HEALTH ASSESSMENT IN EMERGENCIES

Murnei & Zalingei, West Darfur, Sudan

Final report

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ACKOWLEDGEMENTS

The situation in Darfur has been such that only a very limited number of expatriates could be present in the MSF programs in place for several months. In addition, the teams have faced a huge number of constraints in their work and living conditions have been basic. It is just amazing the work that the teams have accomplished in such conditions. Impressive … congratulations!

Special thanks to the MSF team in Zalingei for their collaboration and continuous dedication in spite of the difficult circumstances : Olivia, Onno, Virginie, Nancy, Isabelle, Fabrice and Paul. And an equally special thanks to the team in Murnei for their participation in the survey, their support and enthusiasm : Andrea, Isabelle, Nolwenn, Sandrine, Danielle and Naoufel.

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SUMMARY

Several hundreds of thousands of people are internally displaced since the start of the conflict in the Darfur region of Sudan in February 2003. Because of political and logistical constraints, access to this highly vulnerable population has been very limited up to now. The French section of Médecins Sans Frontières (MSF) is providing assistance to an estimated 150 000 displaced persons in West Darfur.

In April-May 2004, 2 population surveys were carried out in the camps of Zalingei and Murnei, covering retrospective mortality, conditions of displacement, access to food and non-food items, and assessment of the nutritional and measles vaccination status in children under 5 years of age. In addition, a simple active mortality surveillance system was implemented, and morbidity surveillance was simplified.

For the 6-month recall period, excess mortality due to violence was demonstrated in both Zalingei and Murnei : in Zalingei the crude mortality rate was at 2.2 deaths/10 000/day (95% CI [1.8-2.7]) and in Murnei it was at 3.4 deaths/10 000/day (95% CI [3.1-3.8]). These figures represent 2 and 3 times respectively the internationally accepted threshold to indicate an emergency situation. The deaths reported included women, and children below 16 years of age. Nearly all deaths due to violence occurred in the village of origin. Attack of the village was the principle reason for displacement. Prevalence of global acute malnutrition expressed in Z-score was 23.4% (95% CI [19.4-28.0]) in Zalingei and 20.6% (95% CI [17.4-24.2]) in Murnei. Severe acute malnutrition was 4.5% (95% CI [2.8-7.0]) and 4.1% (95% CI [3.1-5.6]) respectively. In Murnei, only 5% of the shelters were found to provide adequate protection against the rain.

The results of both surveys, and even more in the light of the rainy season that has now started, indicate that we are dealing with an extremely vulnerable population. Among priorities and vital needs determining people's health and livelihood, access to food and nutritional rehabilitation, the provision of water and sanitation, and shelter are of concern. Security is the most alarming worry. Sanitary conditions are such that there is a considerably high risk for disease and outbreaks.

Taking into account the enormous needs of the displaced persons, the lack of presence of humanitarian aid is the least to say striking. An urgent increase in resources for assistance is absolutely necessary to avoid a true disaster.

ABBREVIATIONS

ARTI	Acute Respiratory Tract Infection
CMR	Crude Mortality Rate
CI	Confidence Interval
GFD	General Food Distribution
HAC	Humanitarian Aid Commission
ICRC	International Committee of the Red Cross
IDP	Internally Displaced Population
IPD	In-Patient Department
JEM	Justice and Equality Movement
MSF	Médecins Sans Frontières
MUAC	Mid-upper arm circumference
NGO	Non-Governmental Organisation
OPD	Out-Patient Department
SFC	Supplementary Feeding Centre
SLA	Sudan Liberation Army
TFC	Therapeutic Feeding Centre
U5MR	Under-5 Mortality Rate
UNICEF	United Nations Children Fund
WFP	World Food Programme
W/H	Weight for Height

I. INTRODUCTION

Since February 2003, the Sudan Liberation Army (SLA) and the Justice and Equality Movement (JEM) took up the fight against government forces.[1] Ongoing attacks by militia groups have increased insecurity, through the burning of villages, killing and looting. The conflict in Darfur has lead to massive population displacement; some sources estimate there are 800 000 to 1 million Internally displaced populations (IDP), and another 110 000 to 150 000 refugees in Chad.[2] Access to the region is difficult, and results in insufficient assistance to a highly vulnerable population.

Médecins Sans Frontières (MSF) France could only obtain access and authorisation for intervention in Darfur, in December 2003. First activities took place in Nyala, followed by Zalingei in the last days of December, and Murnei in February 2004. At this moment, MSF has a permanent base in Zalingei and Murnei, and ensures regular presence and activities through mobile teams in Niertiti and Kerenik (Annex 1). Activities are very difficult due to limited access : limited human resources, long waiting time before obtaining visa and travel permits, etc.

MSF asked Epicentre to assist in the evaluation of the situation of the internally displaced populations in the emergency in Darfur.

II. MSF SITES OF INTERVENTIONS

1. Zalingei & Niertiti

Zalingei is a town with an estimated population of 27 000 residents, an extrapolation from the 1993 census.[3] On the road between Nyala and El Genina, Zalingei is an important centre of commercial activities. Agriculture is the other main source of income for the resident population. The first displaced arrived in September-October 2003, mainly coming from the villages around Zalingei, at several hours walking distance. The majority of the displaced are organized in 11 IDP sites: 6 within the town (Chamsa Dagaid, Koranik, Shebab, Djebelmara, Shamalia & Al Naguel), 2 on the west side (Hamedia & Hamedia Mohajamad), and 3 sites on the east side of the town (Hasahisa Jedid, Hasahisa Mohajamad & Hasahisa School). In addition, there is a small proportion of IDP's living among resident population. In March 2004, the total number of IDPs within the sites were estimated to be 31,000, based on a count by the MSF home visitors.

MSF has opened a health centre in Hasahisa and a second one in Hamedia. In each site, there was an out-patient department (OPD), an ambulatory therapeutic feeding centre (TFC) and a supplementary feeding centre (SFC). In the hospital of Zalingei town, MSF installed a measles isolation tent, and was progressively integrated in the paediatric ward. Zalingei had a proper but insufficient water supply, and MSF was working to increase the capacity. The International Committee of the Red Cross (ICRC) was planning to intervene since several weeks.

Due to the high population density in the camps, the situation of the IDPs in Zalingei was extremely precarious. MSF was up until May 2004 the only active NGO.

The situation seemed more precarious in the sites within the town compared to the ones outside : in Hasahisa and Hamedia together there were about 400 large tents ("mohajamad"), and a limited number of IDPs are busy building new mud houses. Shelters are about $10m^2$, made from grass and/or bamboo, and do not give any protection against the coming rain (rainy season from June to October). Mid-May, ICRC started the distribution of about 7000 non-food item kits, containing plastic sheeting, blankets, mosquito net tissue, and some clothes.

In December 2003, a first World Food Programme (WFP) general food distribution (GFD) took place : half a ration for 9000 people. In early February 2004, a full ration was distributed for 17 000 people, and end of April, a full ration for 38 000 people. Even though no food basket monitoring was done, informal reports from patients and staff indicated that the distribution may not have correctly covered the target population.

The health situation is precarious as well. Since OPD data analysis only started in mid-April, a total of around 2500 consultations per week are reported, with the main pathologies being acute respiratory tract infections (ARTI) and diarrhea. Between week 14 (3 April) and 19 (8 May), a total of 429 measles cases have been reported.[4] The Zalingei health authorities have done a house-to-house measles vaccination in March for 12,000 children under 5 years of age (coverage), and a catch-up vaccination campaign was done by MSF in mid-April. As for nutrition, on 21 May, there were 185 children admitted in the ambulatory TFC, and 695 children in the SFC.

Niertiti

At about 1.5 hours drive from Zalingei, Niertiti is a small village of about 6500 residents, with an estimated 20,000 IDPs. They arrived since January 2004, but continue to come from the villages in Jebel Marra. The displaced were organized in a "North camp" and a "South camp", where the grass-made shelters were very small and crowded. In reaction to a measles epidemic, MSF opened a consultation for measles cases and a isolation unit, as well as a nutritional program (ambulatory TFC & SFC). Non-food item distribution was planned in the coming weeks.

2. Murnei

Before the arrivals of the IDPs, Murnei was a small village where already in 1984, refugees from Chad came, some of whom have become resident population by now. According to the village chief and the Imam (religious leader), Murnei had a resident population of about 5500 persons. Agriculture was the main source of income, using fields at maximum 2 hours walk around Murnei. However, due to the ongoing insecurity, residents did not prepare the fields for the rainy season.

The first displaced people arrived in Murnei on 25 September 2003, mainly coming from 3 villages (Tonoko, Diresa & Tiriya). The influx of new people continued up until March 2004 from numerous other villages. Since then the population remained relatively stable, with an estimated 80,000 displaced people.

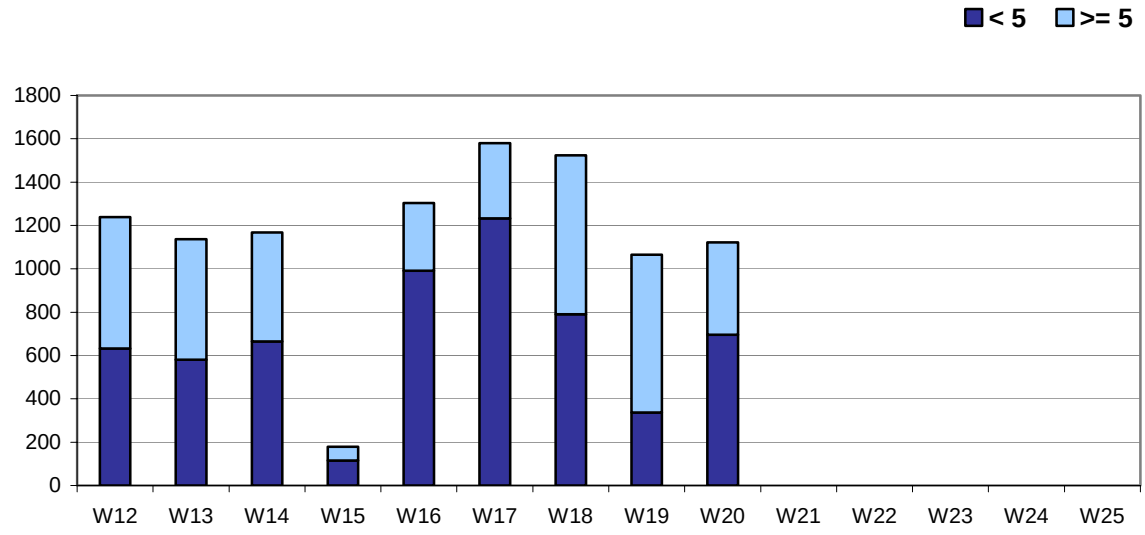
The situation of the IDPs is very precarious here as well, and MSF is the only NGO present up to now. Traditional huts with thatch roofs were exceptional. A distribution of plastic sheeting and blankets was done beginning of June by Save the Children (SCF-US) for about 11 000 families.

Water supply is a problem. Since February, MSF has been providing 5 to 7 litres/person/day, amounting to a total of 550 000 litre per day. The currently used catchment pools in the wadi (dried river) will no longer be operational when the rainy season starts. UNICEF came to dig a borehole, but without any result since the machine broke down.

A first GFD was carried out in February, half a ration for 60 000 displaced beneficiaries. The second distribution was started on 29 April, and reached a total of 67 382 (residents and displaced) people. The theoretical ration distributed corresponded to 2248 kcal/person/day, with 10.1% proteins, and 18.9% of fat, but with a clear lack of micronutrients (e.g. no niacin, no vitamin B1 or B2, and no iron).

As for health care, the MSF hospital with an IPD capacity of 27 beds is the only existing health structure in Murnei. With the limited staff available, about 1500 consultations per week are now done. However, taking into account the target population, this is more than 4 times less than expected. This is why for the time being, and as much as possible, priority is given to the under-5 consultations (Figure 1). A mass vaccination campaign against measles was done end of February for an estimated 10,000 children under 5 years of age; a catch-up was done for 4500 children under 5 years in mid-April. As for nutrition, on 21 May, there were 396 children admitted in the ambulatory TFC, and 2177 in the SFC.

Figure 1 : Number of consultations in children under-5 years versus 5 year and above. MSF OPD Murnei, Darfur, Soudan, 2004.



III. OBJECTIVES

The general objective was to evaluate the magnitude of the emergency in Darfur, in order to obtain information for further planning of field operations, and for lobbying purposes.

Specific objectives were

- To assess retrospective mortality and to obtain an indication on the major cause of death, as well as on the age/sex distribution of the deceased
- To estimate the prevalence of global and severe acute malnutrition among children between 6 and 59 months of age
- To assess measles vaccination coverage in children under 5 years of age (with/without card) after the vaccination campaigns
- To evaluate the socio-demographic situation, including reasons for departure from village of origin, as well as actual demographic data (age/sex pyramid)
- To assess access to food (WFP food distributions and/or MSF blanket food distributions)
- To assess access to non-food items
- To reinforce the surveillance system (mortality, morbidity and nutrition)
- To make recommendations on the priorities to be addressed by MSF

IV. METHODS

Between 18 April and 22 May, a population survey was carried out both in Zalingei and in Murnei, and an active mortality surveillance system was set up.[5] In addition, morbidity surveillance was simplified.[4]

1. Population survey

A 2-stage cluster sampling survey was carried out using a similar standardized questionnaire in both locations. In Zalingei, 30 clusters of 15 households each and 15 children for the nutrition part were included. The survey was done with 4 teams of 3 persons each. In Murnei, 30 clusters of 30 households each and 30 children was finalized, with 5 teams of 3 persons each. For both surveys, a household was defined as people preparing and eating together the same food. Supervision of the teams was ensured according to the human resources available. The questionnaire covered the following issues (Annex 2):

A. Household characteristics

- Family composition was defined according to 5 age groups : 1) < 5 years, 2) 5 – 14 years, 3) 15 – 29 years, 4) 30 – 44 years, and 5) ≥ 45 years. In addition, the distinction between males and females was made.

B. Displacement

- Village of origin
- Month of arrival in the camps of Zalingei and Murnei
- Reason for departure from village of origin
- Brought along food / money / donkey [a]

C. Mortality

- Number of persons in the household who died since the beginning of Ramadan (26 October 2003)
- For each death : age, sex, month, and before or after Eid Kabir – 1 February 2004 [b]. Information on the location and cause of death was also collected.

D. Disappearances & absences

- Number of persons in the household who disappeared since the beginning of Ramadan (absent for more than 2 weeks, without knowing whether the person was alive or dead, or where he was)
- Number of persons in the household who were absent since the beginning of Ramadan (absent for more than 2 weeks, and known to be alive)
- For each disappearance and absence, age and sex were recorded

E. Nutrition

- For the children of ≥ 65 cm and < 110 cm of length, age and sex were recorded, and the mid-upper arm circumference (MUAC), presence of oedema, weight and height were measured
- Admission in the SFC or TFC was verified
- Weight was measured with a 25 kg Salter® scale and height was measured with standard UNICEF measuring boards

F. Measles vaccination coverage

- The vaccination status against measles was recorded for children under 5 years, according to card or history

G. Access to food

- Did the household have WFP registration card [b]
- How many times did the household receive GFD
- How many times did the household receive MSF blanket food distribution [b]

H. Access to non-food items

- Zalingei : number of blankets and number of jerry cans received since arrival
- Murnei : number of blankets and number of jerry cans present in the house
- Number of donkeys owned by the family at the time of the survey [b]
- Did the house offer protection against the rain [b]

[a] Only for Zalingei survey
[b] Only for Murnei survey

I. Data entry and analysis

For both the Zalingei and Murnei survey, data were entered daily after systematically having checked the questionnaires with each team. Data were entered in EpiData 3.0 (Denmark), and analysed using EpiInfo 6.04dfr (CDC, USA).

- Mortality was expressed in number of deaths/10,000/day and presented with the 95% confidence interval (CI).
- Malnutrition was expressed in proportions of global acute malnutrition and severe acute malnutrition, with or without oedema, and MUAC < 110 mm. Weight for height (W/H) indices were expressed in Z-scores and in percentage of the median. All were presented with their 95% CI.
- Other indicators were expressed as proportions with their 95% CI.

2. Surveillance

A. Mortality surveillance

An active mortality surveillance system was set up in the 11 IDP sites of Zalingei.[5] In Murnei, a retrospective mortality surveillance system based on the counting of 10 cemeteries existed since week 12 (20 March). This was changed into an active data collection system in week 20 (15 May), using similar tools as for Zalingei. Murnei was divided in 13 different zones, for a total of 30 home visitors (2 to 3 home visitors per zone). The zones were clearly defined with the teams. Every house in each zone is to be visited daily to ask about the deaths since the last visit. For each death, the age, cause and the place of death (house or hospital) is to be noted. The results are to be reported every day to the MSF expatriate in charge of the mortality surveillance, who will compile the data and reports on a weekly basis the CMR and under-5 MR.

B. Morbidity surveillance

Existing data collection sheets for OPD and IPD activities (including special registration for victims of violence) in Murnei were simplified with automatic graphs for easy follow-up. The same data collection sheets were then adapted for Zalingei as well, in order to use the same tools for both locations.

V. RESULTS

V.1. Population survey

ZALINGEI

The survey in Zalingei was carried out from 24 to 27 April 2004.

1. Description of the survey sample

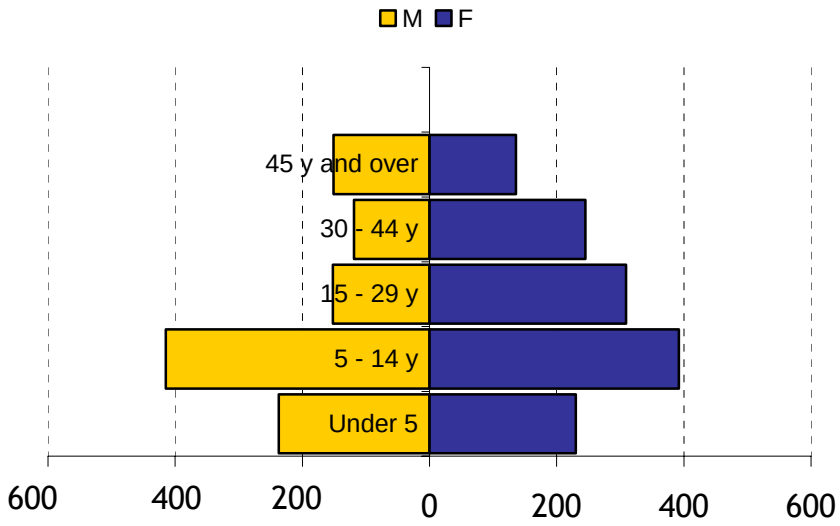
A total of 461 families were included. Family composition was available for 460, which represented a total of 2386 persons. This corresponds to 5.2 persons per family. The sample included 467 children under 5 years of age (19.6%) (Table 1).

Table 1 : Description of survey sample. Zalingei survey, 24-27 April 2004, Darfur, Sudan.

Total number of families	461	-
Total survey population (n = 460)	2386	-
Mean household size	5.2	2386/460
M/F sex ratio	0.82	1074/1312
Children < 5 years (%)	19.6%	467/2386
M/F sex ratio < 5y	1.03	237/230
5 – 14 years (%)	33.8%	807/2386
M/F sex ratio 5-14y	1.06	415/392
≥ 15 years (%)	46.6%	1112/2386
M/F sex ratio ≥ 15y	0.61	422/690

The M/F sex ratio for the above 15 years of age is 0.61, compared to 1.05 for the population under 15 years of age (Table 1). The age/sex pyramid of Zalingei is represented in Figure 2 below. Symmetry between the 2 sexes is seen up to the 5 to 14 years age category, but shows a clear asymmetry with a lack of males for the 2 age groups above (15 up to 44 years).

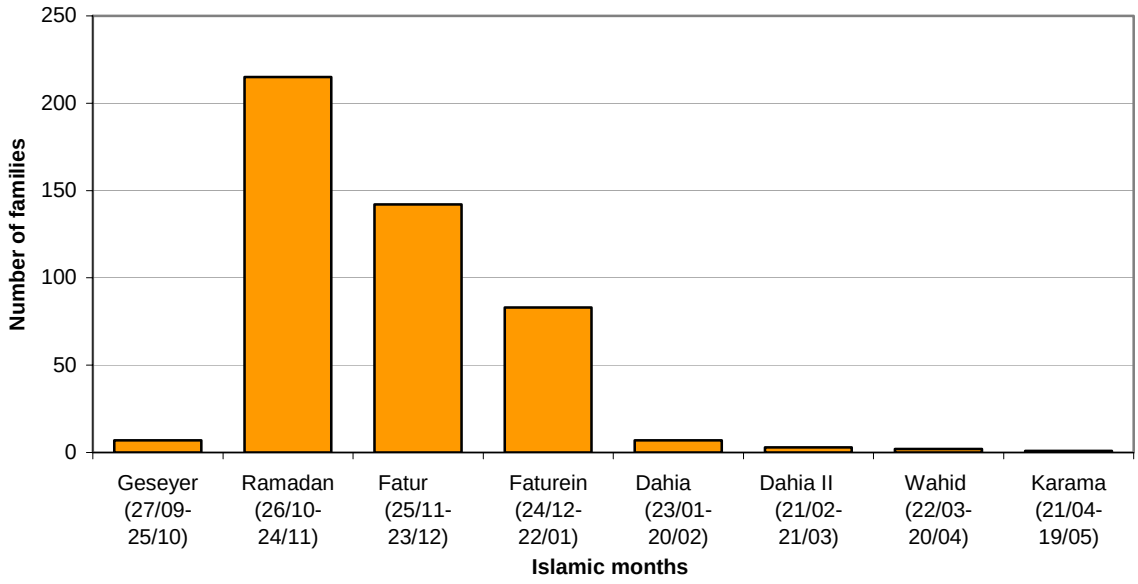
Figure 2 : Age pyramid of displaced population present in Zalingei at the time of the survey (24 – 27 April 2004), Darfur, Sudan.



2. Displacement

Families interviewed came from 68 different villages around Zalingei (n = 460, excluding 1 resident family from Zalingei). The most frequent villages of origin mentioned were Tur (41 families), Tololo (28 families), Sura (27 families) and Bargey (21 families). Figure 3 shows the number of arrivals per Islamic month.

Figure 3 : Number of families arriving per Islamic month. Zalingei, Darfur, Sudan, Sept. 2003 – April 2004.



Families coming from Sura reported a total of 32 deaths, 30 (93.7%) of which occurred in the village or underway. Table 2 shows the number of deaths reported per village of origin. The families reporting 5 deaths or more, came from Tololo, Kangey and Sura. For Tololo 1 out of the 5 deaths (20.0%), and for Kangey 4 out of the 7 deaths (57.1%) reported occurred in the village or underway to Zalingei. All these deaths in the village or underway were due to violence.

Table 2 : Number of deaths (n = 100) reported per village of origin. Zalingei, Darfur, Sudan, 2004.

	N° of villages	%	95% CI
0 deaths	41	60.3	42.2 - 76.1
< 5 deaths	24	35.3	20.3 - 53.5
5 – 10 deaths	2	2.9	0.1 - 17.0
≥ 10 deaths	1	1.5	0.0 - 14.9

For 427 of the families interviewed (92.8% - 95% CI [88.5-95.7]), the attack of the village was the reason for leaving. A total of 105 families (22.8%) brought food and/or donkey(s) when they fled.

3. Retrospective mortality

Between 26 October 2003 (beginning of Ramadan) and 25 April 2004 (mid-survey date), 100 persons were reported to have died, among whom 16 (16.0%) were children under the age of 5 years. The crude mortality rate (CMR) calculated for this recall period of 183 days, was 2.2 deaths/10 000/day, and the under-5 mortality rate (U5MR) was 1.8 deaths/10 000/day (Table 3). The total of 100 deaths in this period were reported by 76 different families.

Table 3 : Crude and under-5 mortality rates (26 Oct. 2003 – 25 April 2004). Zalingei, Darfur, Sudan.

	n	Rate (N° of deaths/10 000/day)	95% CI
Crude mortality	100	2.2	[1.8 – 2.7]
Under-5 mortality	16	1.8	[1.1 – 3.0]

The M/F sex ratio of all deaths reported was 1.33 (57/43). Median age of the deceased was 35 years (range: 0-99). Violence was the cause of death for 49 people (49.0% - 95% CI [34.8-63.4]), 46 of which happened in the village or underway, 2 occurred in Zalingei, and 1 in another location. Figure 4 shows the cause of death (violence versus disease) per Islamic month.

Figure 4 : Cause of death per Islamic month (26 Oct. '03 – 25 April '04). Zalingei, Darfur, Sudan.

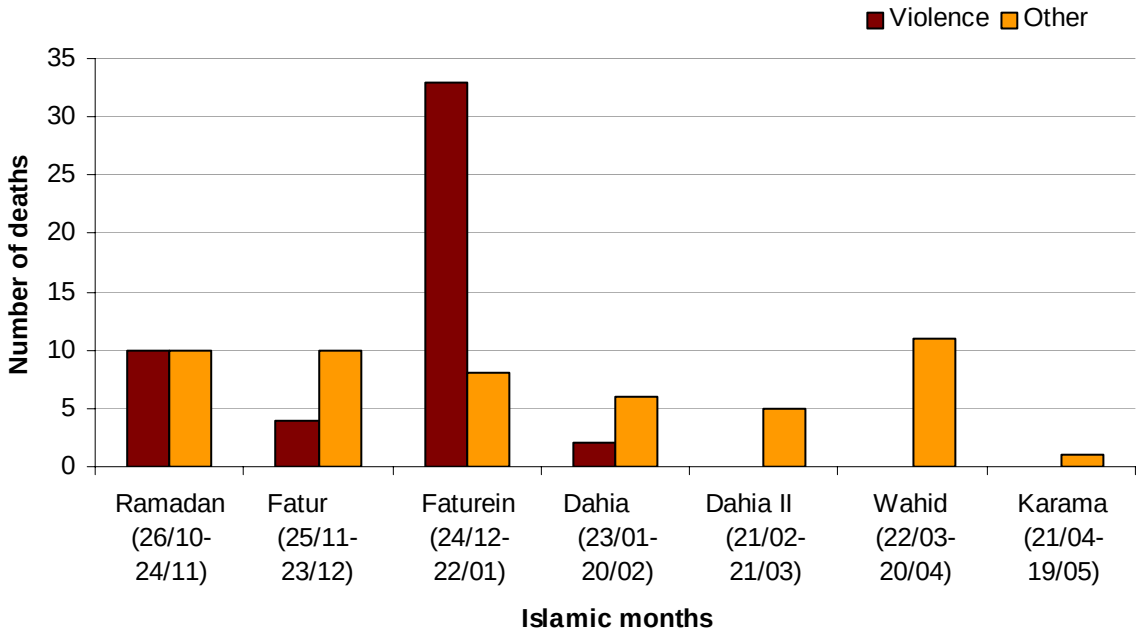
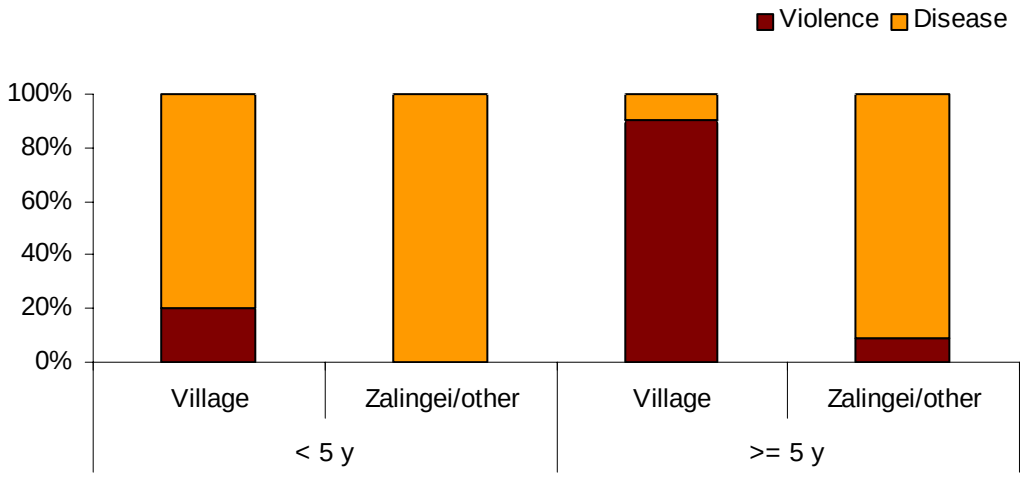


Figure 5 shows the cause and place of death per age group. Among the 16 children under 5 years of age who died, 5 deaths (31.2%) occurred in the village, 1 of whom due to violence. Of the 84 persons over the age of 5 who died, 59.5% (n = 50) died in the village, 45 of whom died because of violence (Figure 5).

For children of 15 years or below, 13.0% (3/23) died because of violence. For the women, this proportion was 13.9% (6/43).

Figure 5 : Cause of death per age group and per location (26 Oct. '03 – 25 April '04). Zalingei, Darfur, Sudan.



4. Disappearances & absences

In Zalingei, 21 persons were reported to have disappeared since the beginning of Ramadan, predominantly men (M/F sex ratio 2.50 [15/6]), with a median age of 25 years (range: 5 – 85). In addition, a total of 253 persons were reported to be absent, median age of whom was 20 years (range: 0 - 80), with a M/F sex ratio of 2.89.

The people who died, and those who were reported disappeared or absent, represent a 14% loss in Zalingei at the time of the survey (25 April) (Table 4). In that original population, there were 6 persons per family.

Table 4 : Sample size at the time of the survey affected by the events (n = 460 families). Zalingei, Darfur, Sudan, 2004.

People present in Zalingei on 25 April 2004	2386	86.4
Number of deaths	100	3.6
Number of disappeared	21	0.8
Number of absences	253	9.2
People present in the villages on 26 Oct. 2003	2760	100.0

5. Nutrition

a) Prevalence of acute malnutrition in Z-score

Global acute malnutrition, expressed as –2 Z-scores, and including children with oedema or MUAC < 110 m, was at 23.4%. Severe acute malnutrition, expressed as –3 Z-scores, including children with oedema or MUAC < 110 mm, was at 4.5% (Table 5).

Table 5 : Prevalence of acute malnutrition expressed in Z-score, oedema or MUAC (n = 470). Zalingei, Darfur, Sudan, 2004.

	n	%	95% CI
Global acute malnutrition < -2 Z or oedema or MUAC < 110mm*	110	23.4	19.4 - 28.0
Severe acute malnutrition < -3 Z or oedema or MUAC < 110mm*	21	4.5	2.8 - 7.0

* Including 6 children with oedema

b) *Prevalence of acute malnutrition in W/H percentage of the median*

Global acute malnutrition, expressed as weight for height (W/H) percentage of the median below 80%, and including children with oedema or MUAC < 110 m, was at 19.6%. Severe acute malnutrition, expressed as W/H percentage of the median below 70%, including children with oedema or MUAC < 110 mm, was at 1.7% (Table 6).

Table 6 : Prevalence of acute malnutrition expressed in W/H % of the reference median, oedema or MUAC (n = 470). Zalingei, Darfur, Sudan, 2004.

	n	%	95% CI
Global acute malnutrition < 80% or oedema or MUAC < 110mm*	92	19.6	16.1 - 23.6
Severe acute malnutrition < 70% or oedema or MUAC < 110mm*	9	1.9	0.9 - 3.7

* Including 6 children with oedema

c) *Mid-upper arm circumference (MUAC)*

Based on the results of the MUAC analysed alone, 10.5% of the children were to be considered severely malnourished, i.e. MUAC < 125 mm, and 0.6% had a MUAC < 110 mm indicating severe acute malnutrition (Table 7).

Table 7 : Measures of mid-upper arm circumference (n = 463). Zalingei, Darfur, Sudan, 2004.

	n	%	95% CI
< 110 mm	3	0.6	0.1 – 3.1
110 – 125 mm	46	9.9	6.5 – 14.7
> 125 mm	414	89.4	84.5 – 92.9

d) *Nutritional program coverage*

Of the 92 children who were below 80% W/H, or had oedema, or a MUAC of < 110 mm at the time of the survey, 25 (27.2% - 95% CI [15.6-42.5]) were admitted in the TFC or SFC. Of the 9 children with TFC admission criteria, 3 (33.3% - 95% CI [4.0-80.8]) were admitted in the TFC and 4 (44.5% - 95% CI [8.1-86.8]) in the SFC.

6. Measles vaccination coverage

Of the 380 children under 5 years of age for whom valid data were available, 62.9% (95% CI [55.6-69.7] - n = 239) were vaccinated with the card as proof seen by the survey team. Another 104 children (27.4% - 95% CI [21.3-34.4]) were vaccinated according to history. This means a presumed measles vaccination coverage of 90.3%.

7. Access to food and non-food items

Of the 461 families interviewed, 56.0% (95% CI [49.3-62.4] - n = 258) stated not to have received any food while in Zalingei, 68.3% (95% CI [61.8-74.2] - n = 315) had received no blankets, and 80.0% (95% CI [74.2-84.9] - n = 369) no jerry cans.

The survey in Murnei was carried out from 3 to 8 May 2004.

1. Description of the survey sample

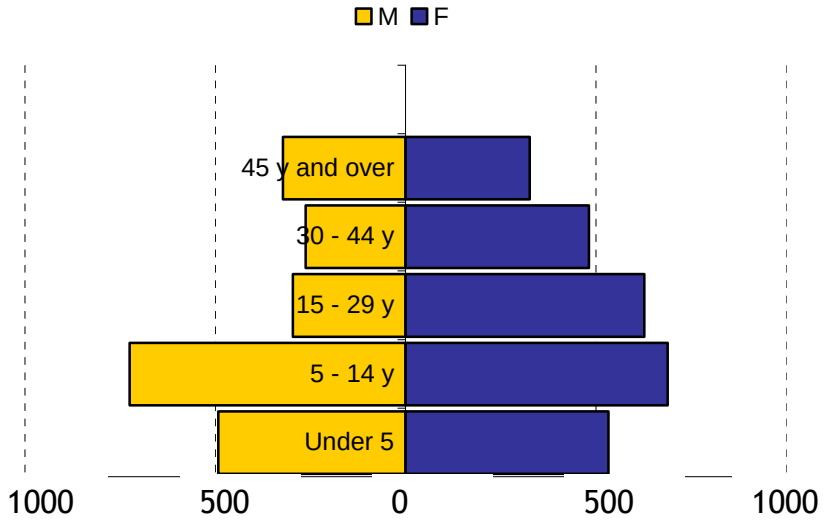
A total of 912 families were included, corresponding to 4754 displaced persons (n = 909), 21.6% of which was under the age of 5 years. The overall population M/F sex ratio was 0.79, and 0.92 for the under-5's (Table 8).

Table 8 : Description of survey sample. Murnei, Darfur, Sudan, 2004.

Total number of families	912	
Total survey population	4754	n = 909
Mean household size	5.2	4754/909
M/F sex ratio	0.79	2097/2657
Children < 5 years (%)	21.6%	1025/4754
M/F sex ratio < 5y	0.92	492/533
5 – 14 years (%)	29.7%	1414/4754
M/F sex ratio 5-14y	1.05	725/689
≥ 15 years (%)	48.7%	2315/4754
M/F sex ratio ≥ 15y	0.61	880/1435

While for the smaller age categories the M/F sex ratio was around 1, for 15 years and above it became 0.61. The age pyramid in Figure 6 visualizes this imbalance.

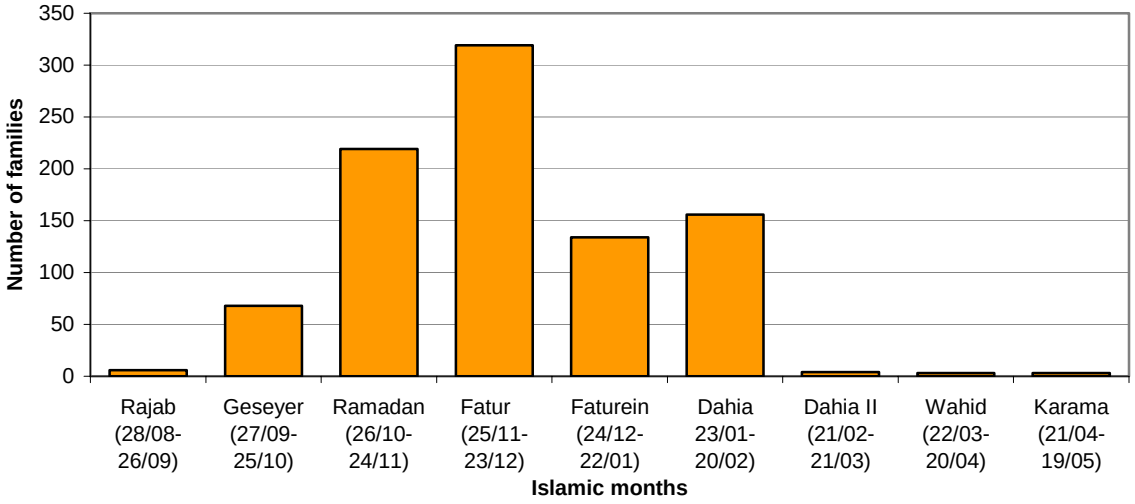
Figure 6 : Age pyramid of displaced population present in Murnei at the time of the survey (3 – 8 May 2004), Darfur, Sudan.



2. Displacement

The 912 families interviewed in Murnei came from 111 different villages. The most frequently mentioned villages of origin included Buromadina (39 families), Aru (34), Mere(34), Mumu (32), Gara (30), Farjani (28), Mara (28), Hier (27), Tonoko (24), Sulu (23), Tulus (23) and Garna (22). Figure 7 shows the number of families that arrived per Islamic month. For 97.4% (888/912), the reason for leaving the village was because it was attacked, while 2.6% (24/912) left because of a feeling of insecurity.

Figure 7 : Number of families arriving per Islamic month. Murnei, Darfur, Sudan, Aug 2003 – May 2004.



For 11 villages of origin, 10 or more deaths were reported (Table 9). These included Tonoko (21 deaths reported), Mumu (18), Urum (17), Sulu (16), Buromadina (16), Bogoj (14), Garna (13), Aru (12), Mara (12), Abdue (10) and Warai (10). Most of the deaths due to violence occurred in the village of origin or underway to Murnei, and coincided (though not all) with the time of leaving the village.

Table 9 : Number of deaths reported per village of origin (n = 912). Murnei, Darfur, Sudan, 2004.

	N° of villages	%	95% CI
0 deaths	41	36.9	24.7 – 51.0
< 5 deaths	48	43.2	30.3 – 57.2
5 – 10 deaths	11	9.9	3.9 – 21.6
≥ 10 deaths	11	9.9	3.9 – 21.6

3. Retrospective mortality

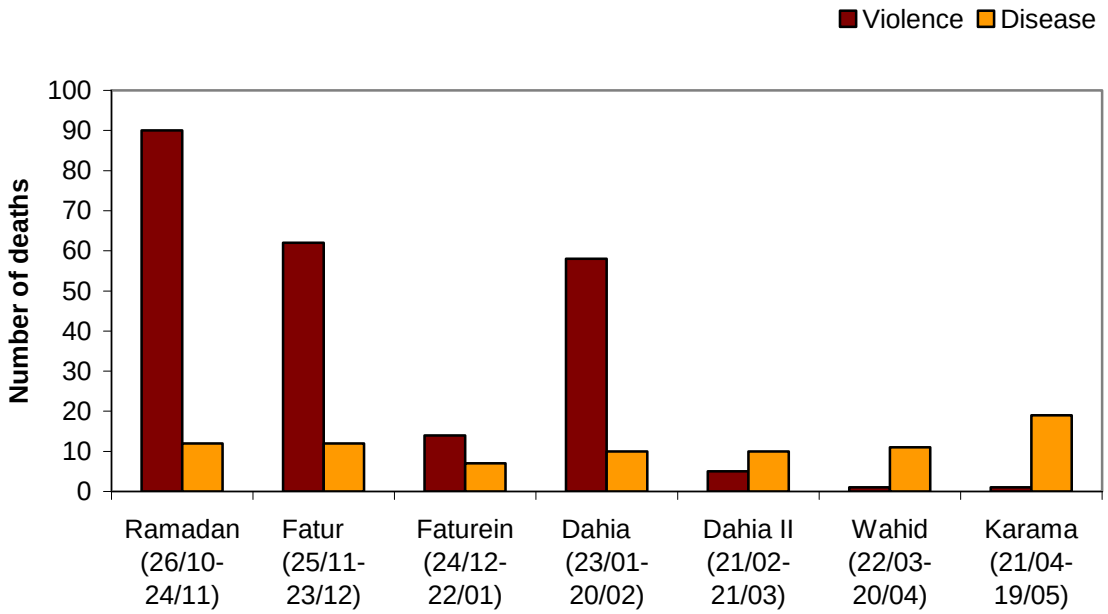
Data analysis below was based on 905 families, representing a total population of 4726 people, 1020 of whom were below 5 years of age. Over the 193-day recall period (26 Oct. 2003 – 5 May 2004), 322 deaths were reported, 32 (9.9%) of which occurred in children younger than 5 years old. The CMR was 3.4 deaths/10 000/day, and the U5MR was 1.6 deaths/10 000/day (Table 10). The total number of deaths were reported by 229 families. The M/F sex ratio of the deceased was 2.9 (241/82), with a median age of 40 years (range : 0-99) (n = 322).

Table 10 : Crude and under-5 mortality rates (26 Oct. 2003 – 5 May 2004). Murnei, Darfur, Sudan.

	n	Rate (N° of deaths/10 000/day)	95% CI
Crude mortality	322	3.4	3.1 – 3.8
Under-5 mortality	32	1.6	1.1 – 2.2

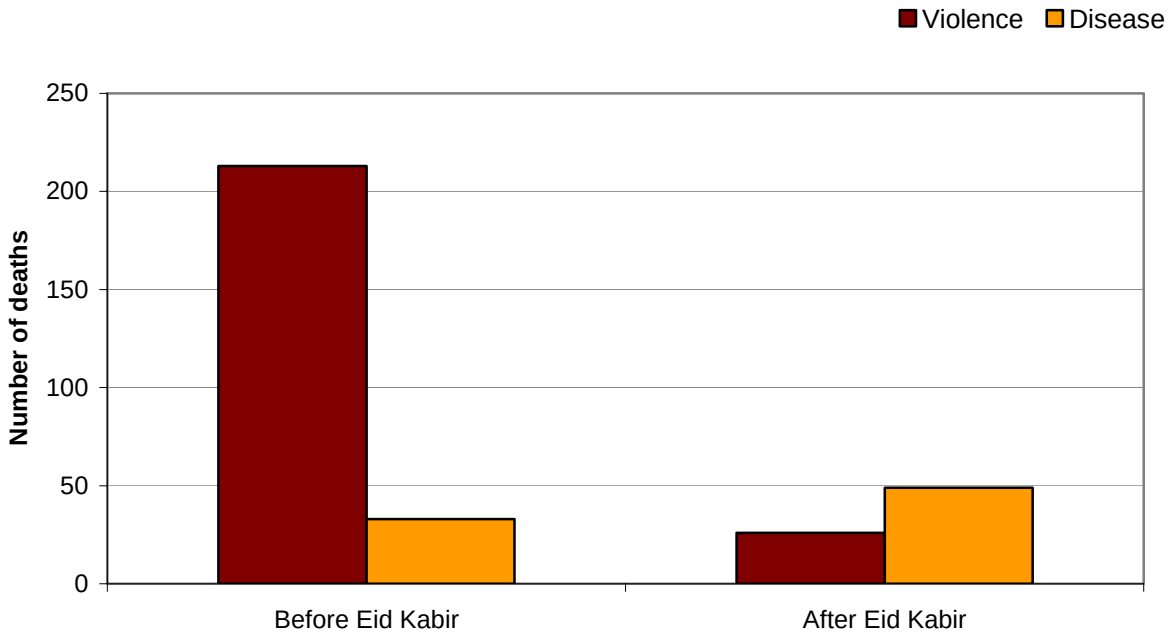
Figure 8 presents the number of deaths per month, while at the same time distinguishing violence and disease as cause of death.

Figure 8 : Cause of death and CMR per Islamic month (26 Oct. '03 – 5 May '04). Murnei, Darfur, Sudan.



For the total 6 months recall period, 74.7% (95% CI [67.1-81.1] - n = 239) of the deaths were due to violence, which in particular was predominant during the first 3 months (Figure 8). This is corroborated by Figure 9, which was based on the question whether death occurred before or after Eid Kabir (1 February). The CMR for this first period was as high as 5.1 deaths/10 000/day (95% CI [4.51 – 5.78]), while it was 1.7 (95% CI [1.31 – 2.07]) for the second period. The U5MR remained more stable for both periods, being 1.5 deaths/10 000/day (95% CI [0.8 – 2.4]) and 1.7 (95% CI [1.02 – 2.77]) respectively.

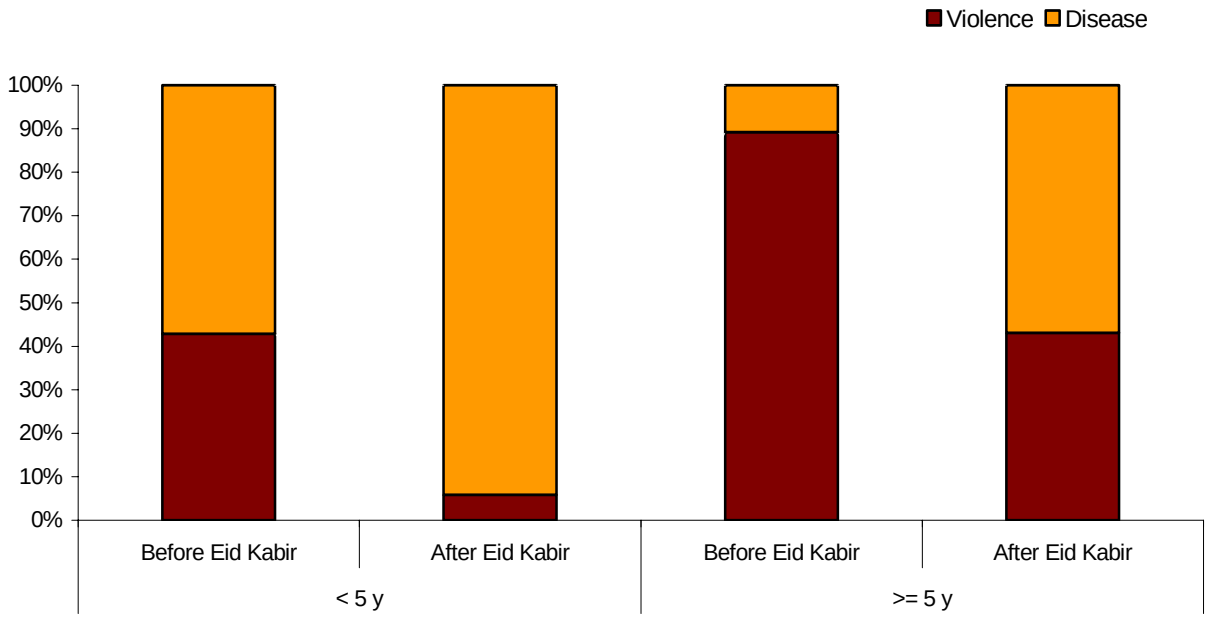
Figure 9 : Number and cause of death per period (26 Oct. '03 – 31 Jan. '04 versus 1 Feb. - 5 May '04), Murnei, Darfur, Sudan, 2004.



Of the 32 children under the age of 5 years reported dead since the beginning of Ramadan, 21.9% (7/32) was due to violence. Before Eid Kabir, violence was the cause of death for 42.9% of the children under 5 years reported dead (6/14), whereas after Eid Kabir, violence was the cause of death for one child (1/17). (Figure 10) .

For persons of 5 years and above, 80.3% (232/289) died because of violence over the whole period. For the period before Eid Kabir, violence was the cause of death for 89.2% (95% CI [81.8-94.0] - 207/232) of the deaths in. In the second period, violence was still responsible for 43.1% (95% CI [25.5-62.4] - 25/58) of the deaths in this age group (Figure 10).

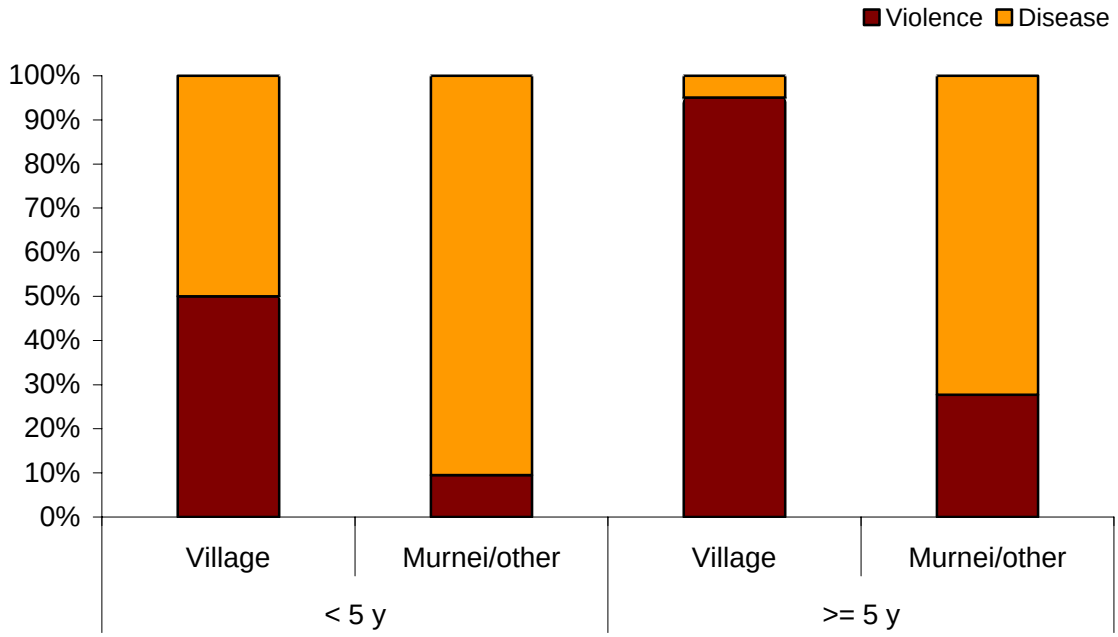
Figure 10 : Cause of death per period (26 Oct. '03 – 31 Jan. '04 versus 1 Feb. - 5 May '04) and per age group. Murnei, Darfur, Sudan.



Of the 48 children who died below 16 years of age, 43.7% (95% CI [24.5-64.9] - n = 21) died because of violence. In addition, 78.3% (95% CI [55.8-91.7] - 36/46) of the women who died, was also due to violence.

The majority of the violent deaths occurred before coming to Murnei ; however, 8.4% (20/239) of the deaths due to violence occurred while in Murnei (n = 19) or elsewhere (n = 1) (Figure 11). The majority of these deaths were in persons of 5 years or above (n = 18).

Figure 11 : Cause of death per age group and per location. (26 Oct. '03 - 5 May '04). Murnei, Darfur, Sudan.



4. Disappearances & absences

In Murnei, a total of 79 persons were reported to have disappeared (not known where they are, whether they were dead or alive) since the beginning of Ramadan. The M/F sex ratio was 1.3, and the median age was 35 years (range : 7-99).

In addition, 458 persons were reported to be absent, (known where they are, and known to be alive), most of whom were men with a M/F sex ratio of 2.60 (n = 456). Median age of the absent persons was 22 years (range : 0-90).

Considering the deaths, disappearances and absences, there is a 15.3% loss of persons in Murnei compared to the estimated original population at the start of Ramadan (Table 11). The mean family size before Ramadan consisted of 6.2 persons.

Table 11 : Sample size at the time of the survey affected by the events (n = 909 families). Murnei, Darfur, Sudan, 2004.

People present in Murnei on 5 May 2004	4754	84.7
Number of deaths	323	5.7
Number of disappeared	79	1.4
Number of absences	458	8.2
People present in the villages on 26 Oct. 2003	5614	100.0

5. Nutrition

a) Prevalence of acute malnutrition in Z-score

Global acute malnutrition, expressed as –2 Z-scores, and including children with oedema or MUAC < 110 m, was at 20.6%. Severe acute malnutrition, expressed as –3 Z-scores, including children with oedema or MUAC < 110 mm, was at 4.1% (Table 12).

Table 12 : Prevalence of acute malnutrition expressed in Z-score, oedema or MUAC (n = 917). Murnei, Darfur, Sudan, 2004.

	n	%	95% CI
Global acute malnutrition < -2 Z or oedema or MUAC < 110mm*	189	20.6	17.4 - 24.2
Severe acute malnutrition < -3 Z or oedema or MUAC < 110mm*	38	4.1	3.1 - 5.6

* Including 2 children with oedema

b) Prevalence of acute malnutrition in W/H percentage of the median

Global acute malnutrition, expressed as weight for height (W/H) percentage of the median below 80%, and including children with oedema or MUAC < 110 m, was at 14.9%. Severe acute malnutrition, expressed as W/H percentage of the median below 70%, including children with oedema or MUAC < 110 mm, was at 2.7% (Table 13).

Table 13 : Prevalence of acute malnutrition expressed in W/H % of the reference median, oedema or MUAC (n = 917). Murnei, Darfur, Sudan, 2004.

	n	%	95% CI
Global acute malnutrition < 80% or oedema or MUAC < 110mm*	137	14.9	[12.4-17.8]
Severe acute malnutrition < 70% or oedema or MUAC < 110mm**	25	2.7	[1.9-3.9]

* Including 2 children with oedema

c) *Mid-upper arm circumference*

According to the MUAC, 115 children (12.5%) were severely malnourished or below the threshold of 125 mm, and 1.3% had a MUAC < 110 mm indicating severe acute malnutrition (Table 14).

Table 14 : Measures of mid-upper arm circumference (n = 917). Murnei, Darfur, Sudan, 2004.

	n	%	95% CI
< 110 mm	12	1.3	0.5 – 3.0
110 – 125 mm	103	11.2	8.6 – 14.6
> 125 mm	802	87.5	84.0 – 90.3

d) *Nutritional program coverage*

Of the 137 children measured to have W/H below 80%, 72 (52.5% - 95% CI [40.2-64.6]) were admitted in the nutritional program : 15 in the TFC, and 57 in the SFC. Of the 16 children with W/H below 70%, 7 (43.7% - 95% CI [13.7-78.5]) were admitted in the TFC, and 2 (12.5% - 95% CI [0.7-53.3]) in the SFC.

6. Measles vaccination coverage

Measles vaccination coverage in children below 5 years of age, was at 73.8% (688/932 – 95% CI [69.5-77.7]) according to the card. According to history another 11.8% (110/932 – 95% CI [9.1-15.2]) had been vaccinated.

7. Access to food and non-food items

Only 21 families (2.3% - 95% CI [1.2-4.3]) stated not to have a registration card for WFP food distributions; 2.1% (19/912 – 95% CI [1.0-4.0]) stated to have never received any GFD at all since present in Murnei.

At the time of the survey, MSF had done one blanket food distribution, targeting children under the age of 5 years (height below 110 cm). Of the 583 families who stated to have children under the age of years old, 56 (9.6% - 95% CI [6.6-13.7]) did not receive food from the blanket food distribution.

Almost half of the families interviewed (393/912 - 43.1% - 95% CI [38.5-47.8]) did not have any blankets in the house. For operational reasons, some additional calculations were done, which are illustrated in Table 15. Assuming that a family of 3 persons or less needs at least 1 or 2 blankets, that a family of 4 to 6 persons needs at least 3 or 4 blankets, and a family of 7 or more members needs at least 5

blankets, we found that 85% of the families did not have a sufficient number of blankets in the house. In Table 15 these are represented by the coloured squares.

Table 15 : Number of blankets according to household size. Murnei, Darfur, Sudan, 2004.

	No blanket		1 or 2 blankets		3 or 4 blankets		5 or more blankets	
Family size	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
≤3 p/family	138	15.1	109	11.9	4	0.4	0	0.0
4-6 p/family	180	19.7	207	22.7	16	1.8	0	0.0
≥7 p/family	75	8.2	151	16.6	29	3.2	3	0.3
TOTAL	393	43.1	467	51.2	49	5.4	3	0.3

In addition, 24.9% (227/912 – 95% CI [21.0-29.2]) did not have any jerry cans, 41.4% (377/912 – 95% CI [36.8-46.0]) of the families did not own a donkey, and for 95.3% (865/908 – 95% CI [92.8-97.0]) the interviewer teams estimated that the house would not offer any protection against the rain.

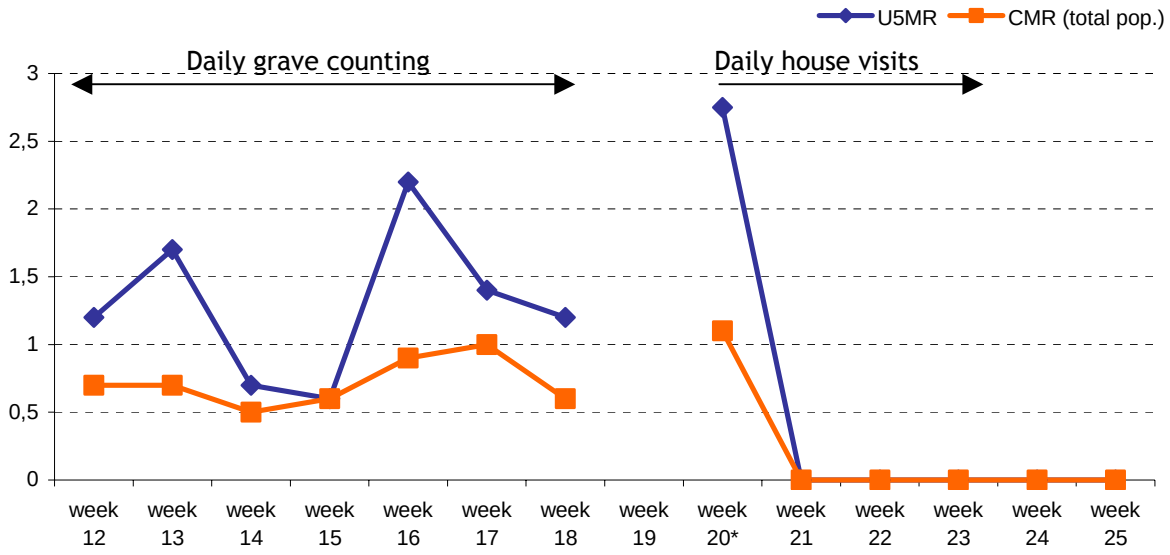
V.2. Surveillance

1. Mortality surveillance

For detailed information on mortality surveillance in Zalingei, we refer to the report of Sibylle Gerstl.[5] A follow-up visit on the mortality surveillance in Zalingei as well as in Niertiti was done, and confirmed a well-functioning system in both locations. For week 20, CMR in Zalingei was at 0.3 deaths/10 000/day, and the U5MR was at 0.7 deaths/10 000/day.

In Murnei, active data collection started on 17 May and the first week's data were available for 5 days (Figure 12). For these 5 days of week 20, the CMR was at 1.1/10 000/day, and the U5MR was at 2.8/10 000/day. During these 5 days, 44 deaths were reported : 22 in children under the age of 5 years (6 of which were reported to have died in the hospital), and 22 in persons of 5 years or above, all of whom died at home.

Figure 12 : Crude and under-5 mortality rate, based on active mortality surveillance. Murnei, Darfur, Sudan, 2004.



2. Morbidity surveillance

The main points of morbidity surveillance were discussed in the report of Vincent Brown; here we only discuss the last information collected in Murnei.[4] Data collection in OPD and IPD was simplified.

The proportion of the main pathologies observed at the OPD is represented in Figure 13. Main reason for consultation were acute respiratory tract infections and diarrhea.

Figure 13 : Proportional distribution of main pathologies at MSF OPD. Murnei, Darfur, Sudan, 2004.

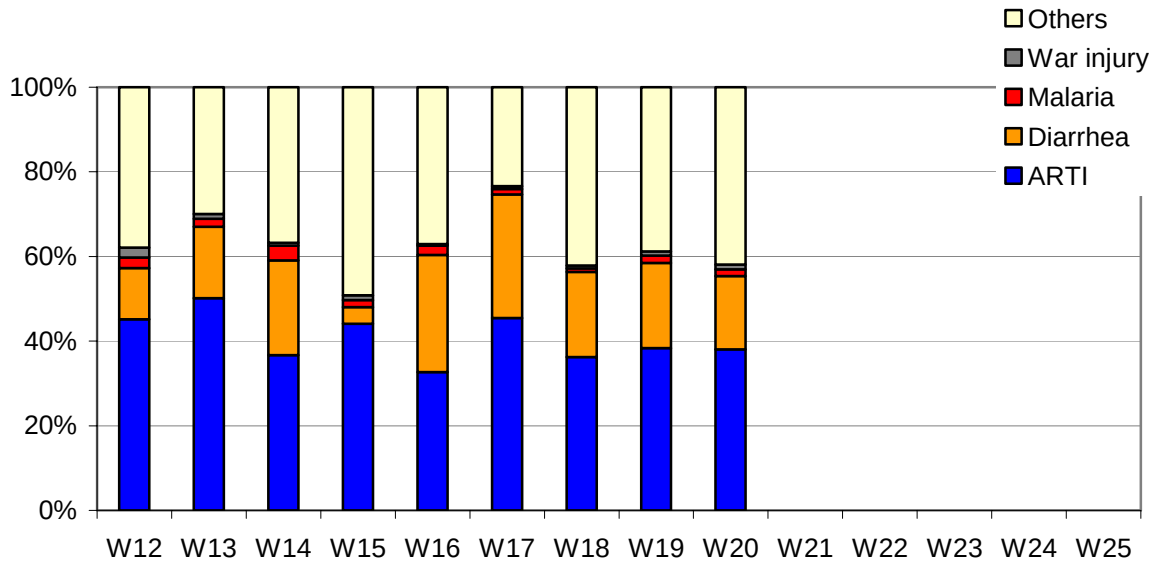
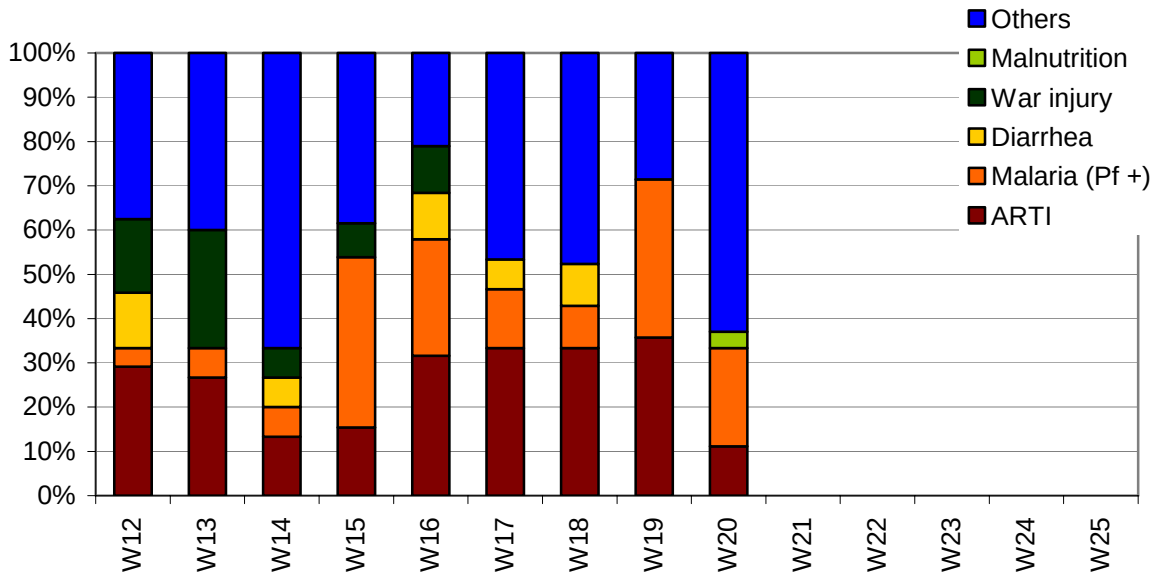


Figure 14 illustrates the proportional distribution of pathologies in the IPD. As from week 20, children admitted in the TFC who are clinically in a bad condition and therefore in 24-hour care, are included as a separate category in the IPD data collection.

Figure 14 : Proportional distribution of main pathologies at MSF IPD. Murnei, Darfur, Sudan, 2004.



VI. DISCUSSION

During this consultation, a population survey was done in Murnei and Zalingei, an active data collection system for mortality surveillance was put in place in both locations, and the tools for morbidity surveillance were simplified. Under difficult working conditions, considering the political context, the lack of trained human resources, and the climate (55°C!), representative data were obtained, which immediately served the field for operational purposes.

1. Population surveys

Displacement, retrospective mortality, disappearances and absences

Survey results showed that attack of the village was the principle reason for people to have left their village. The peak of arrival in Zalingei was November 2003, while 2 arrival waves, in December and February, were distinguished in Murnei. The extent of the events that were responsible for this mass displacement was illustrated by the large number of villages involved. The families interviewed in Murnei came from more than 100 different villages, and in Zalingei from almost 70 different villages.

Over the 6-month recall period, excess crude mortality in Murnei was more than 3 times higher than the emergency threshold of 1 death/10 000/day, and more than 2 times higher in Zalingei. In Murnei, this excess mortality was even more striking for the first 3 months surveyed, with a CMR of 5 times the emergency threshold, or 10 times the expected mortality rate in a stable context.[6] In both locations, the great majority of these deaths were due to violence, which is completely unacceptable where it concerns women or children, or even adult civilians. In Murnei, almost half of the children under 16 years, and 4 out of 5 of the women, who died in this period, died because of violence. In addition, 1 on 12 of the violent deaths occurred while the people were already in Zalingei or in Murnei, which supposedly are safe refuges. These data demonstrate that the security of the displaced populations in Murnei and Zalingei is not guaranteed.

The age-sex distribution for both Murnei and Zalingei shows a clear lack of men between the age of 15 and 45 years old; the men only represented about one third of the persons in that age group. Considering the M/F sex ratio of the deceased, part of these men is likely to have died, whereas others had disappeared, might be at war, or were travelling in search of work or more security. The observed lack of men suggests that there were a considerable number of households where the head of the family was a woman, which implies an increased vulnerability of the household.

Health, food and non-food items

Survey results based on vaccination cards showed that about 3 out of 4 children under 5 years were vaccinated against measles. However, there is overcrowding in a large part of Murnei and in several of the sites in Zalingei, and children between 5 and 14 years were not targeted for vaccination. This implies that the risk for a measles epidemic cannot be excluded. Ideally a catch-up vaccination for those children without card, and for the children above 5 years, should be done.

Malnutrition prevalence in both locations was high, with one out of 5 children under 5 years being acutely malnourished. The coverage of the TFC and SFC in both Murnei and Zalingei should be improved. Considering the fact that for security reasons strictly nobody is cultivating, neither the displaced or the resident population, the situation can only get worse. Moreover, with the beginning of the rainy season in June, access by road will become very difficult, if not impossible, and the villages risk to be largely isolated. The road between Murnei and Zalingei will be completely cut. This means that in the coming months, the population will be completely dependent on external food aid. Up to now, the general food distributions have been irregular and incomplete.

2. Surveillance

The simple active mortality surveillance in place showed an alarmingly high U5MR in Murnei, in contrast to the values found in the retrospective mortality survey. This indicates the high vulnerability of this part of the population, which should be addressed. With a CMR above the emergency threshold, it is clear that the adult population deserves equal attention. With the given conditions, this borderline situation is only to get worse. In Zalingei, at this point, mortality rates were acceptable, but close monitoring is necessary.

VII. CONCLUSIONS

The data presented in this report clearly show that the military conflict of the Darfur crisis has led to an extremely precarious situation. Like a textbook case, vulnerability of the 110 000 displaced people in Murnei and Zalingei involves every level determining people's health and livelihood : security, access to food and nutritional rehabilitation, the provision of water and sanitation, and shelter. Poor sanitary conditions and the high population density represent a high risk for disease and outbreaks. At the same time, for the duration of this consult, the discrepancy between the population's needs on one hand, and the lack of assistance present in the field on the other, was the least to say striking.

We have only reported on 2 locations in West Darfur, where access and humanitarian intervention is allowed. However, there are still many places for which no authorisation to go was obtained and where we can only guess the conditions people are living in.

VIII. RECOMMENDATIONS

In the light of the assessments done in Murnei and Zalingei, we want to make the following recommendations :

- **Mortality surveillance** should be a **priority** in all locations where MSF is intervening. This main indicator (n° deaths/10 000/day) to be followed in emergencies with mass population displacement, reveals the state of the health of the population. This indicator should be monitored closely, in order to ensure a rapid and appropriate response. The **CMR and U5MR** of the 4 locations where MSF is present should be **systematically reported** every week.

- The mortality surveillance indicated that the majority of the deaths occur at home, and not at the hospital (cf. number of deaths in the hospital versus total number of deaths reported by the home visitors). This implies that the coverage of the health system at this time is insufficient. Together with the high CMR and U5MR, **health care capacity** should urgently be **increased**, in particular in Murnei.

- **Causes of mortality**, are quite reliable at the hospital level, and need to be followed. As for the causes of death reported through the active mortality surveillance system, data reliability is limited but can be considered as indicative of lethal events in the community.

- **Security** of the displaced populations is not guaranteed. On almost daily basis, persons are reported to have disappeared, beaten, raped or killed. ICRC should be involved to find out the whereabouts of these people. Protection of the IDPs should be a priority, and lobbying on this issue should continue at national and international levels.
- Coverage of the nutrition programs is insufficient, and an active effort should be made to increase this. The network of home visitors should be used to **actively trace malnourished children**. The **tracing of defaulters** from the TFC should also be a priority, since these children are at risk of death. In addition, while they are waiting to receive the food ration, the opportunity should be used to **teach the mothers** of the children in the TFC or SFC on the causes and treatment of malnutrition.

- With the high malnutrition prevalence, the lack of cultivation, and the irregular and incomplete GFD, **blanket food distributions should continue**.

- The rations distributed at the general food distribution should be monitored in Kcal/person/day and monthly plotted on a graph. As they were during the last distributions, the rations provided insufficient levels of micronutrients. Taking into account the anticipated long-term dependence on external food aid, **micronutrient supplementation** should be ensured.

- Reportedly, some inconsistencies occurred during the last food distribution in Zalingei. If security allows, it is recommended to organize **food basket monitoring** at the food distribution points for the next GFD (30 families – to be interpreted with specific software).

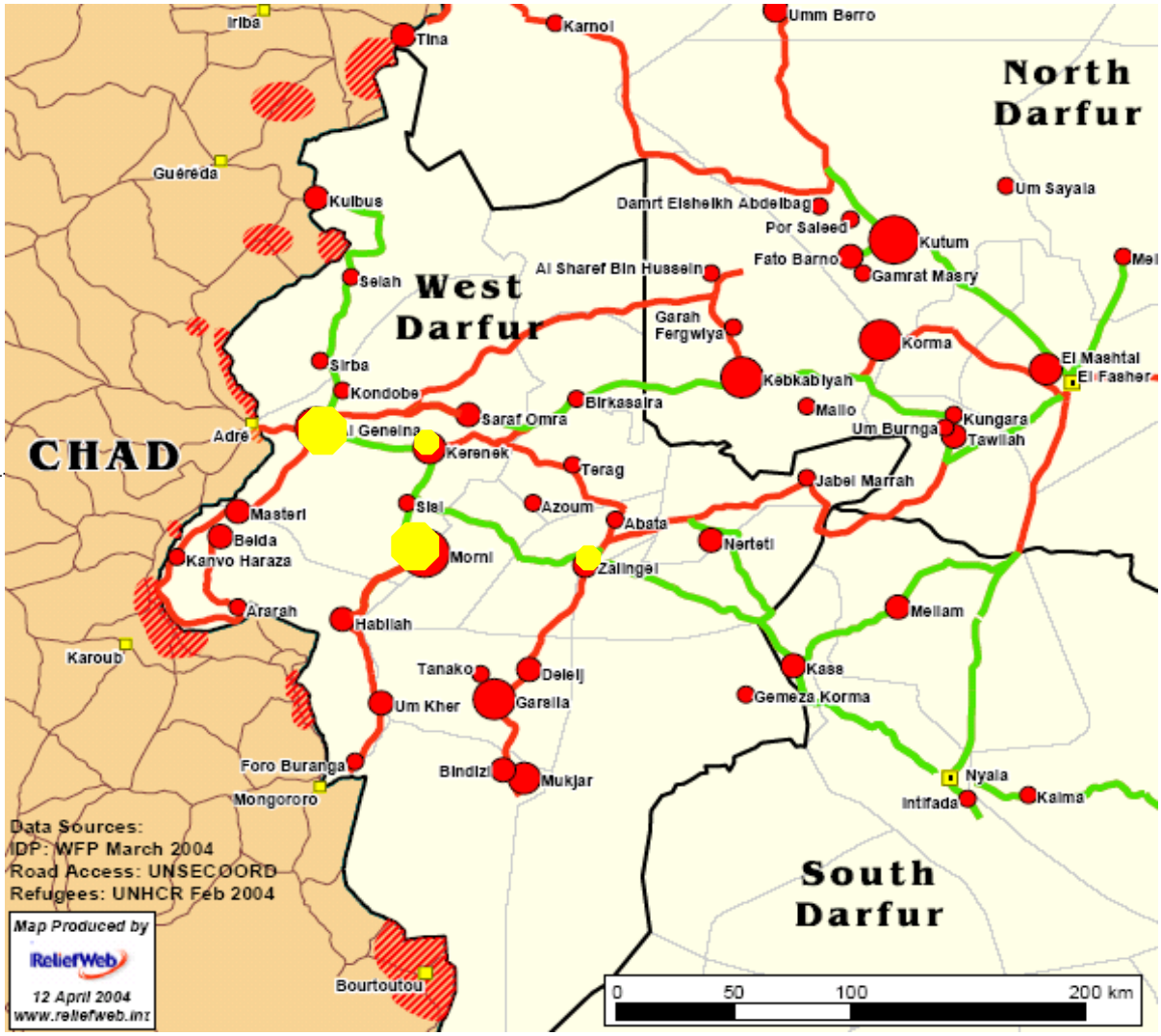
- There is no clear picture of the health situation of the displaced in Niertiti or Kerenick. It is recommended to do a proper **health assessment** in these locations as well, to ensure adapted operational response.

- The network of **home visitors** (1 per 1000 to 2500 persons) is a necessary monitoring tool in MSF programs. Once the mortality surveillance system is well consolidated, their tasks can progressively be extended : e.g. active nutritional screening and defaulter tracing, referral for measles vaccination for those without cards, or referrals of clinically sick patients to the hospital. Also important are population counts and monitoring of population movements. In each location, an MSF expatriate should be responsible to ensure continuous and close supervision of these home visitors. This strong support is essential in order to get reliable information.

- It is really important for the expatriates to go outside of the hospital or the health centre, and **move around** the village as much as security allows. It provides important information, such as the food available in the house, the general health status of the people, or seeing how people share the food received at the GFD with the donkeys … The daily round of the home visitors is an excellent opportunity for this.

IX. ANNEXES

Annex 1 : Map of West Darfur region



Annex 2 : Survey questionnaire used in Murnei

	Displacement				Family Composition										GFD			Non-food	
	Fam N°	Village of origin	Arrival Date mo/yr	Reason departure 1.Attack 2.Insecurity 3.Other	Total	< 5y		5-14y		15-29y		30-44y		≥45		Card Y/N	n° x received food WFP	n° x received food MSF	Blanket in house n°	Jerry can in house n°
						M	F	M	F	M	F	M	F	M	F					
1																				
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Household		Deaths												
Donkeys present n°	House protects against the rain Y/N	Total	Age	Sex M/F	Mth	Period 1.Ram - Eid Kabir 2.After Eid Kabir	Location 1.Village/ underway 2. Murnei 3. Other	Cause 1.Violence 2.RTI 3.Diarrhea 4.Other	Age	Sex M/F	Mth	Period 1.Ram - Eid Kabir 2.After Eid Kabir	Location 1.Village/ underway 2. Murnei 3. Other	Cause 1.Violence 2.RTI 3.Diarrhea 4.Other

						Disappeared				Absent			
Age	Sex	Mth	Period	Location	Cause	Age	Sex	Age	Sex	Age	Sex	Age	Sex
	M/F		1.Ram - Eid Kabir 2.After Eid Kabir	1.Village/ underway 2. Murnei 3. Other	1.Violence 2.RTI 3.Diarrhea 4.Other		M / F		M / F		M / F		M / F

	ChildN°	FamN°	Age	Sex M / F	Oedema Y / N	MUAC mm	Weight kg	Height cm	TFC Y / N	SFC Y / N	Measles vaccination	
											Card	History
1												
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