

**EMERGENCY NUTRITION AND MORTALITY SURVEYS
CONDUCTED AMONG SUDANESE REFUGEES AND CHADIAN
VILLAGERS,
NORTHEAST CHAD, JUNE 2004**



Basia Tomczyk, RN, DrPH, MS
International Emergency and Refugee Health Branch/NCEH/CDC

Eileen Dunne, MD, MPH
Division of STD Prevention
Epidemiology and Surveillance Branch/NCHSTP/CDC

Michelle Chang, MD
Special Pathogens and Meningitis Branch/NCID/CDC

Stefano Fedele, MSc
UNHCR Nutrition Coordinator, Chad

Leisel Talley, MPH
International Emergency and Refugee Health Branch/NCEH/CDC

Curtis Blanton, MS
Division of Environmental Emergency and Health Services/NCEH/CDC

Collaborative Surveys Conducted by:

United Nations High Commissioner for Refugees (UNHCR)
United Nations World Food Programme (WFP)
United Nations Children's Fund (UNICEF)
Ministry of Health-Chad (MOH-Chad)
Centers for Disease Control and Prevention (CDC)

CONTENTS

MAP OF SURVEY AREA	3
LIST OF TABLES	4
ACKNOWLEDGEMENTS	6
SUMMARY	8
INTRODUCTION	11
GOAL AND OBJECTIVES	12
DATA COLLECTION METHODS FOR ALL THREE SURVEYS	13
Definitions	14
Consent	16
Implementation Schedule	16
Logistics	16
Data Analysis	16
 SURVEY I: BAHAI AND CARIARI REFUGEE SETTLEMENTS	
Background	17
Methodology	17
Results.	18
 SURVEY II: IRIDIMI, TOULOUM, AND KOUNOUNGO REFUGEE CAMPS	
Background	24
Methodology	25
Results.	26
 SURVEY III: ELEVEN CHADIAN VILLAGES.	
Background	32
Objectives	32
Methodology	32
Results.	34
 DISCUSSION.	39
CONCLUSIONS	40
RECOMMENDATIONS	41
 APPENDIX A—Questionnaire French Version	43
APPENDIX B—Questionnaire English Version	46
APPENDIX C—Questionnaire for Villages English and French Version	54

Map of Survey Area



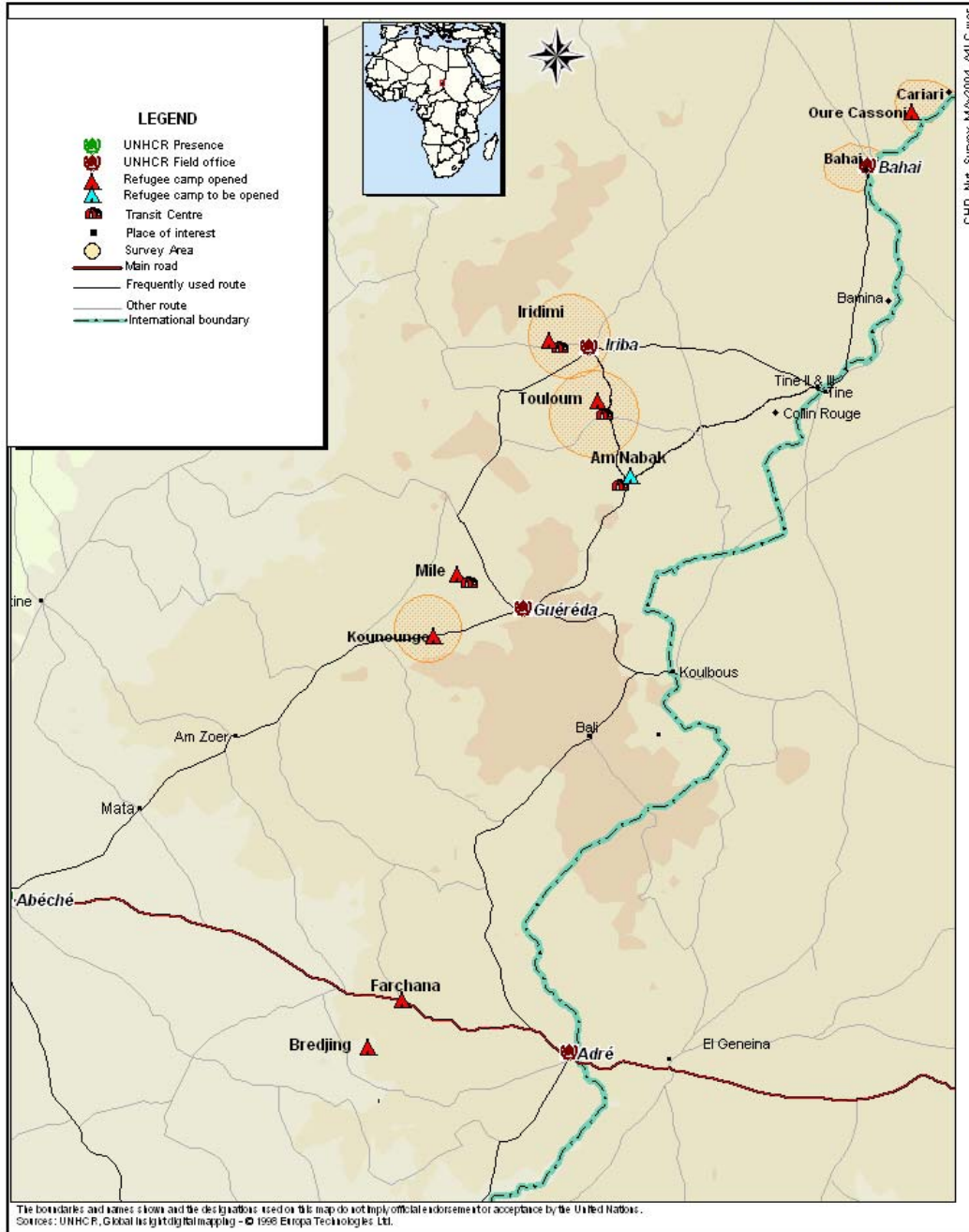
NUTRITION SURVEY AREAS EASTERN CHAD

30.05.2004 - 20.06.2004

GIMU / PGDS

Geographic Information and Mapping Unit
Population and Geographic Data Section

Email: Fedele@unhcr.ch



* Tented areas indicate survey sites, northeastern Chad, June 2004.

List of Tables

Table 1—Summary of Main Findings for the Three Surveys Conducted Among Refugees and Chadian Villagers, Chad, June 2004

Table 2—Crude Mortality Rate and Age-Specific Mortality Rate Among Refugee Frontier Settlements and Camps and Indigenous Villages in Chad, June 2004

Table 3—Type of Malnutrition, Anthropometric Index, Degree of Malnutrition, and Definition Using Z-Scores for the Three Surveys, Chad, June 2004

Table 4—The Recommended Cut-offs for MUAC in Pregnant Women Used in the Three Surveys, Chad, June 2004

Bahai and Cariari Refugee Settlements

Table 5—Population Estimate for Bahai and Cariari Refugee Frontier Settlements Based on the IRC Census; Estimated Number of Children < 5 years; Number of Households Sampled and Number of Children Sampled, Chad, June 2004

Table 6—Characteristics of Households in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Table 7—Prevalence of Acute and Severe Malnutrition by Weight-for-Height Z-Scores in Children 6–59 Months of Age, Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Figure 1—Distribution of Weight-for-Height Z-Scores, Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Table 8—Age Distribution of Acute Malnutrition (Weight-for-Height: < -2 Z- scores) in Children 6–59 Months of Age in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Table 9—Crude Mortality Rate and Age-Specific Mortality Rate and Main Cause of Death in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Table 10—Reported Illness During the Last 2 Weeks in Children 6–59 Months of Age in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Table 11—Measles Vaccination and Vitamin A Supplementation Status Among Children 6–59 Months of Age, in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Table 12—Ration Estimates for Latest Food Distribution in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Iridimi, Touloum, and Kounoungo Refugee Camps

Table 13—Population Estimate for Three Refugee Camps Based on the UNHCR Census; Estimated Number of Children < 5 years; Number of Households Sampled and Number of Children Sampled

Table 14—Characteristics of Households in Iridimi, Touloum, and Kounoungo Refugee Camps Chad, June 2004

Table 15—Prevalence of Acute and Severe Malnutrition by Weight-for-Height Z-Scores in Children 6–59 Months of Age, Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Figure 2—Distribution of Weight-for-Height Z-Scores, Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Table 16—Age Distribution of Acute Malnutrition in Children 6–59 Months of Age in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004 (weight for height: < -2 Z-scores)

Table 17—Crude Mortality Rate and Age-Specific Mortality Rate and Main Cause of Death in >5 and <5 Years in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Table 18—Reported Illness During the Last 2 Weeks in Children 6–59 Months of Age in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Table 19—Measles Vaccination and Vitamin A Supplementation Among Children 6–59 Months of Age, in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Eleven Chadian Villages

Table 20—Selected Local Chadian Villages Near Refugee Camps and Spontaneous Settlements, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 21—Primary Water Source, Type of Latrine, Access to Soap, Mosquito Net Use, and Testing of Iodized Salt, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 22—Staple Food Consumption Patterns in 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 23—Resource Sharing and Interaction Between Villagers and Refugees, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 24—Measles Vaccination and Vitamin A Supplementation Among Children 6–59 Months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 25—Reported Illness During the Last 2 Weeks in Children 6–59 Months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 26—Breastfeeding Patterns in Children 6–23 months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004.

Table 27—Prevalence of Acute and Severe Malnutrition by Weight-for-Height Z-scores in Children 6–59 Months, 11 Chadian Villages, Chad, June 2004

Figure 3—Distribution of Weight-for-Height Z-scores, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Table 28—Age Distribution of Acute Malnutrition in Children 6–59 Months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Acknowledgements

We gratefully acknowledge the important contributions of so many who made this survey possible.

Survey Team Members

Interviewers and Measurers

UNICEF N'Djamena

Fatimé Banounga

WFP Abeche

Midaye Ngarhasta Delphine

UNHCR N'Djamena

Dr. Mamadou Barry
Stefano Fedele

Centre National de Nutrition et Technique Alimentaire, Chad

Temoua Djingué
Idriss Soumaine

Wetchou Payang

Khadidja Rahma Saleh

Jean Laoukole
Radandi Laesala

Translators and Assistants

IMC

Zara Mohomad
Manira Abdraman
Adam Mousle
Zanat Ali
Achta Issaka

MSF-Belgium

Maka Mohomad

Secodev

Hassam Adam

CARE

Senoussi Abdekerim

IRC

Faisa Mohammed
Maka Abdul
Mugbala Assam
Zubeida Abraham
Weida Bashar Ahmed
Mabulah Abraham Mohammed
Mobark Mahatar

IRC CHWs

Adem Ishaq
Mayuck Ibrahim
Haute Ahmed
Hawa Shariff
Easa Shulta
Sumayan Basha
Hawa Abdul Karim

IRC CHW Supervisor

Ali Yahai

Dr. Camillo Valderrama

Dr. Amey Kouwonou

Suad Mahi

Drivers

Abdel Marjit Adam

Abukar Honainne Isse

Support for Survey

Secodev in Touloum camp:
Oriko Nandjingar, Priscilla Bogue

IMC in Kounoungo camp: Dr. Asikal

CARE in Iridimi camp:

Howard Hollingsworth, Chief of Program; Michel Turkote; Sylvain Ningoulgo; Abdilaziz Zakaria;
Samedi Dadjo; Zonbeida Saleh; Sadie Ismael Hosky; Hamid Ali Nassour; Fatime Nourene; Afaf
Tidjina

Survey Supervisor

Dr. Basia Tomczyk
International Emergency and Refugee Health Branch/CDC

Survey Coordinators

Dr. Eileen Dunne
Division of STD Prevention; NCHSTP, CDC

Dr. Michelle Chang
Meningitis and Special Pathogens Branch/CDC

Logistic Coordinator

Stefano Fedele
UNHCR Nutrition Coordinator, Chad

Nutrition and Statistic Coordinators

Leisel Talley
Nutritionist—International Emergency and Refugee Health Branch/CDC

Curtis Blanton
Statistician—Division of Environmental Emergency and Health Services/CDC

CDC/International Emergency and Refugee Health Branch

Mike Gerber	Fiona Galloway	Mark Anderson
Barbara Lopes-Cardozo	Muireann Brennan	David Sussman
Tom Handzel		

CDC/Division of Nutrition and Physical Activity
Bradley Woodruff

Operational Support

Fathia Abdalla (Designated UNHCR Nutrition Technical Focal point)
Nadine Ezard (Designated UNHCR Health Technical Focal point)
Rita Bhatia (Policy and Nutrition Unit WFP Rome)
Theophilus Vodounou, Head of UNHCR Sub-office, Abeche
Emile Belem, Head of UNHCR Field-office, Iriba
Abdoulaye Bakayoko, Head of UNHCR Field-office, Guereda
Gaston Nteziriba, Head of UNHCR Field-office, Bahai
N'djamena, UNHCR office

Summary

Sudanese refugees are seeking safety in Chad due to a conflict that began in April 2003, in the Darfur region of Sudan that has resulted in a humanitarian emergency. There were three emergency nutritional surveys conducted in northeastern Chad among Sudanese refugee and local Chadian populations. An urgent anthropometric assessment was warranted because health agencies had already reported a high prevalence of malnutrition as assessed by mid upper arm circumference (MUAC) and selective feeding centers were filled beyond capacity. The primary goal of each survey was to assess health and nutritional status of the population, to make recommendations to improve public health interventions. Data were collected from three populations: 1) Sudanese refugees living in the frontier settlements of Bahai and Cariari; 2) three Sudanese refugee camps, Iridimi, Touloum, and Kounoungo; and 3) 11 Chadian villages near refugee settlement.

The survey was funded and initiated at the request of United Nations High Commissioner for Refugees (UNHCR). It was carried out by the Centers for Disease Control and Prevention (CDC), in collaboration with the United Nations World Food Programme (WFP), United Nations Children's Fund (UNICEF), the World Health Organization (WHO), and the Centre National de Nutrition et Technique Alimentaire (CNNTA), Chad. The imminent arrival of the rainy season and the need to assess the Bahai and Cariari area before relocation of settlements prompted a rapid organization of logistics, training, and other arrangements. Additionally, collaborators wanted to assess the effects of the refugee influx on the host Chadian population's food and water resources, particularly in the arid northeast.

Teams used a field-tested survey to assess household practices and specific concerns about children 6–59 months old, such as measles vaccinations, vitamin A supplementation, and morbidity. Anthropometric measurements, weight, and height, were obtained from children (6–59 months of age), and mid upper arm circumference (MUAC) were obtained from pregnant women (15–45 years). A 217-day recall period, from the beginning of Ramadan 2003, was used to estimate crude mortality rates and mortality rates for children younger than 5 years old. Salt from the Chadian villages, only, was tested for iodine. In addition, teams analyzed the general ration distribution records for nutritional content in the Bahai/Cariari frontier settlements.

Between 35%–39% of 6–59 month old children were found to have acute global malnutrition (GAM) in all three surveys, using weight for height z-scores ($WHZ < -2$). Between 3.7%–6.4% of 6–59 month old children were found to have severe wasting when using weight-for-height z-scores ($WHZ < -3$). There were three cases of kwashiorkor, one case in the Chadian villages and two cases in the refugee camps. The mean mid upper arm circumference (MUAC) in pregnant women 15–49 years of age was 24.7 cm in the Chadian villages, 25.8 cm (95% CI, 25.2–26.4) in the refugee camps, and 24.6 cm (95% CI, 23.6–25.6) in the frontier settlements.

Vaccination coverage in the refugee frontier settlements was 24% (95% CI, 34.3–44.2), in the refugee camps was 83% (95% CI, 78.2–88.1), and in the Chadian villages was 31.6%.

The prevalence of diarrhea in infants/children, as reported by mothers, was 35% (95% CI, 30.1–40.0) in the refugee settlements and 58% (95% CI, 53.1–63.35) in the camps. Table 1 summarizes the results by each survey.

Emergency Nutrition and Mortality Surveys Conducted among Sudanese Refugees and Chadian Villagers, Northeast Chad, June 2004

The crude mortality rate (CMR) and under 5 years of age mortality rates (U5MR) were calculated using a 217-day recall period. The CMR in the camps, including missing family members, was 2.57/10,000/day (95% CI, 2.42–2.71); for the frontier settlements, the rate was 1.07/10,000/day (95% CI, 0.96–1.18). The U5MR was 0.5/10,000/day (95% CI, 0.31–0.57) in the frontier settlements and 1.65/10,000/day (95% CI, 1.47–1.82), including missing, in the refugee camps (Table 2).

In conclusion, the nutritional status of children in the surveys, although they are not comparable, is of serious concern. The levels of acute malnutrition found in this survey were high (GAM range in all three surveys 35%–39%). The proportion of measles vaccination in children < 5 years of age was (23%–83%). Additionally, a high prevalence of diarrhea and bloody diarrhea suggest that diarrheal disease could aggravate the precarious nutritional status. The underlying causes of diarrhea likely relate to overcrowding and lack of access to, and availability of, clean water. It is imperative that activities occur soon to address malnutrition, and the underlying factors. Nutritional and health recommendations should target severe and acute malnutrition, but should also include a comprehensive public health approach such as access to safe water, shelter, and primary health care. Recommendations for actions based on the findings of this survey are provided following the discussion.

Table 1. Summary of Main Findings for the Three Surveys Conducted Among Refugees and Chadian Villagers, Chad, June 2004

Characteristic	Frontier Refugees % (95% CI)	Refugee Camps % (95% CI)	Chadian Villages %
Global acute malnutrition (GAM; < 2 z-scores)	39.2 (34.3–44.2)	35.6 (30.9–40.3)	35.0
Severe acute malnutrition (SAM; < 3 z-scores)	6.4 (4.0–8.8)	5.5 (3.1–7.9)	3.7
Measles vaccination by card and history in past 6 months	23.9 (19.0–28.8)	83.1 (78.2–88.1)	31.6
Reported receiving vitamin A in past 6 months	38.4 (32.0–44.7)	61.1 (54.6–67.6)	28.0
Reported diarrhea in last 2 weeks	35.1 (30.1–40.0)	58.2 (53.1–63.3)	45.8
Reported acute respiratory infection (ARI) symptoms in last 2 weeks	50.6 (45.1–56.2)	72.5 (67.8–77.1)	59.3
Reported having received food in June 2004	88.8 (84.9–92.7)	54.8 (39.2–70.4)	Not asked
Mean hours to fetch water	5.6 (5.3–6.0)	2.1 (2.0–2.2)	3
Living without shelter	98.5 (97.1–100.0)	0.0	0.0

Table 2. Crude Mortality Rate and Age-specific Mortality Rate among Refugee Frontier Settlements and Camps and Indigenous Villages in Chad, June 2004

	Refugee Frontier Settlements Mortality Rate/10,000/day (95% CI)	Refugee Camps Mortality Rate/10,000/day (95% CI)	Benchmark* Mortality Rate/10,000/day
Crude Mortality Rate (CMR)	0.62 (0.53–0.70)	1.56 (1.44–1.67)	1.0
Crude Mortality Rate including missing persons [†]	1.07 (0.96–1.18)	2.57 (2.42–2.71)	1.0
Under 5 Years Mortality Rate (U5MR)	0.5 (0.31–0.57)	1.46 (1.30–1.63)	2.0
U5MR, including missing persons [†]	0.5 (0.31–0.57)	1.65 (1.47–1.82)	2.0

* A crude mortality rate of greater than one death per 10,000 persons per day and/or an under 5 years of age mortality rate greater than two deaths per 10,000 per day indicate that a relief program is a very serious situation (*Handbook for Emergencies United Nations High Commissioner for Refugees, Second Edition*).

[†] Individuals were classified as missing if family members reported that they could not find the person.

Introduction

In January 2003, refugees began to flee from the Darfur region of Sudan because of the civil war that threatens millions of people with violence, displacement and hardship. Initially, refugees settled near the areas of Tine, Bahai, and Adré, but over the following months spread along the length of the eastern border from Tissi in the south to Cariari in the north; a distance of 600 kilometers (km). In September 2003, the United Nations High Commissioner for Refugees (UNHCR) and the Centre National de Nutrition et Technique Alimentaire (CNNTA), the Chadian government refugee agency, began to assess the situation and the first pre-registration took place in November 2003. Farchana camp, the first refugee camp, was established in January 2004.

At present, there are seven refugee camps in eastern Chad. Two camps, Farchana and the newly opened Bredjing camp, are located to the east of the UNHCR sub-office in Abeche. Four camps, Kounoungo, Touloum, Iridimi, and Mile, are further north; one camp, Goz Amer, is located in the south. Three additional camps are in the planning stage: Oure-Cassoni in the Cariari area, in the north; Treguine near Adré; and Djabal, near Goz Beida, in the south. In May 2004, UNHCR estimated the current refugee population to be 105,000 in the camps and about 74,800 in spontaneous settlements along the border.

Refugees in the north are mainly of Zaghawa ethnicity, while those in the south belong to the Massali and Tama ethnic groups. Most are traditionally agro-pastoralist populations.

An interagency health and nutritional working group (UNHCR, WFP, MOH-Chad and UNICEF) was formed in April 2004 to address public health issues among both refugee and host populations. Nutritional assessments included a survey conducted by Médecins Sans Frontières-Belgium (MSF-B) among refugees in the Daguessa, Chad, in March 2004 and demonstrated moderate malnutrition and severe malnutrition rates among children aged 6–59 months of 18.3% and 5.0%, respectively¹. In April 2004, The International Rescue Committee (IRC) conducted nutritional screening in Cariari and found moderate and severe malnutrition rates of 34% and 2%, respectively among the same age group². These previous surveys were limited to northeastern Chad, as data collected in southeastern Chad indicated a more stable situation in terms of public health, with regular food and water distributions and adequate health care provision.

The previous surveys included an evaluation using mid upper arm circumference (MUAC) for the anthropometric measurement of malnutrition. This measure is highly unreliable when used as a population measure of malnutrition compared with weight for height measurements. MUAC is best used for rapid screening to refer children to selective feeding programs, whereas weight and height measurements are taken before admission. (MUAC cutoffs used in these assessments were: MUAC < 125 mm = global malnutrition; MUAC > 110 mm and < 125 = moderate malnutrition; and MUAC < 110 mm = severe malnutrition.). Furthermore, screening by IRC was limited to 107 children.

¹ Preliminary Assessment of the Nutritional Status of a Refugee Population, Daguessa, Chad March 27, 2004. Report by Médecins Sans Frontières-Holland.

² Nutritional Emergency in Cariari Area, Northeastern Chad, April 24, 2004. Report by International Rescue Committee, Dr. Vlderrama. Emergency Nutrition and Mortality Surveys Conducted among Sudanese Refugees and Chadian Villagers, Northeast Chad, June 2004

A nutritional survey was imperative to support selective feeding programs. There is one therapeutic feeding center located in Iriba hospital operated by Médecins Sans Frontières (MSF; Doctors Without Borders)-Belgium that consistently has 150–170 children enrolled from Iridimi and Touloum camps and from the frontier settlements of Bahai and Cariari (located approximately 3-4 hours by road). There is a therapeutic feeding center also serving Kounoungo at the hospital in Guéréda. There were no therapeutic feeding centers located on the camp/frontier premises. Iridimi and Touloum camps have supplemental feeding programs run by MSF-Belgium (1 day a week in Iridimi, 2 days a week in Touloum at the time of the survey) and there is no supplemental feeding program (SFP) in Bahai or Cariari. MSF-Belgium is now in the process of expanding the number of days for SFP in the camps.

From the information above, the interagency working group determined that there was an urgent need for a comprehensive nutrition survey to provide data on the current nutritional situation in northeastern Chad, and to direct the implementation of feeding programs and nutritional interventions in the area. Three surveys were conducted: 1) refugees living in the camps of Iridimi, Touloum, and Kounoungo; 2) refugees living in the refugee frontier settlements of Bahai and Cariari; and 3) 11 villages located near the refugee settlements.

Goal and Objectives

The overall goal of each survey was to collect data on the health and nutritional status of the population and provide recommendations to international organizations serving the refugees in Iridimi, Touloum and Kounoungo camps, refugees living on the frontier region of Bahai and Cariari and the Chadian villagers living in proximity to the refugee settlements.

Objectives

Among children 6–59 months

- Estimate the current prevalence of acute malnutrition (wasting) defined by weight-for-height z-scores
- Estimate measles vaccination coverage among children
- Estimate the 2-week prevalence of diarrhea disease and acute lower respiratory infection in children
- Estimate the mortality rate

Among the entire affected population

- Describe source and access to household water supply
- Determine types of latrines available
- Determine access to and sharing of food rations, the adequacy of food supplies, alternative food sources, and the ability of the refugees to cook
- Estimate the crude mortality rate

Among the pregnant women 15–49 years of age

- Estimate the prevalence of acute malnutrition (wasting) defined by MUAC

Data Collection Methods For All Three Surveys

Data collection tools (household demographics, mortality, and child questionnaires) were developed from previous instruments used in refugee settings. The questionnaires were translated from English into French (see Appendix A for French form and Appendix B for English). The survey instrument was pre-tested in Farchana camp (not designed to be included in the survey sample) beforehand and revisions were made on the basis of that pre-test experience.

Training on administering the questionnaire was provided over 4 days. Although survey team members were previously experienced in anthropometric measurements, a review of anthropometric assessment techniques for weight, height/length, and MUAC for pregnant women was also conducted for all survey team members. A day-long evaluation of measurement on six children measured twice by all team members was conducted on the final training day.

Data were collected by three teams headed by one survey supervisor. Each team included a team coordinator, an interviewer, and two anthropometric measurements personnel (12 survey team members). The team coordinators had previous survey experience. All survey workers received 3 days of classroom training and 1 day of field practice under supervision. Each team was monitored by an expatriate supervisor during the survey. At each household, interviewers asked the adult member of the household questions about household demographics, including family size, water source and collection time, and sanitation. Questions addressing famine indicators were included regarding consumption of wild foods, past and present food consumption, past and present food sources, and livestock conditions. Households were asked about the receipt of food aid. Information on the consumption of rations was collected. A household census was taken as of the beginning of Ramadan (November 7, 2003). Births, deaths, and unaccounted for individuals occurring in each household between Ramadan and the date of the interview (midpoint of the survey) were recorded with the month of their occurrence. Cause of death was classified into one of eight categories (accidental and war-related injury, measles-associated, bloody diarrhea, diarrhea, pneumonia, meningitis, other/unknown) using a series of questions adapted from the World Health Organization (WHO) recommended protocol for verbal autopsies (see Appendix A).

Information was collected from an adult member of the household, preferably the mother, on each child less than 5 years of age. The information included whether the child was enrolled in supplemental or therapeutic feeding programs, vitamin A supplementation, and measles vaccination history and illness during the last 2 weeks. As vaccination cards were not consistently issued during the previous campaigns or may have been lost in flight, the mother's or other caretaker's report were taken as evidence of vaccination against measles and receipt of vitamin A capsules.

A local calendar was developed to assist in both age determination of children and mortality recall. The calendar consisted of seasonal events, such as the rainy season and crop harvests. It also included major events that would be familiar to most households, such as Ramadan (Appendix A). Individuals were classified as missing if family members reported that they did not know where to find them.

The local calendar was used to assist mothers in reporting the child's age. Height was also used to assist in the determination. It is likely that there are inaccuracies in the reporting of children's ages.

Anthropometric Assessments

Anthropometric measurements were taken on children and pregnant women in the household. Survey workers measured children's weight and height/length and assessed the presence of bilateral lower extremity edema. Weight was determined using an electronic digital scale (SECA 835) measuring to the nearest 100 grams (g) for children. Scales were checked daily for reliability using a known weight. Children (6–59 months) were weighed either standing alone or while being held by a caretaker or member of the survey team. Scales were equilibrated to zero before the child's weight was determined. Children were weighed wearing one item of clothing, such as a shirt or dress. Weighing a selection of these clothes confirmed that they weighed less than 100 g. For children less than 85 centimeters (cm) or younger than 2 years of age, length was measured to the nearest millimeter in the recumbent position using a standard height board. Children over 85 cm were measured in a standing position. Edema was assessed by applying thumb pressure to the feet for approximately 3 seconds and then examining for the presence of a shallow print or pit. MUAC was measured on pregnant women using a measuring tape for adults. Whenever possible, malnourished children and women were referred to supplemental or therapeutic feeding centers (<80% height-for-weight or MUAC <18.5 cm for pregnant women) or severe malnutrition (<70% height-for-weight or MUAC <21.0 cm for pregnant women). In addition, vitamin A supplementation was provided in the home to children >6–59 months who had not received vitamin A supplementation.

Definitions

Household: Households were defined as people sharing the same tent or living structure and food. Within each household, all individuals of the appropriate age groups were interviewed and measured. All eligible subjects were invited and encouraged to take part. Any who refused or were absent were not replaced in the sampling plan. Subjects who were reported to be in health centers or hospitals were located for interviewing and measured. If no one was at home at a selected house, a neighbor was consulted regarding the whereabouts of the household. If the members had departed permanently or would not return before the survey team had to leave, the household was skipped and not replaced. In most instances, time did not permit revisiting to locate absent family members.

Acute malnutrition children 6–59 months of age: Z-scores were used in the analyses of anthropometric data on children in this survey. In a well-nourished population, there is a standard distribution of height and weight for children under the age of 5 years. Under-nourishment in a population can be gauged by comparing children to this standard distribution. The standard or reference population used here is CDC's National Center for Health Statistics (NCHS) standard, which is recommended for use by the United Nations Children's Fund (UNICEF) and WHO. Each of the three nutritional status indicators is expressed in standard deviation units (z-scores) from the median of this reference population. Children whose weight-for-height is more than two standard deviations below the median of the reference population are classified as moderately or severely wasted. Those who fall more than three standard deviations below the median are severely wasted. Wasting is usually the result of a recent nutritional deficiency. The indicator may exhibit significant seasonal shifts associated

with changes in the availability of food or with disease prevalence. The relevant definitions are as follows and shown in Table 3.³

Table 3. Type of Malnutrition, Anthropometric Index, Degree of Malnutrition, and Definition Using Z-Scores for the Three Surveys, Chad, June 2004

Type of malnutrition	Anthropometric index	Degree of malnutrition	Definition using z-score
Acute	Weight-for-height	None	≥ -2.0
		Moderate	≥ -3.0 but < -2.0
		Severe	< -3.0 or edema
Global acute (GAM)	Weight-for-height	Moderate + Severe	< -2.0 or edema
Severe acute (SAM)	Weight-for-height	Severe	< -3.0 or edema

MUAC for pregnant women: Body mass index cannot be used to assess the nutritional status of pregnant women because of increased weight during pregnancy. MUAC has been recommended as an alternative assessment tool. The recommended cut-offs for MUAC in pregnant women are shown below (MSF unpublished revised nutrition guidelines) (see Table 4).

Table 4. The Recommended Cut-offs for MUAC in Pregnant Women Used in the Three Surveys, Chad, June 2004

Category of malnutrition	MUAC
Global undernutrition	< 21.0 cm
Moderate undernutrition	18.5–20.9 cm
Severe undernutrition	< 18.5 cm

Cumulative prevalence of diarrhea and acute lower respiratory infection: During interviews with an adult caretaker, survey workers defined diarrhea as three or more bowel movements in the past 24 hours. Any child who had diarrhea at any time in the preceding 2 weeks was considered positive. Caretakers that reported diarrhea were asked if they had noticed bloody diarrhea within the past 2 weeks. Acute lower respiratory infection was defined as the presence of cough and fever; at any time in the prior 2 weeks.

Consent

Ethics and Informed Consent

³ World Health Organization 2000. The Management of Nutrition in Major Emergencies. World Health Organization, Geneva. Emergency Nutrition and Mortality Surveys Conducted among Sudanese Refugees and Chadian Villagers, Northeast Chad, June 2004

The aims and objectives of the survey were discussed and agreed upon with members of the refugee and village leadership (refugee tribe and village leaders). Information about the survey was disseminated before commencement of the survey by the village leadership. During the survey, when teams arrived at a household they first explained the purpose of the survey using an information sheet translated into French. All households received a verbal explanation of the survey. Households were informed that the survey was confidential and that their answers would not affect food distributions. Participation was voluntary. Households had the right to refuse to answer any or all questions, as well as anthropometric assessments. Household and consent was recorded on each questionnaire. If agreement was given, the team then entered the household sitting area within a tent or hut or outside near the trees. Individuals were able to elect to be measured for anthropometry, but decline to answer questions. All records collected during the survey were considered as confidential and were not stored with name or address identifying data. The questionnaires are stored at the CDC in Atlanta.

Implementation Schedule

The survey team was assembled in Abéché on May 27, 2004. The survey administration started on June 4 and ended on June 18.

Logistics

UNHCR, the United Nations World Food Programme (WFP), WHO, and the Chadian Ministry of Health (MOH) provided transport during training and survey periods. The UNHCR and WFP Abéché provided training venue and accommodation for the team during the training. The UNHCR suboffices in Iriba, Guéréda, and Abéché provided accommodations for the survey teams.

Data Analysis

Data were entered and stored in three separate data files. Individual interviewed during the survey were each assigned a unique ID number based on their cluster, location, and household number. Data were entered into Epi Info version 6.0⁴. The analysis was performed on records excluding out-of-range values identified using the standard Epi Info flag criteria. The chi-square test was used to test difference in percentages and the t-test for differences between means. A p-value <0.05 was considered to be statistically significant. Analysis variables were created in SAS version 9 and Epi Info 6.0⁵. Sample weights were constructed using the inverse probability of selecting a family or household within each camp and frontier settlement. Analyses were done using the SUDAAN (version 8.02) software to take into account the complex sample design of the camp and frontier surveys⁶. SAS version 9.0 and Epi Info 6.0 were used to analyze data from the village survey.

Survey I: Bahai and Cariari Refugee Frontier Settlements

⁴ Dean, AG., Dean DA, et al. Epi Info Version 6 a word processing database and statistics program for public health. Centers for Disease Control and Prevention, Atlanta, GA

⁵ SAS. SAS Institute Inc. Cary, NC

⁶ SUDAAN Release 8.02, January 2003, Research Triangle Institute, Research Triangle Park, NC

Background

Following a major Sudanese refugee influx during January 2004, IRC conducted a census of the study population in April. This census reported a total of 8,620 Sudanese refugees for the Bahai area and 8,140 for the Cariari area. These figures are less than the combined population of about 25,000 reported by UNHCR, but are believed to be more accurate.

Both populations were distributed along the length of Quaddi Howa, a dry riverbed that forms a physical border with Sudan for much of this area. In such an arid landscape, this is the only place where a few acacia trees and bushes offer some shade from the scorching sun with temperatures reaching up to 115 degrees Fahrenheit. In addition to the lack of shelter, the lack of safe drinking water and irregular food distribution were expected to have greatly influenced the health status of the refugees. Relocation of refugees from both areas to the site of Oure Cassoni was planned for early July 2004.

Methodology

Sample Size Calculation

The sample size of 375 children aged 6–59 months of age was calculated on the basis of achieving a 95% confidence interval of ± 5 percentage points around an estimated prevalence rate for global acute malnutrition of 25% and a design effect of 1.5. Given an average of 1.5 children aged 6–59 months per household, 250 households would be required. Allowing for a 90% response rate of households, the survey eventually targeted 263 households. The sample was proportionally allocated based on population size to each of the refugee settlements.

Sampling Methodology

Because registration lists were available for the two frontier settlements, data for this survey were obtained through systematic random sampling. The number of households chosen was proportionate to population size for both camps (Table 5). Thirteen community health workers employed by IRC assisted with family selection and identification.

Table 5. Population Estimate for Bahai and Cariari Refugee Frontier Settlements Based on the IRC Census; Estimated Number of Children < 5 years; Number of Households Surveyed and Number of Children Surveyed, Chad, June 2004

Camp	Approximate population	Population < 5 years (estimated)	Number of households surveyed	Number < 5 years surveyed
Bahai	8,620	1,465	136	222
Cariari	8,143	1,384	127	201
TOTAL	16,763	2,849	263	423

Results

The survey team successfully completed 263 household interviews that included information on 423 children aged 6–59 months. The nonresponse rate was only 1% (three families had moved and could not be located).

The average household size was 6.0 (range 2–13), with 1.6 children 6–59 months of age per household. All households had been displaced from Sudan and had resided in the area for an average of 4.6 months (range 1–6 months) (95% CI, 4.5–4.8). There is a significant difference ($p < 0.0001$) in the mean duration of residence between the settlements of Bahai and Cariari (4.3 and 5.0 months, respectively). Most interviews (97%) were conducted with the female head of household, usually the mother (Table 6).

The most common source of water for households was traditional wells (68.3%; 95% CI, 64.7–71.9), followed by water from a river or pond (28.5%; 95% CI, 24.8–32.2). The reported average time spent collecting water (for the last time the household collected water) was 5.6 hours (95% CI, 5.3–6.0). There was a significant difference ($p < 0.0001$) in mean time spent collecting water between Bahai and Cariari, (7.6 and 3.1 hours, respectively).

Sixty-seven percent of all households had collected water the day before the survey interview; 30% had collected water on the same day as the interview. There were no differences between the settlements in the time since the last water collection. Most households (72.3%; 95% CI, 66.9–77.7) had a container of sorts in which to store water; the volume of these receptacles was not recorded. Although hygiene practice was not measured, 14.7% (95% CI, 10.3–19.0) of the refugees reported having soap in the household. Access to latrines was minimal, with only 0.9% (95% CI, 0.0–1.8) of households reporting use of latrines. Most of the refugees lived without any type of shelter (98.5%; 95% CI, 97.1–100.0) (Table 5).

Table 6. Characteristics of Households in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Characteristic	Percent (95% CI)
Households*	
Bahai	51.7
Cariari	48.3
Shelter	
Plastic sheeting	0.4 (0.0–1.2)
Hut	1.0 (0.0–2.2)
No shelter/living under trees	98.5 (97.1–100.0)
Soap in the house	
Yes	14.7 (10.3–19.0)
No	85.3 (81.0–89.7)
Water source	
Traditional well	68.3 (64.7–71.9)
River, open water, dam	28.5 (24.8–32.2)
Hand pump	0.4 (0–1.2)
Water collection time, roundtrip	
1 hours	6.4 (3.6–9.2)
2–4 hours	42.0 (37.0–47.0)
5–6 hours	15.8 (11.4–20.3)
7–10 hours	26.7 (21.9–31.4)
≥11 hours	9.1 (5.6–12.6)
Last time collected water	
Today	29.5 (23.9–35.1)
Yesterday	67.3 (61.6–73.1)
More than 2 days	3.1 (1.0–5.3)
Vessel for water storage	
Yes	72.3 (66.9–77.7)
No	27.7 (22.3–33.1)
Latrine	
Yes	0.8 (0.0–1.8)
No	99.2 (98.2–100.3)

* Unweighted

Child nutrition

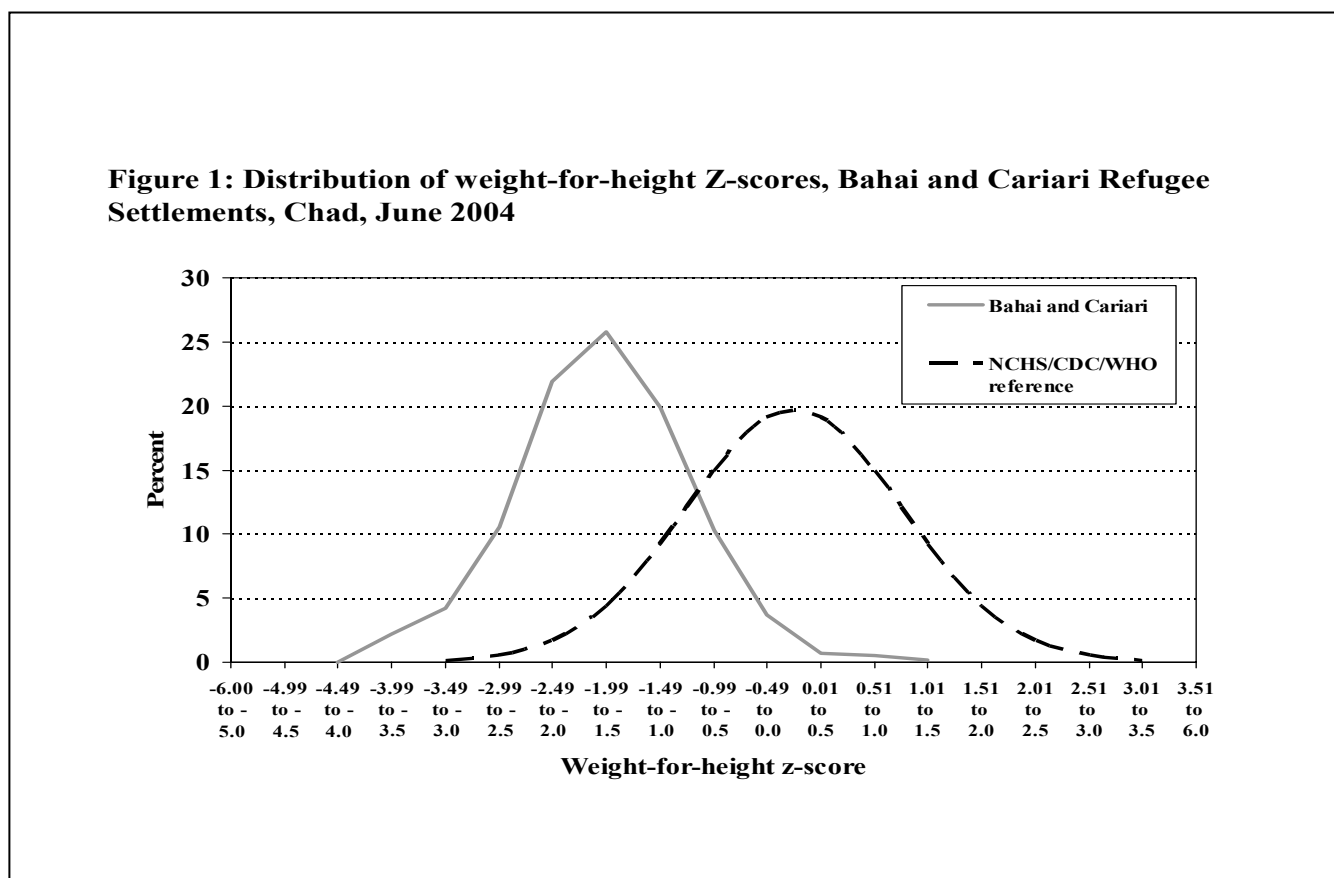
Acute Malnutrition

A total of 416 children were weighed and measured. The prevalence of global acute malnutrition (GAM) was 39.2%; the prevalence of severe acute malnutrition (SAM) was 6.4% (see Table 7). There were no cases of edema identified among the children living in the refugee frontier settlements. The distribution of weight-for-height z-scores among children aged 6–59 months in the refugee camps is shifted to the left when compared to the reference population (see Figure 1).

Table 7. Prevalence of Acute and Severe Malnutrition by Weight for Height Z-Scores in Children 6–59 Months of Age, Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Weight-for-height*	Number (%)	95% Confidence interval
Global Acute Malnutrition	163 (39.2)	34.3–44.2
Severe Acute Malnutrition	27 (6.4)	4.0–8.8

*see text for definition



The age group 24–59 months had the highest proportion of malnourished children (65%; 95% CI, 61.8–69.1), followed by children aged 12–23 months (26.6%; 95% CI, 19.6–33.5). The highest prevalence of malnutrition was found among children aged 12–23 months (57.3%; 95% CI, 45.6–69.0) (see Table 8). Note, however, that age determination was extremely difficult in this population.

Table 8. Age Distribution of Acute Malnutrition (Weight-for-Height: < -2 Z-Scores) in Children 6–59 Months of Age in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Age Category	Acute malnutrition (WHZ < -2) Number (%) (95% CI)
6–11 months	13 (8.0) (3.4–12.5)
12–23 months	43 (26.6) (19.6–33.5)
24–59 months	107 (65.4) (58.2–72.7)

The prevalence of global acute malnutrition did not differ significantly by sex: 44.0% (95% CI, 36.7–51.2) and 34.7% (95% CI, 28.4–41.0) for boys and girls, respectively. However, the surveys did reveal a difference in the prevalence of severe malnutrition by sex ($p < 0.0015$): 10.2 % (95% CI, 6.0–14.4) and 2.7% (95% CI, 0.6–4.7) for boys and girls, respectively.

Mortality

The reported crude mortality rate for the period covered in the survey (November 7, 2003 through June 10, 2004) was 0.62 deaths per 10,000 population per day). The crude mortality rate, including the missing, was 1.07 deaths per 10,000 population per day. However, the cause of death for the missing was not included in the cause of death calculation. The age-specific mortality rate for children less than 5 years of age was 0.44 deaths per 10,000 population per day (Table 9).

Table 9. Crude Mortality Rate and Age-Specific Mortality Rate and Main Cause of Death in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Mortality	Deaths/10,000/day; (95% CI)
Crude mortality rate*	0.62 (0.53–0.70)
Crude mortality rate, including missing [†]	1.07 (0.96–1.18)
Mortality rate for children younger than 5 years	0.44 (0.31–0.57)
Main Cause of Death excludes missing	
For children older than 5 years: war-related	46.4 % (95% CI, 26.2–66.1)

* A crude mortality rate of greater than one death per 10,000 persons per day and/or an under 5 years of age mortality rate greater than two deaths per 10,000 per day indicate that a relief program is a very serious situation and that relief efforts need to be urgently mobilized (*Handbook for Emergencies United Nations High Commissioner for Refugees, Second Edition*).

[†] Individuals were classified as missing if family members reported that they did not know where they were.

Child Health and Measles Vaccination Coverage

Breastfeeding

Mothers were asked if they had breastfed their child (<24 months) within the past 24 hours; 88.4% (95% CI, 81.7–95.0) responded “yes.” Of those mother’s who reported breastfeeding, 74.6% (95% CI, 65.4–83.7) stated that they had given that child other liquid foods, such as water or tea (38.2%; 95% CI, 26.2–50.2) or had given their child solid food (49.1%; 95% CI, 36.8–61.4). Mothers less frequently reported giving animal milk as a supplement (2.5%; 95% CI, 0–6.0).

Childhood Morbidity

Mothers reported that one-third of children (35.1%; 95% CI, 30.1–40.0) had diarrhea in the 2 weeks before the interview. Of those children, 31.5% were reported as having bloody diarrhea (Table 10). The prevalence of diarrhea in those children who were acutely malnourished was 44.7% (95% CI, 36.4–53.1) and of the severely malnourished 64.6% (95% CI, 45.3–83.9) had diarrhea in the previous 2 weeks. The difference between malnourished children with diarrhea and children not malnourished with diarrhea was statistically significant ($p < 0.0026$). Slightly more than half of all children (50.6%) were reported as having acute respiratory infection (ARI) in the 2 weeks before the interview. The prevalence of ARI was reported in 57.7% (95% CI, 49.4–66.0) and 66.0% (95% CI, 46.2–85.8) of all children with acute and severe malnutrition, respectively.

Table 10. Reported Illness During the Last 2 Weeks in Children 6–59 Months of Age in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Illness	Percent (95% CI)
Diarrhea	35.1 (30.1–40.0)
Bloody diarrhea	31.5 (23.4–39.6)
Acute respiratory infection	50.6 (45.1–56.2)

Coverage With Measles Vaccine and Vitamin A Supplementation

The proportion of children aged 6–59 months of age vaccinated against measles within 6 months before the survey was 23.9% (by card or history) (95% CI, 19.0–28.8). Vitamin A supplementation during the same period was reported for 38.4% of children in the same age group (Table 11). Some cards had only documented vitamin A, but not measles vaccine.

Table 11. Measles Vaccination and Vitamin A Supplementation Status Among Children 6–59 Months of Age, in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

	Percent (95% CI)
Measles	
Yes with card	19.3 (14.6–23.9)
Yes without card	4.6 (2.3–7.0)
No	76.1 (71.2–81.0)
Vitamin A	
Yes	38.4 (32.0–44.7)
No	61.6 (55.3–68.0)

Food and Livelihoods

Food Consumption and Production

Eighty-two percent (95 % CI, 77.1–86.5) of households reported that sorghum was their primary food source at the time of the survey. This compares to 2.4% (95% CI, 0.5–4.2) for a normal year. For a typical year, 95% (95% CI, 92.3–97.7) reported that millet would be the primary source of food, whereas only 6% (95% CI, 2.9–8.7) reported millet as the primary source during the survey. Most households (93%; 95% CI, 90.2–96.1) reported that they would typically consume wild foods such as Mukhet (a type of seed picked from trees) during this time of year. However, only 15% (95% CI, 10.5–18.7) of households were currently consuming wild foods.

Targeting of Food Rations

During the month of June, 88.8% (95% CI, 84.9–92.7) of households reported receiving some type of food aid. The number of households receiving a ration changed during February and April, (24.8% and 71.7%). In April, 72% (95% CI, 66.2–77.1) of households reported receiving a ration, but that number significantly declined in May to 8.7% (95% CI, 5.2–12.3).

During the last distribution, the most common food items received by households were wheat (87.4%; 95% CI, 83.3–91.5), oil (99.2%; 95% CI, 98.1–100), and beans (97.4%; 95% CI, 95.3–99.4).

Of those households that received a ration in the month of June, 70.6% (95% CI, 65.0–76.2) reported that the ration was consumed entirely within the household. Among those households not entirely consuming the ration, all families reported sharing their ration with other families or neighbors; 3.4% (95% CI, 0.0–7.9) also reported selling part of the ration. Most families were able to cook food in pots at home (92.4%; 95% CI, 89.1–95.7), using branches for fuel.

Table 12. Ration Estimates for Latest Food Distribution in Bahai and Cariari Refugee Frontier Settlements, Chad, June 2004

Ration Content	Daily ration g/person/day	Energy Kcal	Protein grams	Fat grams
Sorghum	404	1,341	44.4	13.3
Beans	52	174	11.4	0.8
Vegetable oil (vitamin A fortified)	30	262	0.0	29.6
Total ration	486	1,777	55.9	43.7
Minimum requirements ⁷		2,100	52.5	40.0
Percentage supplied by the ration		85%	106%	109%

The average size of the ration was 37.7 kg wheat, 4.7 kg beans, and 2.7 liters of vegetable oil in the last distribution. The average family size was six persons, resulting in a mean ration size of 6.2 kg of wheat, 783 g of beans, and 450 milliliters (mL) of vegetable oil per person.

Calculations are based upon self-reports of the quantity of the specific commodity received during the last distribution. Nutritional values and content were analyzed using NutVal 2003 ration planning and calculating sheets developed by UNHCR, Geneva, and the Institute of Child Health, London.

MUAC measurements among pregnant women

MUAC was used to assess nutritional status among women who reported that they were pregnant at the time of the survey. MUAC measurements ranged from 20.3 to 30.3 mL. The mean was 24.6 (95% CI, 23.6–25.6). Only one pregnant woman was classified with moderate malnutrition.

Survey II: Iridimi, Touloum, and Kounoungo Refugee Camps

Background

The refugee camps of Iridimi, Touloum, and Kounoungo were selected because these camps were expected to have the most significant burden of malnutrition on the border. Two of the camps, Iridimi and Touloum, were located in the north Biltene region. The Kounoungo camp was located in the central region. We also included a sample of households in spontaneous settlements around the camp of Touloum.

The camps were first opened from February to March, 2004 and registered refugees were transferred from the border area. However, some camps had spontaneous settlements of registered and non-registered households surrounding or within the camp. Some camps had spontaneous settlements of registered and non-registered households surrounding or within the camp. The camp shelters varied from tents, plastic sheeting, or in some settings, blankets and sheets covering and surrounding trees. The organization of the camps varied from rows of tents to sporadic settlements in a distinct area. Data were collected between June 3 and 18, 2004.

⁷ The requirement for 2,100 kcal per person per day was established by the WFP/UNHCR Joint Assessment Mission, February 2002.

Methodology

The household was the primary sampling unit in Kounoungo and Touloum and the secondary sampling unit in Iridimi. A household was defined as any group of people who live under the same structure and shared household resources, such as food. Members of a household were not necessarily relatives by blood or marriage. For polygamous houses, only those individuals living within the physical structure selected were interviewed. If no one was at home at a selected house, a neighbor was consulted regarding the whereabouts of the household. If the members had departed permanently or would not return, the household was skipped and replaced. If there were children under 5 years of age who were missing from the household, the household was visited at least twice to gather data on the children under 5 years of age. All children who were currently enrolled in a therapeutic feeding center (TFC) were evaluated at the center.

The sample size of approximately 400 children, ages 6–59 months, was calculated on the basis of achieving a 95% confidence interval of ± 5 percentage points around an estimated prevalence rate for global acute malnutrition of 25% and a design effect of 1.5. Given a household average of 1.5 children, ages 6–59 months, 267 households would be required. Allowing for a response rate of 90%, the survey eventually targeted 297 households. The sample was originally proportionally allocated to each camp based on the total population size.

Population estimates and the actual number of households and person included in the survey sample are shown in Table 13. A total of 293 households and 424 children less than 5 years of age were surveyed. Data were collected in three north and central refugee camps in Chad between June 3 and 18, 2004.

Table 13. Population Estimate for Three Refugee Camps Based on the UNHCR Census; Estimated Number of Children < 5 years; Number of Households and Children Sampled

Camp	Approximate population	Population < 5 years	Number of households surveyed	Number < 5 years surveyed
Iridimi	13,319	2,264	110	151
Touloum	17,727	3,013	133	219
Kounoungo	8,271	1,406	50	54
Total			293	424

Iridimi

The sample size for Iridimi camp was calculated using UNHCR statistics on the population as of May 2004, of 13,319 persons. The houses within Iridimi were sampled using a stratified two-stage cluster design. Iridimi was organized into 12 groups named for the Sudanese villages of origin. These groups had distinct placards at the front of the group, and the households were sporadically located within the group. Clusters were created within each group of approximately 40 households. A total of 25 clusters were allocated across the 12 groups using probability proportional to the group size. Within each cluster, 1-in-10 households were selected using systematic sampling with a random start.

Touloum

Emergency Nutrition and Mortality Surveys Conducted among Sudanese Refugees and Chadian Villagers, Northeast Chad, June 2004

The camp of Touloum was organized into approximately equal size areas of blocs of A-S (10 clusters per bloc, eight tents per cluster, 17,727 persons). Surrounding the camp were spontaneous settlements awaiting organization into the camp. In addition, 40 households in spontaneous settlements surrounding Touloum were selected, but were not included in the final data analysis. We conducted systematic sampling and surveyed seven households (every 10th household) per bloc, for a total of 133 households.

Kounoungo

The camp of Kounoungo was organized into rows of tents and distinct groups. The sample size of 50 households in Kounoungo camp was calculated using UNHCR statistics on the population as of May 2004, of 8,271 persons. We conducted systematic sampling of the camp of Kounoungo.

Results

The survey team successfully completed 293 household interviews that included information on 430 children aged 6–59 months.

Anthropometric data was collected on 421 children aged 6–59 months of age, of whom 198 (47.0%) were male and 223 (52.9%) were female.

The range in refugee family size was 1–14 persons, with a median of six household members. All households had been displaced from Sudan and had resided in the area for an average of 3.6 months (range 1–6 months; 95% CI, 3.4–3.8). The mean duration of residence differed significantly ($p < 0.0001$) between the three camps. Most interviews (85.7%) were conducted with the female head of household, usually the mother.

The most common source of water for households was from distributed water (99.7%; 95% CI, 99.1–100.0). The reported average time spent collecting water (for the last time the household collected water) was 2.1 hours (95% CI, 2.0–2.2). The mean time spent collecting water differed significantly ($p < 0.0001$) between Touloum (2.5 hours) and Kounoungo (1.1 hours), and Kounoungo and Iridimi (2.3) hours.

About 53% (95% CI, 48.6–56.8) of households had collected water on the same day as the interview; 43.7% (CI 95%, 38.8–48.6) of all households had collected water the day before the interview. There were no differences between the camps in the time since the last water collection. Most households (91.5%; 95% CI, 86.5–96.6) had a container to store water. Fourteen percent (95% CI, 6.0–21.1) of households reported having soap for household use. Although refugees were registered in the camp, 67.4% (95% CI, 56.3–78.5) of households reported that most household members used the brush as a latrine. Most households had a tent or plastic sheeting for shelter (Table 14).

Table 14. Characteristics of Households in Iridimi, Touloum and Kounoungo Refugee Camps Chad, June 2004

Characteristic		Percent (95% CI)
Households		
	Iridimi	110 (NA)
	Touloum	133 (NA)
	Kounoungo	50 (NA)
Shelter		
	Tent	63.5 (58.3–68.6)
	Plastic Sheeting	36.5 (31.4–41.7)
Soap in the house		
	Yes	13.6 (6.0–21.1)
	No	86.4 (78.9–94.0)
Water source		
	Water bladder with tap	99.7 (99.1–100)
	Hand pump	0.3 (0.0–0.9)
Water collection time, roundtrip		
	1 hours	46.4 (38.0–54.8)
	2-4 hours	45.6 (35.7–55.4)
	5-6 hours	7.4 (4.1–10.8)
	7-10 hours	0.6 (0.6–0.7)
Last time collected water		
	Today	52.7 (48.6–56.8)
	Yesterday	43.7 (38.8–48.6)
	More than 2 days	3.6 (1.7–5.5)
Vessel for water storage		
	Yes	91.5 (86.5–96.6)
	No	8.5 (3.4–13.5)
Latrine		
	Yes	32.6 (21.5–43.7)
	No	67.4 (56.3–78.5)

Child Nutrition

Acute Malnutrition

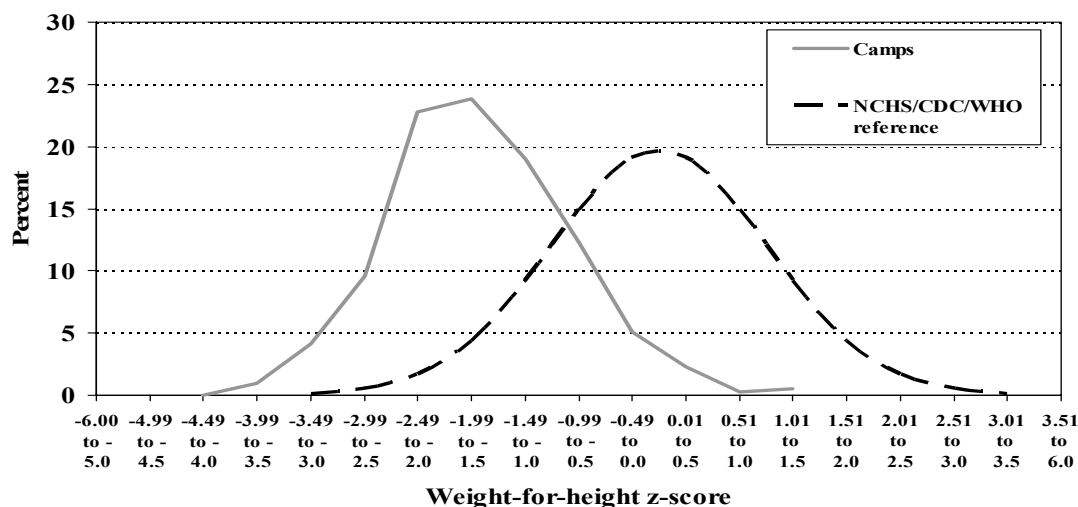
A total of 421 children were weighed and measured. The prevalence of GAM was 35.6% (95% CI, 30.9–40.3); the prevalence of SAM was 5.5% (95% CI, 3.1–7.9) (see Table 15). There were two cases of edema identified among the children included in the survey. The distribution of weight-for-height z-scores among children ages 6–59 months in the three camps is shifted to the left when compared to the reference population (see Figure 2).

Table 15. Prevalence of Acute and Severe Malnutrition by Weight-for-Height Z-Scores in Children 6–59 Months of Age, Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Weight-for-height*	Number (%)	95% Confidence interval
Global Acute Malnutrition	152 (35.6)	(30.9–40.3)
Severe Acute Malnutrition	24 (5.5)	(3.1–7.9)

*see text for definition

Figure 2: Distribution of Weight-for-height Z-scores, Iridimi, Kounoungo and Touloum Refugee Camps, Chad, June 2004



The age group 24–59 months had the highest proportion of malnourished children (63%), followed by children aged 12–23 months (26%) (Table 16). An almost equal prevalence of malnutrition was found among children aged 6–11 months and 12–23 months, 50% (95% CI, 33.2–66.8) and 49.4% (95% CI, 37.0–61.9), respectively.

Table 16. Age Distribution of Acute Malnutrition in Children 6–59 Months of Age in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Age category	Acute malnutrition (WHZ < -2) Percent (95% CI)
6–11 months	11.6 (6.3–16.8)
12–23 months	25.6 (16.6–34.7)
24–59 months	62.8 (54.4–71.2)

The data revealed a significant difference ($p < 0.0005$) in the prevalence of global acute malnutrition by sex, which was 25.5% (95% CI, 19.0–32.1) and 45.0% (95% CI, 37.8–52.1) for boys and girls, respectively. The prevalence of severe malnutrition also differed significantly by sex ($p < 0.0085$): 2.8% (95% CI, 0.4–5.3) and 8.0% (95% CI, 4.5–11.4) for boys and girls, respectively.

Mortality

The reported crude mortality rate for the period covered in the survey (November 7, 2003 through June 10, 2004) was 1.56 deaths per 10,000 population per day (95% CI, 1.44–1.67). The crude mortality rate, including the missing, was 2.57 deaths per 10,000 population per day (95% CI, 2.42–2.71). The age-specific mortality rate for children less than 5 years of age was 1.46 deaths per 10,000 population per day (95% CI, 1.30–1.62). When missing children less than 5 years were included, the rate increased slightly to 1.64 (95% CI, 1.47–1.81) (Table 14). The main causes of death reported for children older than 5 years of age not including the missing was war-related (64.1%; 95% CI, 47.7–80.4). Diarrhea was the main cause of death for children younger than 5 years of age not including the missing (36.6%; 95% CI, 7.7–65.0). The CI was large, however (see Table 17).

Table 17. Crude Mortality Rate and Age-Specific Mortality Rate and Main Cause of Death for Children >5 and <5 Years in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Mortality	Deaths/10,000/day (95% CI)
Crude mortality rate*	1.56 (1.44–1.67)
Crude mortality rate, including missing†	2.57 (2.42–2.71)
Mortality rate for children <5 Years	1.46 (1.30–1.62)
Mortality rate for children <5 Years, including missing	1.64 (1.47–1.81)
Main Cause of Death excludes missing	(95% CI)
—For children older than 5 years: war-related	64.1% (47.7–80.4)
—For children younger than 5 years: diarrhea	47.8% (7.7–65.0)

* A crude mortality rate of greater than one death per 10,000 persons per day and/or an under 5 years of age mortality rate greater than two deaths per 10,000 per day indicate that a relief program is a very serious situation and that relief efforts need to be urgently mobilized (*Handbook for Emergencies United Nations High Commissioner for Refugees*, Second Edition).

† Individuals were classified as missing if family members reported that they did not know where to find them.

Child Health and Measles Vaccination Coverage

Breastfeeding

Mothers were asked if they had breastfed their child within the past 24 hours; 26.9% (95% CI, 22.9–30.9) responded “yes.” Of those mother’s who reported breastfeeding, 80.4% (95% CI, 71.3–89.6) most frequently stated that they had given that child other liquid foods such as water or tea (89.1%; 95% CI,

81.5–96.7) or had given their child solid food (70.1%; 95% CI, 59.8–80.4). Mothers less frequently reported giving animal milk as a supplement (3.31%; 95% CI, 0–6.9).

Childhood Morbidity

Table 18 shows mothers reported that more than one-half of children (58.2%) had diarrhea in the 2 weeks before the interview. Of those children, 36.8% were reported as having bloody diarrhea. The prevalence of diarrhea in those children who were acutely malnourished was 70.8%. Among the severely malnourished children, 85.9% had diarrhea in the previous 2 weeks. The difference between malnourished children with diarrhea and children not malnourished with diarrhea was statistically significant ($p < 0.0001$). Almost 73% of all children were reported as having ARI within the 2 weeks before the interview. ARI was reported in 75.1% (95% CI, 67.8–82.4) and 91.9% (95% CI, 80.9–100) of all children with acute and severe malnutrition, respectively.

Table 18. Reported Illness During the Last 2 Weeks in Children 6–59 Months of Age in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

Illness	Percent (95% CI)
Diarrhea	58.2 (53.1–63.3)
Bloody diarrhea	36.8 (29.7–43.9)
Acute respiratory infection	72.5 (67.8–77.1)

Coverage With Measles Vaccine and Vitamin A Supplementation

The proportion of children aged 6–59 months of age vaccinated against measles within 6 months before the survey was 83.1% by card or history (95% CI, 78.2–88.1). Vitamin A supplementation during the same period was reported for 61.1% of children in the same age group (Table 19).

Table 19. Measles Vaccination and Vitamin A Supplementation among Children 6–59 Months of Age, in Iridimi, Touloum, and Kounoungo Refugee Camps, Chad, June 2004

	Percent (95% CI)
Measles	
Yes with card	49.4 (41.5–57.4)
Yes without card	33.7 (26.9–40.5)
No	16.9 (11.9–21.8)
Vitamin A	
Yes	61.1 (54.6–67.6)
No	38.9 (32.4–45.4)

Food and Livelihoods

Food Consumption and Production

Information on food distribution varied by camp. In general, wheat was reported by households in the camps as their primary food at the time of the survey (48%; 95% CI, 44.0–52.4). Sorghum was the next most common food (36.8%; 95% CI, 30.4–43.2).

In a typical year, 97.1% (95% CI, 94.4–99.7) of surveyed households reported that millet would be the primary source of food; no one reported millet as the primary source during the survey. Most households (86.4%; 95% CI, 79.4–93.3) reported that they would typically consume wild foods during this time of year, but only two (0.8%; 95% CI, 0–1.1) households surveyed were currently consuming wild foods.

The number of households whose own food production served as the primary source of food decreased from 251 (82.2%; 95% CI, 79.0–85.5) last year to two (0.8%; 95% CI, 0.3–1.9) over the 4 weeks before the survey. Most households (99.4%; n=289; 95% CI, 99.3–99.4) had received food rations in the last 6 months.

Targeting of Food Rations

During May, 98.3% (95% CI, 97.0–99.5) of households reported receiving some type of food aid. The number of households receiving a ration increased in March and April (65.9%; 95% CI, 58.2–73.6 and 91.8%; 95% CI, 88.9–94.7; respectively). The ration reported by households declined, however, in the most recent food distribution conducted in June (54.8%; 95% CI, 39.2–70.4).

During the last distribution received by households, wheat, corn soy blend, beans, and vegetable oil were the most common items received, 33.8% (95% CI, 18.1–49.5), 86.1 (95% CI, 67.9–100), 92.2% (95% CI, 88.7–95.8), and 99.0% (95% CI, 97.7–100.0), respectively.

Of those households that received a ration in the month of June, most reported that the entire ration was not consumed by the household (69.5%; 95% CI, 61.1–77.8). Among those households not entirely consuming the ration, 17.2% (95% CI, 10.6–23.9) reported selling part of the ration. Almost all families were able to cook food at home (91.7%; 95% CI, 90.0–93.5).

MUAC Measurements Among Pregnant Women

Among pregnant women in this survey MUAC measurements ranged from 20.9–31.0 mL, with a mean of 25.8 mL (95% CI, 25.2–26.4). Only one pregnant woman was classified with moderate malnutrition.

Results for Spontaneous Refugee Settlements Near Touloum Camp

Estimates of the number of households in the spontaneous settlements around the camp of Touloum were less precise. The survey team conducted sampling separately from the camp for this reason. From available information and visual inspection, spontaneous settlements surrounding the camp contained about 400 households. Spontaneous settlements around the camp of Touloum were considered a separate sampling framework because the population estimates and organization were different from the camp. The survey team evaluated the spontaneous settlements and described six clusters. We conducted a convenience sample of random households relative to the approximate size of the cluster. The sample size of spontaneous settlements was 40 households. The systematic sampling included every 10th household for a total of 40 households and 65 children younger than 5 years. The spontaneous settlements are considered a subsample of the population of refugees who have arrived around the camps without having been registered by UNHCR. For this reason, they may be vulnerable because they have less access to food, shelter, and water. For these reasons, analysis of the data collected on this group is conducted separately and limited to the main variables of interest.

Forty households in settlements surrounding Touloum were randomly sampled. All households used no latrine (outdoors) and 15% of the households had no covering (no tents were used outside the camp). The

households had been living at the location for 1-4 months (median 2 months). The median time to obtain distributed food was 6 hours. Eighty percent of households had received distributed food and 13% had shared their food distribution with family or neighbors. There were 65 children under the age of 5 years in these 40 households. Thirty-nine percent of the children under 5 years had not had measles immunization in the last 6 months, and 43% had not received vitamin A supplementation. Sixty-two percent of the children had diarrhea and 10% of those with diarrhea had bloody diarrhea. Seventy-two percent of the children had fever or respiratory symptoms in the last 2 weeks. By weight-for-height z-score, 21 (32%) of the children under 5 years had global acute malnutrition and four (6%) had severe acute malnutrition.

Survey III: Nutrition and Health Assessment in Villages Near Refugee Sites

Background

Little is known about the nutrition and health status of local Chadian communities near refugee camps and spontaneous settlements. Because of frequent interactions between villagers and refugees, the influx of large numbers of refugees to multiple areas in the country has raised questions regarding the possible health and nutrition impact on the local villages. However, to understand the health effects on the villages related to refugee migration, a preliminary assessment of the nutrition and health status in select villages near camps or settlements was needed.

Objectives

Among the general village population

- Define the demographics of the selected village population
- Estimate the prevalence of iodized salt in the households
- Estimate the prevalence of mosquito netting use
- Assess general health and hygiene conditions (i.e., soap use, toilet facilities)
- Gather preliminary information regarding the relations between villagers and refugees

Among children ages 6 months through 59 months

- Estimate the prevalence of malnutrition in children
- Estimate the prevalence of measles vaccination coverage
- Estimate the prevalence of vitamin A supplementation
- Estimate the rate of children with diarrhea and acute respiratory infections during the preceding 2 weeks

Methodology

Villages were selected based on accessibility and proximity to two refugee camps (Iridimi and Touloum), and one refugee frontier settlement (Bahai). These villages were estimated to be within 15 km from the refugee sites and had been visited by refugees, according to anecdotal report. The following four villages near Touloum Camp were surveyed: Touloum Center, Iriani Sounadanga, Iriani Togrobé, and Iriani Koulbé. The following five villages near Iridimi Camp were surveyed: Gourfou Tine-Tine, Tiné Arso, Iridimi, Erikidi Kedibé, and Ouriba Marché. For the frontier refugee settlement, households in Bahai and the neighboring village of Narakma were selected (Table 20).

Table 20. Selected local Chadian Villages Near Refugee Camps and Spontaneous Settlements, Chad, June 2004.

Location	Number of households surveyed (%)
A. Touloum Area	
Touloum Center	13 (11)
Iriani Sounadanga	9 (8)
Iriani Koumbé	8 (7)
Iriani Togrobé	5 (4)
B. Iridimi Area	
Iridimi	14 (12)
Ouriba Marché*	13 (11)
Gourfou Tine-Tine	10 (9)
Erikidi Kedibé	9 (8)
Tiné Arso	7 (6)
C. Bahai Area	
Narakma	19 (17)
Bahai*	8 (7)
Total	115 (100)

* Denotes large village where convenience sampling was conducted

Sample sizes were not calculated because population estimates and basic village demographics were not available. Thus, the survey strategy was inclusion of all households within small villages (i.e. village of < 20 households), and a convenience sample within the larger villages. All households were surveyed in nine small villages; convenience samples of households were obtained in the two large villages (Ouriba Marché and Bahai). Because of time constraints, no additional attempts to locate absent household members or children were made after the first visit. A household was defined as all persons sharing the same living space and household resources. A sample size of 115 households and 175 children (6–59 months) was achieved.

A standardized questionnaire modified from the version used in the camps and frontier sites was used in the village interviews (see Appendix C for a one-page modified questionnaire). Questions in the original camp/frontier questionnaire regarding water storage, shelter type, food distributions, and the ability to cook at home were omitted in the village questionnaire. Questions concerning sharing water and food with refugees, type of relationship with refugees, occupation, and mosquito net use were added to the village questionnaire. All additional questions (except those regarding sharing water and food, and type of relationship with refugees) were adapted from Senegal Demographic and Health Surveys questions⁸. In addition, cooking salt in each household was tested for iodine using standard MBI kits with the acceptable threshold defined at 15 ppm provided by the Ministry of Health-Chad and UNICEF.

⁸ Demographic and Health Survey, Senegal 2003. Macro International 1997.
Emergency Nutrition and Mortality Surveys Conducted among Sudanese Refugees and Chadian Villagers, Northeast Chad, June 2004

All children in each participating household within the ages of 6 months through 59 months were weighed and measured in the standard fashion. Children who met the criteria for moderate and severe malnutrition (<80% of the median) were referred to the nearest community health center or therapeutic feeding center for further evaluation and treatment usually by a family member or other person in the village (such as the chief) with a vehicle. Results were recorded immediately on the data collection form, which used only unique identification numbers for each household. Data collection began on June 4, 2004 and ended on June 12, 2004.

Results

Household Demographics

Team members surveyed 115 households in 11 villages. The average number of persons per household was 6.5, with a range of 2–15. Most households (78.9%) contained only one family. Most interviews were conducted with female members of the household (76.5%). The principal occupation for heads of households was either agriculture or animal husbandry, or both (78.9%). Other occupations included commerce, military/government service, and chauffeuring.

The most common source of water for households was from traditional wells (59.1%), followed by constructed wells (27.8%). The median reported time to collect water was 3 hours currently and 2 hours at this same time last year. Mosquito net use was reported in 61.6% of households. Non-iodized salt was found through testing in 94.8% of households (Table 21). Millet was the most common base food (97.4%) consumed during the last 4 weeks. This was unchanged from previous years. However, the percentage of households currently consuming wild foods decreased from reported previous consumption (from 34.2% to 5.3%) (see Table 22).

Table 21. Primary Water Source, Type of Latrine, Access to Soap, Mosquito Net Use, and Testing of Iodized Salt, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Characteristic	Number (%)
Water source (n=115):	68 (59.1)
Open well	32 (27.8)
Closed/constructed well	9 (7.8)
Pump	6 (5.2)
Other	3 (2.6)
Time needed to collect water now (median hours)	3 (range 1–15)
Time needed to collect water last year (median hours)	2 (range 1–12)
Type of toilet facility used by members of household (n=114):	72 (63.2)
Latrine	42 (36.8)
Field/bush	
Access to soap (n=115):	95 (82.6)
Soap currently in house	20 (17.4)
No soap currently in house	
Use of mosquito net (n=112):	69 (61.6)
Testing for iodized salt (n=97):	5 (5.2)
Iodized	92 (94.8)
Non-iodized	

Table 22. Staple Food Consumption Patterns in 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Characteristic	Number (%)
Habitual and current consumption of base food (n=114):	
Type of base food habitually consumed:	
Millet	110 (96.5)
Other	4 (3.5)
Type of base food currently consumed:	111 (97.4)
Millet	3 (2.6)
Other	
Use of alternative food sources:	
Current consumption of wild foods	6 (5.3)
Habitual consumption of wild foods	39 (34.2)

Resource Sharing and Relationship Between Villagers and Refugees

Most households reported sharing the local water source and food with refugees, 77.9% and 87% respectively. The most frequently reported consequences of sharing were increased time required to collect water and insufficient quantities of water and food. Interactions between villagers and refugees extended beyond sharing resources: 62.2% of village households reported “employing” refugees by exchanging food items for work (Table 23).

Table 23. Resource Sharing and Interaction Between Villagers and Refugees, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Characteristic	Number (%)
Share the same water source with refugees (n=113)	88 (77.9)
Consequence of sharing water source with refugees (n=87)	
More time needed to collect water and/or quantity insufficient	82 (94.3)
No change	3 (3.4)
Other	2 (2.3)
Shared food with refugees (n=115)	100 (87.0)
Consequence of sharing food with refugees (n=99)	
Quantity insufficient	78 (78.8)
No change	21 (21.2)
Type of relationship with the refugees (n=111)	
Employer of refugee	69 (62.2)
Charity	28 (25.2)
No relationship	12 (10.8)
Friendship/kinship	2 (1.8)

MUAC measurements among pregnant women

The MUAC findings among women who reported that they were pregnant at the time of the survey ranged from 22.0–28.0 mm, with a mean of 24.7 mm.

Children

One hundred seventy-five children from 6–59 months of age were available for weighing and measuring. The average number of children within this age group per household was 1.52. Sex distribution for the sampled population was 45.9% female and 54.1% male.

Percentage of children vaccinated against measles within the last 6 months documented with a card was 22.5%. Vitamin A supplementation during this same period was reported for 26.6% of children (Table 24).

Table 24. Measles Vaccination and Vitamin A Supplementation among Children 6 to 59 months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

	Number (%)
Measles	
Yes with card	38 (22.6)
Yes without card	15 (8.9)
No	115 (68.5)
Vitamin A	
Yes	45 (26.6)
No	116 (68.6)

Diarrhea, including both bloody and non-bloody types, during the last 2 weeks was reported for 45.8% of children. Bloody diarrhea was reported for 19.2% of children. Respiratory infections (symptoms of difficulty breathing and/or fever) was reported for 59.3% of children (Table 25). The prevalence of diarrhea and ARI among children who were malnourished was 48.2% and 64.3%, respectively.

Table 25. Reported Illness During the Last 2 Weeks in Children 6–59 Months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Illness	Number (%)
Diarrhea	77 (45.8)
Bloody diarrhea	15 (19.2)
Acute respiratory infection	99 (59.3)

For children < 24 months, 76.7% were breastfed within the past day. The majority of children in this same age group (93.9%) received food items other than breast milk (Table 26).

Table 26. Breastfeeding Patterns in 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Characteristic	Number (%)
Child has been breastfed since this time yesterday Age 6–23 months (n=47)	33 (76.7)
Child has consumed other food items than breast milk since this time yesterday Age 6–23 months (n=44)	31 (93.9)
Types of other foods consumed Ages 6–23 months (n=30)	30 (100)
Water, tea, or juice	14 (46.7)
Powdered milk or formula	7 (23.3)
Animal milk	17 (56.7)
Solid food	

Prevalence of Acute Malnutrition

The global acute malnutrition for the village population sampled was 35.0%. Severe acute malnutrition was 3.7% with one case of kwashiorkor (Table 27). The weight-for-height z-scores distribution curve shifted to the left of the normal distribution is shown in Figure 3. The percentage of global acute malnutrition measured among males was 38.6% and 30.7% in females.

Table 27. Prevalence of Acute and Severe Malnutrition by Weight-for-Height Z-Scores in Children 6–59 Months, 11 Chadian Villages, Chad, June 2004

Weight-for-height*	Number (%)
Global Acute Malnutrition	57 (35.0)
Severe Acute Malnutrition	6 (3.7)

*see text for definition

The largest proportion of children with acute malnutrition was 24–59 months (75.4%) and the smallest proportion was 6–11 months (5.3%) (Table 28).

Table 28. Age Distribution of Acute Malnutrition in Children 6–59 Months, 11 Chadian Villages Located Close to Refugees, Chad, June 2004

Age category	Acute malnutrition (WHZ < -2) Number (%)
6–11 months	3 (5.3)
12–23 months	11 (19.3)
24–59 months	43 (75.4)

Discussion

The nutritional status of participants in this study is alarming and must be addressed immediately. There is a dire need for additional therapeutic and supplemental feeding programs. Therapeutic feeding centers (TFCs) at the time of the survey were exceeding operating capacity in terms of physical space and potentially in the number of staff per patient. Additionally, the significant distances between settlements and existing TFCs appear to be a limiting factor for both coverage and sustained attendance by mothers and their children. Newly established TFCs should ideally be housed within or near camps. Community therapeutic care may be appropriate for this situation, potentially reducing the number of defaulters by reducing the time spent at the actual TFC. However, this does not alleviate the need for the initial inpatient treatment associated with phase 1 care and the corresponding facilities required to carry out this urgently required intervention.

Supplemental feeding programs must be established to cope with the one third of children who are moderately malnourished. Without any intervention and an inconsistent and insufficient ration, the nutritional status of these children will continue to deteriorate. Blanket supplementary feeding is recommended for all children under 5 years of age and pregnant and lactating women, as these are the most vulnerable groups. The objective of the blanket supplementary feeding should be to prevent these vulnerable individuals from progressing to a state of malnutrition. Those children already identified as moderately malnourished should be immediately enrolled in supplemental feeding. It is imperative that there be systems in place to ensure that children discharged from TFCs are picked up by the supplemental feeding program.

In conjunction with the establishment of selective feeding programs (therapeutic and supplemental), all efforts to improve the general food ration should be made. World Food Programme estimates in terms of total calories and the self-report of received commodities by refugees fall below the recommended minimum of 2,100 kilocalories per person per day. The survey data show that the ration has neither been consistent in terms of commodities, with corn-soy blend (CSB) missing in recent distributions, nor in the frequency of distributions. The absence of CSB, a micronutrient fortified flour, in the general ration severely limits the micronutrient intake of this population, particularly in riboflavin and vitamin C.

Improving the water and sanitation situation among all populations is essential. In the frontier settlements, the mean reported time required for water collection was almost 6 hours; most households used unsafe water sources, specifically traditional wells and open water sources such as rivers, as their primary drinking water source. Sanitation and hygiene are lacking throughout the frontier settlements, and almost no household has access to latrines. Diseases associated with poor sanitation and hygiene are common. One-third of all children reported diarrheal disease during the previous 2 weeks and a high prevalence of malnourished children reported diarrheal disease. Hand soap distributions and hygiene promotion to reduce diarrheal disease should be implemented and could be combined with the general food distributions.

To compare the results of the current survey with other data on nutritional status in Sudan, the Multiple Indicator Cluster Survey (MICS) conducted by UNICEF in 2000 was assessed. The survey reported 12% of the children were moderately malnourished and another 12% were severely malnourished in the rural north of the country. A prevalence of 12% of wasting was reported in Chad⁹. Although no direct

⁹ Multi Cluster Indicator Survey 1995-2000. Sudan and Chad, UNICEF
Emergency Nutrition and Mortality Surveys Conducted among Sudanese Refugees and Chadian Villagers, Northeast Chad, June 2004

comparisons can be made between the surveys, it is clear from the results that the children in these surveys are consistently worse than the host population in Sudan and Chad.

There are a number of limitations to this emergency nutrition and mortality assessment. As with any retrospective mortality assessment, recall bias is an important limitation. The survey attempted to minimize this bias by limiting the recall period to 8 months and defining the starting point with a well-known religious holiday, Ramadan. We reported mortality rates with and without missing since in a conflict setting it is likely that a substantial amount of the missing are dead. The mortality rate for children <5 years that was found might be lower than the crude mortality rate (> 5 years) since a majority of deaths were reported as war related in the adult male population. The relationship between the elevated prevalence of acute malnutrition and lower than expected mortality reported in this survey, with the exception of the refugee camps, raises several issues. First, under-reporting of child deaths may be a contributing factor in the lower than expected mortality rates. One possible reason for under-reporting may be the fear of reduction in general ration following the death of a family member. This fear may have been further exacerbated by the reduced ration and infrequent distributions in the months leading up to the survey. Second, only households that were present on the day of the survey were interviewed. Households in which all family members may have died or children under 5 years of age may have died could not have been selected, leading to an underestimation of mortality.

The absence of any functional health information system, death registry, or the distribution of vaccination cards, meant that the oral report and recall of the household member interviewed was used to determine morbidity, cause of death, and vaccination status. However, a revised verbal autopsy based upon the WHO verbal autopsy, used a series of questions to attempt to classify cause of death. Additionally, standardized case definitions for diarrheal disease and ARI were used. The population size estimates were often unavailable or rapidly changing, potentially limiting the accuracy of sample size calculations. Finally, the multiple steps in the translation of the questionnaire from written French to the verbal translation into the appropriate dialect may have resulted in the mistranslation for questions or answers.

Although the malnutrition and health status in the refugee camps, refugee frontier settlements and Chadian villages showed similar results, these findings cannot be generalized to other Sudanese refugees in Chad or Chadian villages or compared between the three surveys.

Despite these limitations, there is a clear and urgent need for an integrated public health approach that simultaneously addresses the nutrition and health needs of the population. Selective feeding, improved general rations, access to water and sanitation, shelter, and primary health care—the basic needs of the population—must be established and implemented.

Conclusions

The nutritional status of the surveyed population alone is sufficient to consider the current situation a crisis. However, when additional factors such as lack of water, shelter, and food are weighed, the potential for increases in malnutrition, morbidity, and mortality are great. Survey results indicate that most households are reaching the end of their coping strategies and are heavily, if not solely, dependent upon the general food ration for their existence. The prevalence of diarrheal disease is elevated in all settings. Access to latrines is minimal, even in camp settings and access to water remains problematic. The rainy season is fast approaching, a time when the incidence of diarrheal disease and malaria typically increases. Access to the refugees will be further limited by the onset of the rainy season, underscoring the urgency

of an immediate comprehensive public health approach to prevent morbidity and ultimately mortality in this population.

Recommendations

From the findings of the three surveys, the following recommendations are made for improving the nutrition and health situation of the Sudanese refugees and the host Chadian villagers.

Refugees

Nutrition

- Support expansion of therapeutic feeding centers (TFC) and targeted supplemental feeding programs (SFP)
 - Immediately establish a therapeutic feeding center and supplementary feeding program in Oure Cassoni to address the critical prevalence of malnutrition in the areas of Bahai and Cariari. Referrals to the Iriba TFC from this area are not feasible.
 - Establish a therapeutic feeding center in the camps of Iridimi and Touloum and extend the provision of supplementary feeding support in both camps to help reduce the burden of the Iriba TFC to less than 100 children.
 - Increase personnel to staff TFCs and SFPs in all sites.
 - Increase training of local personnel for administering supplemental and therapeutic feeding.
 - Institute regular reporting and monitoring of therapeutic feeding centers
- Support supplementary feeding programs
 - Blanket supplementary feeding program for all children below 5 years of age and pregnant women until malnutrition rates fall at least below 15% for a period of at least 6 months
- Establish nutritional screening to properly identify moderately and severely malnourished children
- Improve general food ration
 - Implement regular food basket monitoring, post distribution and at the household level
 - Ensure consistent and sufficient nutritional content of the general food ration

Public health

- Immediately improve communication and coordination about health and nutrition issues
 - Standardize data collection regarding nutritional status, access to and availability of rations and water, and regularly report information to a central point such as the UNHCR Emergency Health and Nutrition Coordinator
 - Consider including community health workers in evaluation of health and nutrition within the camps and settlements and “chieftains” as health partners in evaluation of households
 - Increase community awareness and sensitization to nutrition and food issues
 - Improve communication about health and nutrition issues within the camp by regular communication between partners
- Provide additional support to all local health services to help build their capacity and self-reliance
- Provide education to parents on health and nutrition
- Stockpile cholera supplies kits (drugs/IV fluids, etc)
- Measles vaccination and Vitamin A coverage to all children 6 months to 15 years with the support of health agencies
- Improve access and availability of safe water and latrines

- Target community education on sanitation and hygiene practices

Surveillance

- Conduct surveillance for bloody diarrhea and conduct laboratory assessments for the cause of bloody diarrhea.
- Non-bloody diarrhea (cholera) surveillance
- Early identification, treatment and surveillance for ARI
- Conduct rapid assessments of spontaneous and frontier settlements for food distribution/water/shelter
- Standardized nutritional surveillance should be implemented including use of weight for height
- Consider repeat nutritional survey including micronutrient assessment following the implementation of interventions
- Establish Health Information System

Villages

Nutrition

- The prevalence of acute malnutrition is elevated and needs to be addressed; further nutritional evaluations of the host population are warranted.
- UNICEF should support the Chad MOH to conduct a nutritional survey as soon as possible using a more representative sample of villages.
- Children identified as malnourished should be appropriately referred to therapeutic or supplemental feeding programs based upon the admission criteria.
- The host population should have access to selective feeding programs; the international community should consider including the host population in food distributions, as the refugees drew heavily upon the resources of the population prior to the establishment of the camps.

Public Health

- Strengthen village level community health surveillance and primary care outreach—the population within these small communities have limited or no access to primary healthcare
- Community level healthcare workers trained in surveillance methods and primary care needs could be the first point of contact
- Responsibilities for the healthcare workers could include medical triage, health education, health program coordination, and surveillance
- Conduct periodic health education campaigns by the primary health care staff focusing on proper mosquito net use, iodized salt use, childhood vaccination needs and vaccination record keeping, breastfeeding recommendations, prenatal care recommendations, and hygienic techniques (specifically hand washing and soap use)
- Engage village leaders and chiefs in campaigns (Accessibility of items such as mosquito nets, iodized salt, and soap could be facilitated by the leaders of the communities)
- Review records/reports of measles campaign conducted in March 2004 in this area (The reason for the high percentage of children not vaccinated during this campaign is unclear); identify all unvaccinated areas and plan for a “catch up” vaccination campaign

APPENDIX A

French Version of the Questionnaire

Camp/Site _____ 1=Touloum 2=Kounongo 3=Iridimi 4= Bahai 5=Cariari
Village: _____ Numéro de Grappe: _____ Numéro du Ménage: _____
Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / ____mm

Enquête Nutritionnelle et Sanitaire, Tchad, 2004

Bonjour, je m'appelle _____ et je travaille avec les agents de la Santé Publique (Ministère de la Santé du Tchad, UNHCR, UNICEF, PAM et CDC). Nous menons une enquête sanitaire et nutritionnelle de votre famille. Nous souhaiterions beaucoup votre participation à cette enquête. Nous aimerions vous poser des questions sur la santé et aussi peser et mesurer les enfants de moins de 5 ans. L'enquête habituellement dure 30 minutes. Chaque information recueillie de vous restera confidentielle. La participation à cette enquête est volontaire et vous pouvez choisir ne pas répondre à certaines questions ou à toutes les questions. Cependant, j'espère que vous participerez à cette enquête quand vous verrez son importance. Votre collaboration est vivement souhaitée. Avez-vous des questions au sujet de cette enquête ?

Pourrais-je commencer l'interview?

D'Accor

Section A:

Interview réalisée avec: Chef de ménage: Homme Femme Autre personne précisez _____

QUESTIONNAIRE MENAGE

1) Est ce le lieu habituel de residence de votre famille? *Encercler une réponse*

1= Oui

2= Non

9= Ne sait pas (*aller à la question 2*)

1a) Depuis combien de temps votre famille vit-elle ici? _____ mois OU _____ années

2) Y'a-t-il plus d'une famille vivant dans ce ménage? *Encercler une réponse*

1= Oui

2= Non (*aller à la question 3*)

9= Ne sait pas (*aller à la question 3*)

2a) Si oui, combien de familles? *Encercler une réponse* 1= 1 2=2 3= 3-5 4= >5

3) Quelle est votre principale source d'approvisionnement en eau? *Encercler une réponse*

1= Robinet

4= Puits traditionnel

7= Eau de Ouaddi

2= Forage avec pompe a main

5= Puits aménagé

8= Autres _____

3= Rivière, cours d'eau, barrage 6= Eau de pluie

4) Combien de temps avez-vous mis pour collecter l'eau la dernière fois?

_____ heures

5) Quand avez-vous la dernière fois collecté l'eau pour usage à la maison?

1= Aujourd'hui 2= Hier 3= Entre 2 jours et une semaine 4= Plus d'une semaine

6) Avez-vous un récipient pour le stockage de l'eau ? 1= Oui 2=Non 3= Ne sais pas

7) Quel type de toilette est-il utilisé par la plupart de membres de votre ménage?

1= Fosse 2= Brousse/Champs 3= Autre (précisez) _____

Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / ____mm Numéro du Ménage: _____

8) Quel type d'abri avez-vous? 1) Tente
2) Couverture en Plastique/autre couverture
3) Hute/logement structuré
4) Aucune
5) Autres _____

9) Y'a-t-il de savon dans le ménage? 1= Oui 2= Non

10) Avez-vous d'animaux maintenant? 1=Oui 10a) Si oui, les quels? (cocher) 2=Non (aller à la question 12)

Chevres	Mouton	Ânes/mulet	Chevaux	Boeufs	Dromadaire	Autre

11) Quel est l'état physique de vos animaux? 1= excellent 2= bon 3= mal 4= tres mal

Chevres	Mouton	Ânes/mulet	Chevaux	Boeufs	Dromadaire	Autre

12) Quel aliment de base consommez-vous habituellement en cette periode de l'année? Choisir une

1= Blé 2= Riz 3=Arachide 4=Mais 5= Haricot 6=Sorgho
7= Manioc 8=Mil (Penicillaire) 9=Pois de terre 10=Autre _____

13) Quel aliment de base avez-vous consommé les 4 dernières semaines? Choisir une

1= Blé 2= Riz 3=Arachide 4=Mais 5= Haricot 6=Sorgho
7= Manioc 8=Mil (Penicillaire) 9=Pois de terre 10=Autre _____

14) Comment procurez-vous votre nourriture en ce temps-ci de l'année? Choisir une

1= Propre production 2= Emprunt 3= Achat 4= Troc 5= Nourriture Gratuite

15) Comment avez-vous procuré votre nourriture dans les quatre dernières semaines? Choisir une

1= Propre production 2= Empruntée 3= Achatée 4= Trocée 5= Nourriture Gratuite

16) Comment allez-vous procurer votre nourriture dans les prochains mois? Choisir une

1= Propre production 2= Empruntée 3= Achatée 4= Trocée 5= Nourriture Gratuite

17) Consommez-vous les produits de cueillette en cette periode de l'année? 1=Oui 2=Non 9= Ne sais pas

18) Consommez-vous les produites de cueillette maintenant? 1=Oui 2=Non 9= Ne sais pas

19) Votre ménage a t-il beneficié de la distribution gratuite durant les 6 derniers mois

1=Oui 2=Non (Passez au questionnaire du ménage) 9= Ne sais pas(Passez au questionnaire du ménage)

20) Combien de temps avez -vous mis la dernière fois pour aller prendre la ration gratuite?

_____ Kg Maïs _____ Kg Riz _____ Kg Blé _____ Kg CSB _____ Sel
 _____ Lt Huile _____ Kg Sorgho _____ Petit pois _____ Haricot _____ Autre précisez
 _____ heures

21) En quels mois avez-vous reçu cette aide alimentaire? *Cocher les mois*

Decembre Janvier Fevrier Mars Avril Mai Juin

Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / ____mm Numéro du Ménage: _____

22) Quels types et quantités d'aliments votre ménage a-t-il reçu durant la dernière distribution?

23) La ration a-t-elle été entièrement consommée par le ménage?

1=Oui (*aller à la question 24*) 2=Non 9=Ne Sait pas

23a) Avez-vous partagé votre ration avec d'autres familles ou voisins?.....1=Oui 2=Non 9=Ne Sait pas

23b) Avez-vous vendu ou échangé une partie de votre ration?.....1=Oui 2=Non 9=Ne Sait pas

24) Avez-vous la possibilité de préparer le repas pour le ménage?

1=Oui (*aller à la Section B*) 2=Non 9=Ne Sait pas (*aller à la Section B*)

25) Si Non, Pourquoi? (*choisir la (les) réponse(s)*)

1=Pas d'aliments 2= Pas d'ustensiles 3= pas de charbon ou bois 4=Autre précisez _____

Section B

Je voudrais vous poser des questions sur **chaque personne qui vivait dans votre ménage au début de Ramadan (2003) et les enfants qui sont nés depuis le début de Ramadan jusqu'à présent (calendrier)**

COMPOSITION DU MENAGE

Chef de ménage a la première ligne

1. Vivant (vivant dans le ménage)
 2. Vivant (vivant ailleurs)
 3. Décédé
 4. Disparu/ ne sait pas

Quand _____ est tombé malade, était-il maigre ou avait-il les oedèmes aux pieds ou aux jambes?

Si une femme est enceinte, MUAC

Numero	Age (Moins de 5 ans en mois)	Sexe (encercler M ou F)	Situation AUJOURD'H UI (encercler)	Si décédé ou disparu, quand? (mm/aa)	Quelle est la cause de décès? (poser les questions)	Malnutrition ?	Enceinte ?
1	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
2	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
3	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
4	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
5	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
6	ans ou mois	M / F	1 2 3 4	/		O / N	O / N

7	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
8	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
9	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
10	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
11	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
12	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
13	ans ou mois	M / F	1 2 3 4	/		O / N	O / N
Enfant nés	mois	M / F	1 2 3 4	/		O / N	
Enfant nés	mois	M / F	1 2 3 4	/		O / N	

Autopsie verbale pour déterminer la cause de décès

1. Est-ce que _____ est mort suite d'un accident de voiture, chute, noyade, empoisonnement, brûlure, morsure, piqûre, ou autre violence ou blessure

Si Oui.....Continuer à la question 2

Si Non.....Aller à la question 3

2. Cette blessure était-elle due à une balle, bombe, mine ou autre chose relative à la guerre?

Si Oui.....FIN. Codifier 1

Si Non.....FIN. Codifier 2

3. Est-ce que _____ est mort suite de la rougeole (en terme locale)?

Si Oui.....FIN. Codifier 3

Si Non.....Aller à la question suivante

4. Est-ce que _____ selles liquide, très liquides, molles ou fréquentes?

Si Oui.....Aller à la question suivante

Si Non..... Aller à la question 6

5. Est-ce que _____ selles avec du sang?

Si Oui.....FIN. Codifier 4

Si Non.....FIN. Codifier 5

6. Est-ce que _____ de fièvre et difficulté respiratoire?

Si Oui.....FIN. Codifier 6

Si Non..... Aller à la question suivante

7. Est-ce que _____ cou rigide et fièvre?

Si Oui.....FIN. Codifier 7

Si Non.....FIN. Codifier 8

Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / ____mm Numéro du Ménage: _____

Section C: DONNÉES ANTHROPOMETRIQUES ET MORBIDITÉS CHEZ LES ENFANTS 6 – 59 MOIS

Interview réalisée: Chef de ménage: Homme Femme Autre personne

<85 cm mesure en position couchée/>85 cm mesure en position debout/Commencer avec les plus jeunes enfants

	Enfant 1	Enfant 2	Enfant 3	Enfant 4	Enfant 5	Enfant 6
27. La mère biologique de l'enfant, est-elle vivante? 1=Oui 2=Non 9=Ne sait pas						
28. Age (mois) ___ ou Date de naissance __JJ/ __MM/ ___ _AA						
29. Sexe (encercler M ou F)	M / F	M / F	M / F	M / F	M / F	M / F
30. L'enfant est-il admis dans un 1= CNT 2= CNS 3= Pas admis dans un centre Si CNT, précisez où? _____						
31. Depuis hier à cette heure-ci, l'enfant a-t-il été allaité au sein? 1= Oui 2= Non 9= Ne sait pas						
32. Depuis hier à cette heure-ci, l'enfant a-t-il pris autres choses que le lait maternel? 1= Oui 2=Non (aller à la question 34)						
33. Si oui, Précisez : 1=de l'eau, thé ou jus 2=lait en poudres/formule 3= lait d'animaux 4=nourriture solide 5=autre _____						
34. L'enfant est-t-il vacciné contre la rougeole durant les 6 derniers mois? 0= Non 1= Oui, avec la carte 2= Oui, sans la carte 9= Ne sait pas						
35. L'enfant a-t-il reçu la Vitamin A durant les 6 derniers mois ? 1=Oui 2=Non 9=Ne sait pas (la Vitamin A en gellule a la bouche)						
36. Depuis 2 semaines environs, l'enfant a-t-il fait la diarrhée*? 1=Oui 2=Non (aller à la question 38) 9=Ne sait pas (aller à la question 38)						
37. Y'a t-il eu de sang? 1=Oui 2=Non 9=Ne sait pas						
38. Depuis 2 semaines environs, l'enfant a-t-il eu de problèmes respiratoires et/ou de fièvre? 1=Oui 2=Non 9=Ne sait pas						

*plus de 3 selles anormales par jour

	Enfant 1	Enfant 2	Enfant 3	Enfant 4	Enfant 5	Enfant 6
39. Poids (kg)	___'___	___'___	___'___	___'___	___'___	___'___
40. Taille (cm)	___'___	___'___	___'___	___'___	___'___	___'___
41. Oedèmes (bilatéraux) 1=Oui 2=Non						

Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ___jj / ___ mm Numéro du Ménage: _____

Prise des mesures chez les femmes enceintes:

42. Numéro de person _____ MUAC _____ . ___ cm

43. Numéro de person _____ MUAC _____ . ___ cm

44. Numéro de person _____ MUAC _____ . ___ cm

45. Numéro de person _____ MUAC _____ . ___ cm

Merci pour votre disponibilité

___ Saisie des données ___/___/___ Date

APPENDIX B

English version of the Questionnaire

Camp/Settlement _____	1=Touloum 2=Kounongo 3=Iridimi 4= Bahai 5=Cariari 6=Tine	
Village: _____	Cluster number: _____	Household number: _____
Team code: _____	Interviewer code: _____	Date of interview: ____dd / ____mm ENG

Nutrition and Health Survey, Chad, 2004

Hello my name is _____ and I'm working with the Chad Ministry of Health, UNHCR, UNICEF and CDC. We are conducting a survey on the health and nutrition of your family. We would very much appreciate your participation in this survey. I would like to ask you about the health of your family. We will also weigh and measure your children who are younger than 5 years of age. The survey usually takes 30 minutes to complete. Any information that you provide will be kept strictly confidential and will not be shown to other persons. Participation in this survey is voluntary and you can choose not to answer individual questions or all the questions. However, we hope that you will participate in this survey since your views are important. Do you have any questions about the survey? May I begin the interview now?

Consent

Section A:

Interview conducted with? Male Head of Household Female Head of Household Other

HOUSEHOLD DATA

1) Does your family now live in your usual place of residence? *circle one*

1=Yes 2= No

9= Unknown (*skip to question 3*)

1a) How long since the family has lived there? _____ months OR _____ years

2) Is there more than one family living in this household? *Circle one*

1=Yes 2= No (*skip to question 2*)

9= Unknown

2a) If Yes, how many families? *Circle one*

1= 1

2= 2

3= 3-5

4= >5

3) What is your main source of water? *circle one*

1= Piped water

4= Traditional Well

7= Water from River Bed

2= Borehole with hand pump

5= Other Well

8= Other, specify _____

3= River, small river, lake, dam

6= Rain water

4) How long did it take you to collect water the last time?

_____ hours

5) When was the last time you collected water for use in the home?

1= today

2= yesterday

3= >2 days to 1 week ago

4= more than 1 week ago

6) Do you have a receptacle to store water? 1= Yes 2= No 3= Don't Know

7) What kind of toilet facility do most members of your household use?

1= Pit Latrine

2= No facility/ Bush/Field.

3= Other, Specify _____

8) What type of shelter do you have?

1) Tent

2) Plastic Sheeting, other covering

3) Hut/structural abode

4) Nothing

5) Other _____

9) Do you have soap available for the household? 1=Yes 2=No 3= Don't Know

10) Do you have any animals now?

1=Yes 2=No skip to question 10

If yes which ones?

Goats	Sheep	Equines	Cattle	Camel/Dromidary	Other

11) What is the physical condition of your animals? 1= excellent 2= good 3= poor 4= very poor

Goats	Sheep	Equines	Cattle	Camel/Dromidary	Other

12) What food staple do you usually eat at this time of year?

Choose one

1= Wheat

2= Rice

3= Peanuts

4= Maize

5= Haricot Beans

6= Sorghum

7= Cassava

8= Millet (penicillaire)

9= Wild Peas

10= Other _____

13) What was your food staple in the last 4 weeks? Choose one

1= Wheat

2= Rice

3= Peanuts

4= Maize

5= Haricot Beans

6= Sorghum

7= Cassava

8= Millet (penicillaire)

9= Wild Peas

10= Other _____

14) Where do you usually get your main source of food this time of year? Choose one

1= Own production 2= Borrowed 3= Bought 4= Bartered 5= Free Food

15) Where did your main source of food come from in the last 4 weeks? Choose one

Choose one

1= Own production 2= Borrowed 3= Bought 4= Bartered 5= Free Food

16) Where will your main source of food come from in the next 3 months? Choose one

1= Own production 2= Borrowed 3= Bought 4= Bartered 5= Free Food

17) Do you usually eat wild foods at this time of year? 1=Yes 2=No 9=Unknown

18) Are you eating wild foods now? 1=Yes 2=No 9=Unknown

19) Has your household received a general ration within the last 6 months?
1= Yes 2=No 9= Unknown

20) How long did it take the last time to get the general ration? _____ Hours
if NO skip to household information

21) In which months did you receive a general ration? *Choose any*

December January February March April May June

22) During the last distribution, how much of the following items did your household receive?

_____ Kg Maïs _____ Kg Rice _____ Kg Wheat _____ Kg CSB _____ Salt
_____ Lt Oil _____ Kg Sorgho _____ Green Peas _____ Beans _____ Other, specify

23) Was the entire ration consumed by your household?

1=Yes 2=No 9=Unknown

23a Did you share your ration with other families or neighbors?

1=Yes 2=No 9=Unknown

23b Did you sell or trade part of the ration?

1=Yes 2=No 9=Unknown

24) Are you able to cook at home?

1=Yes 2=No (*Skip to Section B*) 9=Unknown (*Skip to Section B*)

22a) If No, Why not? (*may choose more than one*)

1=No Food 2= No pots/pans 3= No fuel 4=Other

Section B

I would like to ask you about each person who lived in this household beginning of Ramadan (2003) and children who were born since the time of the beginning of Ramadan (Show calendar)

___mos/yr

HOUSEHOLD MEMBERS

Head of household on 1st line

- 1. Alive (living in this household)
- 2. Alive (living elsewhere)
- 3. Died
- 4. Missing/Unknown

When ___ became ill, was he/she very thin or did he/she have swollen feet or legs?

Person no.	Age (under 5 in months)	Sex (circle one)	Current Status as of TODAY (circle one)	If missing or dead, since when? (mm/yy)	Died of which cause? (ask questions)	Malnutrition ?	Pregnant?
1	___ years or mos	M / F	1 2 3 4	/		Y / N	
2	___ years or mos	M / F	1 2 3 4	/		Y / N	
3	___ years or mos	M / F	1 2 3 4	/		Y / N	
4	___ years or mos	M / F	1 2 3 4	/		Y / N	
5	___ years or mos	M / F	1 2 3 4	/		Y / N	
6	___ years or mos	M / F	1 2 3 4	/		Y / N	
7	___ years or mos	M / F	1 2 3 4	/		Y / N	
8	___ years or mos	M / F	1 2 3 4	/		Y / N	
9	___ years or mos	M / F	1 2 3 4	/		Y / N	
10	___ years or mos	M / F	1 2 3 4	/		Y / N	
11	___ years or mos	M / F	1 2 3 4	/		Y / N	
12	___ years or mos	M / F	1 2 3 4	/		Y / N	
13	___ years or mos	M / F	1 2 3 4	/		Y / N	
Infants born	___ mos	M / F	1 2 3 4	/		Y / N	
Infants born	___ mos	M / F	1 2 3 4	/		Y / N	

Verbal autopsy to determine cause of death

1. Did _____ die from car accident, fall, drowning, poisoning, burn, bite, sting, If YES Continue to question 2
or other violence or injury? If NO Skip to question 3
2. Was this injury from a bullet, bomb, mine or otherwise related to the war? If YES **STOP. Record code 1**
If NO **STOP. Record code 2**
3. Did _____ have (local term for measles)? If YES **STOP. Record code 3**
If NO Go to next question
4. Did _____ have liquid, watery, soft, OR frequent stools? If YES Go to next question
If NO Skip to question 6
5. Did _____ have blood in the stool? If YES **STOP. Record code 4**
If NO **STOP. Record code 5**
6. Did _____ have fever & difficulty breathing? If YES **STOP. Record code 6**
If NO Go to next question
7. Did _____ have stiff neck & fever? If YES **STOP. Record code 7**
If NO **STOP. Record code 8**

Section C: Child Anthropometry and Morbidity

Interview conducted with: Female Head of Household Male Head of Household Other

65- 85 cm measure length lying down/ 85-110 cm measure height standing up/start with youngest child

	Child 1	Child 2	Child 3	Child 4	Child 5	Child 6
27. Is this child's biologic mother alive? 1=yes 2=no 9=unknown						
28. Age (months) ___ or DOB __/__/__MM/____YY						
29. Sex (circle one)	M / F	M / F	M / F	M / F	M / F	M / F
30. Child currently enrolled in 1= TFP 2= SFP 3= No feeding program If a TFP, which one?						
31. Since this time yesterday has this child been breastfed? 1= Yes 2= No 9= Unknown						
32. Since this time yesterday has this child received other liquids/foods? 1= Yes 2=No (skip to question 31)						
33. If yes what 1=water, tea or juice 2=powdered milk/formula 3=animal milk 4=solid food 5=other _____						
34. Was the child vaccinated for measles in the last 6 months? 0= No 1= yes, by card 2= yes, no card 9= Unknown						
35. Has the child received Vitamin A in the last 6 months 1=Yes 2=No 9=Unknown						
36. Since 2 weeks ago had this child had: Diarrhea* 1=Yes 2=No (skip to 36) 9=Unknown (skip to 36)						
37. Was there blood? 1=Yes 2=No 9=Unknown						
38. Since 2 weeks ago had this child had: Difficulty breathing &/or Fever 1=Yes 2=No 9=Unknown						
	Child 1	Child 2	Child 3	Child 4	Child 5	Child 6
39. Weight (kg)	____.____	____.____	____.____	____.____	____.____	____.____
40. Height (cm)	____ ____.____	____ ____.____	____ ____.____	____ ____.____	____ ____.____	____.____
41. Edema (bilateral) 1=yes 2=no						

*More than 3 (loose/liquid) stools per 24-hour period

Measurements of pregnant women:

42. Person number in household _____ MUAC _____ . ____ cm

43. Person number in household _____ MUAC _____ . ____ cm

44. Person number in household _____ MUAC _____ . ____ cm

45. Person number in household _____ MUAC _____ . ____ cm

Thank you

____ Data Entry ____/____/____ Date

CALENDRIER DES EVENEMENTS LOCAUX

MOIS	Evenements annuels répetés	1999	2000	2001	2002	2003	2004
JANVIER	Nouvel an	5 ans					5 Fête de mouton
FEVRIER	Fin saison froide	5 ans					4
MARS	Debut saison chaude	5 ans					3
AVRIL		5 ans					2
MAI		5 ans					1
JUIN	Debut saison de pluie Cultivé mil	~60 mois 5 years	~48 mois	~36 mois	~24 mois	~12 mois	Enquête 1/6-1/24
JUILLET	Periode de soudure	59	47	35	23	11	
AOUT	Independance	58	46	34	22	10	
SEPTEMBRE	Récolte mil	57	45	33	21	9	
OCTOBRE		56	44	32	20	8	
NOVEMBRE	Debut saison froide	55	43	31	19	7 7 Novembre Debut de Ramadan 2003	
DECEMBRE	Noël	54	42	30	18	6 5 Decembre Fin de Ramadan 2003	

APPENDIX C

First part of village questionnaire that was different from the refugee questionnaire, first page only, French and English versions

Camp/Site _____ 1=Touloum 2=Kounongo 3=Iridimi 4= Bahai 5=Cariari
Village: _____ Numéro de Grappe: _____ Numéro du Ménage: _____
Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / ____mm

Enquête Nutritionnelle et Sanitaire, Tchad, 2004

Version de Village

Bonjour, je m'appelle _____ et je travaille avec les agents de la Santé Publique (Ministère de la Santé du Tchad, UNHCR, UNICEF, PAM et CDC). Nous menons une enquête sanitaire et nutritionnelle de votre famille. Nous souhaiterions beaucoup votre participation à cette enquête. Nous aimerions vous poser des questions sur la santé et aussi peser et mesurer les enfants de moins de 5 ans. L'enquête habituellement dure 30 minutes. Chaque information recueillie de vous restera confidentielle. La participation à cette enquête est volontaire et vous pouvez choisir ne pas répondre à certaines questions ou à toutes les questions. Cependant, j'espère que vous participerez à cette enquête quand vous verez son importance. Votre collaboration est vivement souhaitée. Avez-vous des questions au sujet de cette enquête ?

Pourrais-je commencer l'interview?

D'accord

Section A:

Interview réalisée avec: Chef de ménage: Homme Femme Autre personne précisez _____

QUESTIONNAIRE MENAGE

1) Est ce le lieu habituel de residence de votre famille? *Encercler une réponse*

1= Oui

2= Non

9= Ne sait pas (*aller à la question 2*)

1a) Depuis combien de temps votre famille vit-elle ici? _____ mois OU _____ années

2) Y'a-t-il plus d'une famille vivant dans ce ménage? *Encercler une réponse* 1= Oui

2= Non (*aller à la question 3*)

9= Ne sait pas (*aller à la question 3*)

2a) Si oui, combien de familles? _____

3) Quelle est votre principale source d'approvisionnement en eau? *Encercler une réponse*

1= Robinet

4= Puits traditionnel

7= Eau de Ouaddi

2= Forage avec pompe a main

5= Puits aménagé

8= Autres _____

3= Rivière, cours d'eau, barrage

6= Eau de pluie

4) Combien de temps avez-vous mis pour collecter l'eau la dernière fois? _____ heures

4a) En ce même temps-ci l'année passée ? _____ heures

5) Quand avez-vous la dernière fois collecté l'eau pour usage à la maison?

1= Aujourd'hui 2= Hier 3= Entre 2 jours et une semaine 4= Plus d'une semaine

6) Quel type de toilette est-il utilisé par la plupart de membres de votre ménage ?

1= Fosse 2= Brousse/Champs 3= Autre (précisez) _____

Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / ____mm Numéro du Ménage: _____

7) Y'a-t-il de savon dans le ménage? 1= Oui 2= Non

8) Avez-vous d'animaux maintenant? 1=Oui 10a) Si oui, les quels? (cocher) 2=Non (aller à la question 12)

Chevres	Mouton	Ânes/mulet	Chevaux	Boeufs	Dromadaire	Autre

9) Quel est l'état physique de vos animaux? 1= excellent 2= bon 3= mal 4= tres mal

Chevres	Mouton	Ânes/mulet	Chevaux	Boeufs	Dromadaire	Autre

10) Quel aliment de base consommez-vous habituellement en cette période de l'année? Choisir une

1= Blé 2= Riz 3=Arachide 4=Mais 5= Haricot 6=Sorgho
7= Manioc 8=Mil (Penicillaire) 9=Pois de terre 10=Autre _____

11) Quel aliment de base avez-vous consommé les 4 dernières semaines? Choisir une

1= Blé 2= Riz 3=Arachide 4=Mais 5= Haricot 6=Sorgho
7= Manioc 8=Mil (Penicillaire) 9=Pois de terre 10=Autre _____

12) Comment procurez-vous votre nourriture en ce temps-ci de l'année? Choisir une

1= Propre production 2= Emprunt 3= Achat 4= Troc 5= Nourriture Gratuite

13) Comment avez-vous procuré votre nourriture dans les quatre dernières semaines? Choisir une

1= Propre production 2= Empruntée 3= Achatée 4= Trocée 5= Nourriture Gratuite

14) Comment allez-vous procurer votre nourriture dans les prochains mois? Choisir une

1= Propre production 2= Empruntée 3= Achatée 4= Trocée 5= Nourriture Gratuite

15) Consommez-vous les produits de cueillette en cette période de l'année? 1=Oui 2=Non 9= Ne sais pas

16) Consommez-vous les produits de cueillette maintenant? 1=Oui 2=Non 9= Ne sais pas

17) Partagez-vous cette source de l'eau avec les réfugiés ? 1=Oui 2=Non 9=Ne sait pas
17a) Si OUI, qu'entraîne t'il ce partage d'eau ? 1=Je mets plus de temps de prendre de l'eau
2=Quantité insuffisante 3=Pas de changement 4=Ne sait pas 5=Autre,

précisez _____

18) Partagez-vous votre nourriture avec les réfugiés ? 1=Oui 2=Non 9=Ne sait pas
18a) Si OUI, qu'entraîne t'il ce partage de nourriture ? 1=Je trouve plus de nourriture 2=Quantité
insuffisante 3=Pas changement 4=Autre, précisez _____ 9=Ne sait pas

19) Votre ménage a-t-il acheté ou échangé des produits chez les réfugiés ?
1=Nourriture 2=Vêtements 3=Savon 4=Couverture 5=Médicament 6=Bidon/jerricane 7=Sel
8=Aucune 9=Autre, précisez _____

20) Quel type de sel consommez-vous dans le ménage ? 1=Iodé 2=Non iodé 3=Pas de sel 9=Ne sait pas
TESTER LE SEL POUR VÉRIFIER LA PRÉSENCE D'IODE, RESULTAT:
1=Iodé 2=Non iodé 3=Pas fait

21) Dans votre ménage, quel genre de combustible utilisez-vous principalement pour faire la cuisine?
1=Charbon de bois 2=Bouse 3=Charbon/lignite (Charbon fossile dur) 4=Bois à brûler/Paille
5=Autre, précisez _____

22) Partagez-vous cette toilette avec des autres ménages? 1=Oui 2=Non 3=NA 9=Ne sait pas

Code de l'équipe: _____ Code de l'Enquêteur: _____ Date de l'enquête: ____jj / _____ mm
Numéro du Ménage: _____

23) Dans votre ménage, y a-t-il quelqu'un qui possède : (encercler tous) 1=Une bicyclette 2=Une
mobylette ou une motocyclette 3=Une voiture ou un camion 4=Une charrette 5=Une charrue
6=Aucune

24) Quelle est votre occupation principale ? 1=Agriculture 2=Elevage 3=Agriculture et élevage
5=Commerce 4=Autre _____

25) Etes-vous : 1=Nomade 2=Sédentaire 3=Semi-nomade

26) Quel type de relations avez-vous avec les réfugiés ? (ces choix s'appliquent au ménage) :
1=Employeur 2=Partenaire 3=Employé 4=amitié 5=parenté 6=charité 7=aucune 8=Autre,
précisez _____

27) Utilisez-vous une moustiquaire ? 1=Oui 2=Non 9=Ne sait pas

28) Langue utiliser pour l'enquête (encercler tous) : 1=Zagawa 2=Arabe 3=Français

Nutrition and Health Survey, Chad, 2004

VILLAGE VERSION

Hello my name is _____ and I'm working with the Chad Ministry of Health, UNHCR, UNICEF, and CDC. We are conducting a survey on the health and nutrition of your family. We would very much appreciate your participation in this survey. I would like to ask you about the health of your family. We will also weigh and measure your children who are younger than 5 years of age. The survey usually takes 30 minutes to complete. Any information that you provide will be kept strictly confidential and will not be shown to other persons. Participation in this survey is voluntary and you can choose not to answer individual questions or all the questions. However, we hope that you will participate in this survey since your views are important. Do you have any questions about the survey?

May I begin the interview now?

Consent

Section A:

Interview conducted with?

Male Head of Household Female Head of Household Other

HOUSEHOLD DATA

1) Does your family now live in your usual place of residence? *circle one*

1=Yes 2= No 9= Unknown (*skip to question 3*)

1a) How long since the family has lived there? _____ months OR _____ years

2) Is there more than one family living in this household? *Circle one*

1=Yes 2= No (*skip to question 2*) 9= Unknown

2a) If Yes, how many families? _____

3) What is your main source of water? *circle one*

1= Piped water 4= Traditional Well 7= Water from River Bed
2= Borehole with hand pump 5= Other Well 8= Other, specify
3= River, small river, lake, dam 6= Rain water _____

4) How long did it take you to collect water the last time? _____ hours

4a) How long did it take you to collect water at this same time last year? _____ hours

5) When was the last time you collected water for use in the home?

1= today
2= yesterday
3= >2 days to 1 week ago
4= more than 1 week ago

6) What kind of toilet facility do most members of your household use?

1= Pit Latrine

2= No facility/ Bush/Field.

3= Other, Specify _____

7) Do you have soap available for the household? 1=Yes 2=No 3= Don't Know

8) Do you have any animals now?

1=Yes 2=No skip to question 10

If yes which ones?

Goats	Sheep	Equines	Cattle	Camel/Dromidary	Other

9) What is the physical condition of your animals? 1= excellent 2= good 3= poor 4= very poor

Goats	Sheep	Equines	Cattle	Camel/Dromidary	Other

10) What food staple do you usually eat at this time of year? Choose one

1= Wheat 2= Rice 3=Peanuts 4=Maize 5= Haricot Beans 6=Sorghum

7= Cassava 8=Millet (penicillaire) 9=Wild Peas 10=Other _____

11) What was your food staple in the last 4 weeks? Choose one

1= Wheat 2= Rice 3=Peanuts 4=Maize 5= Haricot Beans 6=Sorghum

7= Cassava 8=Millet (penicillaire) 9=Wild Peas 10=Other _____

12) Where do you usually get your main source of food this time of year? Choose one

1= Own production 2= Borrowed 3= Bought 4= Bartered 5= Free Food

13) Where did your main source of food come from in the last 4 weeks? Choose one

1= Own production 2= Borrowed 3= Bought 4= Bartered 5= Free Food

14) Where will your main source of food come from in the next 3 months? Choose one

1= Own production 2= Borrowed 3= Bought 4= Bartered 5= Free Food

15) Do you usually eat wild foods at this time of year? 1=Yes 2=No 9=Unknown

16) Are you eating wild foods now?

1=Yes 2=No 9=Unknown

17) Do you share your water source with the refugees? 1=Yes 2=No 9=Unknown

17a) If YES, what happens when you share your water source?

1=It takes more time to collect water

2=Quantity is insufficient

3=No change

4=Unknown 5=Other, specify _____

- 18) Do you share your food with the refugees? 1=Yes 2= No 9=Unknown
- 18a) If YES, what happens when you share your food? 1=I obtain more food 2=Quantity insufficient 3=No change 4=Other, specify _____
- 19) Does your household buy from or exchange products with the refugees?
1=Food 2=Clothing 3=Soap 4=Blanket 5=Medication 6=Water container 7=Salt
8=Nothing 9=Other, specify _____
- 20) What type of salt do you consume in the household?
1=Iodized 2=Non-iodized 3=No salt 9=Unknown
- RESULT OF TEST FOR THE PRESENCE OF IODINE IN SALT:
1=Iodized 2=Non-iodized 3=Not done
- 21) In your household, what type of fuel do you primarily use for cooking?
1=Charcoal (*Charbon de bois*) 2=Kerosene (*Bouse*) 3=Coal (*Charbon fossile dur*) 4=Wood (*Bois á bruler/Paille*) 5=Other, specify _____
- 22) Do you share your toilet with other households? 1=Yes 2= No 3=Not applicable 9=Unknown
- 23) In your household, does anyone possess: (*circle all that apply*)
1=Bicycle 2=Moped/Motorbike 3=Car/Truck 4=Cart (*Charrette*) 5=Plough (*Charrue*) 6=None
- 24) What is your primary occupation? (*refers to head of household*)
1=Agriculture 2=Animal husbandry 3=Agriculture and animal husbandry 4=Other,specify _____ 5=Commerce
- 25) Are you: 1=Nomadic 2=Sedentary 3=Semi-nomadic
- 26) What kind of relationship do you have with the refugees? (*refers to anyone in the household*)
1=Employer 2=Partner 3=Employee 4=Friendship 5=Relative/kinship 6=Charity 7=None
8=Other, specify _____
- 27) Do you use a mosquito net? 1=Yes 2= No 9=Unknown
- 28) Language used for the survey (*circle all that apply*): 1=Zaghawa 2=Arabic 3=French