunger V=Violence O=Other												
1 sex															
age															
cause															
treated in hospital?															
2 sex															
age															
cause															
treated in hospital?															
3 sex															
age															
cause															
treated in hospital?															
Household:	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
How many persons slept here last night?															
how many males?															
how many females?															
How many under 5 year															
how many male under 5?															
how many female under 5?															
Since the first rain, has anyone in house died?			Cause of death: D=Diarhoea F=Fever C=Cough H=Hunger V=Violence O=Other												
1 sex															
age															
cause															
treated in hospital?															
2 sex															
age															
cause															
treated in hospital?															
3 sex															
age															
cause															
treated in hospital?															