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Malnutrition in Emergencies

The Determinants and Policy Implications of Malnutrition in Darfur, Sudan

A Dissertation Submitted by Soha G. Moussa

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ABSTRACT

This dissertation focuses on investigating the causes of malnutrition in the crisis-affected region of Darfur, Sudan, on exploring the relationship between household headship and food security and on examining the role of care in determining malnutrition in emergencies. For the first two papers it uses data from Sudan's joint WFP/UNICEF/CDC/Ministry of Health annual Emergency Food Security and Nutrition Assessments between 2005 and 2007, the third paper is a review of the literature.

Most previous analyses of the nutritional situation in Darfur have focused on the prevalence rates of wasting and paid limited attention to its causes. The first dissertation paper aims to provide a causal analysis of child wasting in Darfur. It identifies predictors of wasting and assesses how these differed between 2005 and 2007, and across different categories of crisis-affected populations (internally displaced people (IDPs) living in camps, IDPs living within the host community, and the resident population). Results show that wasting increased between 2005 and 2007 in all categories of displacement, despite improvements in access to clean water, sanitation and many health outcomes. The predictors of wasting were not universal however: they changed from year to year and varied from one vulnerable group to another.

The second dissertation paper analyzes the relation between household headship and food consumption in Darfur as it had been subject to demographic alterations due to the conflict. The results show that men-headed households (MHH) owned more assets than women-headed households (WHH), spent a lower share of their expenditures on food and had better dietary diversity scores. This relative poverty of WHH translated into poorer dietary diversity only in the displaced *de jure* WHH whether living in camps or with the community. Results also show that subtle differences in the determinants of consumption exist among the different categories of headship (MHH, *de jure* WHH and *de facto* WHH) and depending on their displacement status.

The third dissertation paper reviews the effect of displacement on maternal mental health (mothers being the primary responsible for child care provision), the relation between maternal mental health and child malnutrition, and in this light, the effect of complex emergencies on the care of children. Malnutrition is a complex consequence of inadequacies in food, health, and care and the concept of care remains the least studied of all three. It finds enough evidence that maternal mental health directly affects the care dimension and consequently the other related causes of malnutrition.

Needs assessment and relief programs should take into consideration subtle differences among groups usually labeled as vulnerable and be flexible enough to change with time. Analysis of malnutrition should also go beyond the usual analysis of food and health and give the care dimension the attention it deserves.

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With this chapter ending, I look forward to starting the next one.

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To my mother

CHAPTER 1

INTRODUCTION

Most relief interventions in emergency situations aim to save lives and alleviate further suffering. Mortality and malnutrition being intricately linked (Caulfield et al 2004), they are both considered as "the most basic and vital public health indicators of the severity of a crisis" and are systematically used as indicators for monitoring the intensity of a crisis and/or evaluating relief aid interventions (SMART initiative).

The principles of nutritional emergencies and the management of malnutrition in emergencies are well outlined, in both the peer reviewed literature (see for example Young et al 2004, Young et al 2011) and in operational documents (for example SPHERE 2011, IASC 2011, UNHCR/WFP 2011). The term "malnutrition in emergencies" implies specific considerations for the context surrounding malnutrition, which directly affects the screening or identification of malnutrition and the treatment methods and options available. These guidelines however, do not necessarily mean application in programmatic practice, there are still many areas where more research and more guidance are needed (Hall et al 2011). The difficulty often stems from the impracticality of conducting research in emergencies and from methodological challenges such as the lack of technical capacity in study design and the lack of time and resources for reporting in peer reviewed journals. This lack of evidence has resulted in program decisions being based on best practice recommendations in the hope of doing the right thing (Hall 2011).

Most of the current research on nutritional status and/or estimating the prevalence of malnutrition in complex emergencies is done for and used to inform operational needs and relief agency requirements such as target area identification, beneficiary needs assessments, and monitoring and evaluation. Malnutrition prevalence rates as well as mortality rates are mostly used as essential indicators to assess the severity of a crisis, to follow trends, and to guide decision-making including allocation of funds (Prudhon and Spiegel 2007). In emergency situations, the main indicator for malnutrition is acute malnutrition, with stunting sometimes used in long-standing protracted emergency settings (Young and Jaspars 2006). The rates of acute malnutrition in an emergency are used to determine the severity of the crisis, for advocacy, or for triggering a response and program design and implementation, monitoring and evaluation (Young and Jaspars 2006). Providing these data rapidly and reliably has proven essential for decision-making for humanitarian aid (Degomme and Guha-Sapir 2007).

Despite the availability of malnutrition prevalence figures, there is a dearth of studies specifically investigating the various aspects of malnutrition in an emergency situation: its underlying causes, vulnerability profiles, or even the frameworks used in its analysis.

This dissertation aims to fill these gaps by investigating the following areas and research questions. It uses data from the World Food Programme (WFP)'s Emergency Food Security and Nutrition Assessment (EFSNA) conducted in Darfur, Sudan in 2005 and 2007 to achieve this aim.

1. The predictors of child wasting, changes and implications:
    a. What were the predictors of wasting in children under five years of age in Darfur at the beginning of new crisis in 2005 and a bit longer into the crisis in 2007?
    b. Did these predictors change through the years?
    c. Did these predictors change through the different categories of residency (displaced people living in camps, displaced people living with the host community, and the resident community)?

2. Being a woman-headed household in an emergency situation as a main vulnerability characteristic:
    a. Are there any differences in the food security situation of households headed by women as compared to those headed by men? And if so, what are these differences?
    b. Does the vulnerability to food insecurity differ between the different categories of displacement and among the different headship categories?

3. Reviewing the role of care for children as an underlying cause of malnutrition (together with household food security and the health environment) as illustrated by the UNICEF framework for the causes of malnutrition, and in an emergency context:
    a. Do complex emergencies affect care for children?
    b. Does displacement (one of the main consequences of complex emergencies) affect maternal mental health and the ability of mothers to care for their children?
    c. Does maternal mental health affect child malnutrition?

I. Specific Aims of the Dissertation

A. Paper 1

Malnutrition accounts for forty-five percent of the disease burden in children under five years of age in developing countries (Black et al 2013) and the same diseases –diarrhea, respiratory infections, malaria, and measles– are responsible for increased morbidity and mortality in children in complex emergencies as in more stable developmental contexts (Salama et al 2004).

Acute malnutrition in children, i.e. wasting, is one outcome where rapid improvements can be achieved and monitored. The indicator for wasting, weight-for-height in children under five years of age, has been adopted as one of the key indicators of humanitarian effectiveness in emergency response as set by the SPHERE Minimum Standards in Disaster Response (SPHERE 2011), the Standing Committee on Nutrition (SCN 2006), the SMART initiative, and the IASC Global Nutrition Cluster (2011). Children under five years of age with severe acute malnutrition, that is with a weight-for-height below -3 standard deviations (SD) based on the World Health Organization's growth standards (2006) and/or with bilateral edema are at nine times higher mortality risk than children who are above -1 SD from the growth standards (Black et al 2008, WHO/UNICEF 2009).

Much of the existing analysis of the nutritional situation in Darfur focuses on the prevalence rates of acute malnutrition or wasting and little on its causality. Organizations with the humanitarian mandate of saving lives and alleviating suffering are also working in areas with long-standing endemic poverty.

The main aim of the first dissertation paper is to provide a causal analysis of child wasting in the crisis-affected population of Darfur in the years 2005 and 2007, and this by identifying the predictors of wasting in children under five years of age, by assessing whether these predictors remained the same through 2005 and 2007, and by examining whether they remained the same between the three main categories of displacement: displaced people living in camps, displaced people living with the host community, and the resident community. Understanding the underlying causes of malnutrition can potentially lead to better efficiency in preventing and/or addressing malnutrition. In addition, shedding light on the differences (if/when they exist) between the different vulnerabilities of different population sub-groups could potentially inform program design and decisions. To be effective, adequate nutrition assistance should be tailored to the needs of different population groups and change as a crisis changes.

B. Paper 2

Women bear a large part of the hardship inflicted by conflict as they are often targets to gender-based violence and abuse (UNFPA 2002). Crises and conflicts often alter the affected population's demographic structure leading to a high proportion of women headed households (WHH) as men migrate in search of work or leave their households to engage in military activities.

Little is known about the food security of WHH as compared to men-headed households (MHH) and in conflict situations. The bulk of the evidence on the relationship between the gender of the household head and household's food security and/or nutritional situation comes from studies in non-conflict contexts. While women tend to be poorer, more food insecure, have less access to certain types of labor, to credit, and to the socio-economic networks than their men counterparts, the nutritional status of their children remains unaffected, it even tends to be better (Rogers 1996, Kennedy and Peters 1992). This has been attributed to various reasons such as differences in expenditures patterns as women spend preferentially on food (Rogers 1996), differences in care practices as WHH tend to be smaller in size and with better social networks (Handa 1996, Lemke et al 2003), and to differences in intra-household food allocation as women may eat less in order to avail more for their children (McIntyre et al 2003, Rose 1999). These issues have not been investigated in conflict situations where the resources in the hands of women are particularly scarce and the normal childcare and social networks disrupted.

The gender and protection literature is rich in evidence of the hardship inflicted on civilian women who are often targets to gender-based violence and abuse (e.g. UNICEF 2005, UN 2009, UNFPA 2010). The food security literature in conflicts is also extensive (e.g. Maxwell et al 2008, FAO 2010). Studies bridging the two areas of food security and household headship in conflict settings are lacking.

The second dissertation paper aims to contribute to filling this gap by specifically looking at female headship and food security (the access dimension measured by food consumption) in the conflict-affected region of Darfur, Sudan. It aims to do so by identifying the differences (if any) in the food security situation of households headed by women as compared to those headed by men, and by assessing the effect of households displacement status (being internally displaced or not) on food security among the different headship categories. Understanding women-headed households' vulnerability in relation to their food needs and how they access food in a conflict situation would allow better addressing these needs through tailored programs and gender-aware relief aid policies. Additionally, it is important to see whether WHH are poorer than MHH in an emergency context and whether poverty translates into poorer food consumption as this would help shed light on the coping strategies that might be used by WHH and inform targeting programs to address their food-related vulnerabilities.

C. Paper 3

Nutrition programs such as general food distributions, supplementary and therapeutic programs, in their various modalities and forms, are most commonly implemented following an emergency. Implementation is generally based on the malnutrition prevalence rates if available (WFP/UNHCR 2003), the presence or absence of aggravating factors, and the logistical challenges surrounding community outreach (ENN 2008). For the analysis of malnutrition, nutritionists rely on the UNICEF framework as a guide to identify the causes of malnutrition (UNICEF 1990).

The UNICEF framework for the causes of malnutrition was first presented in the UNICEF nutrition strategy for the nineties as a policy tool to showcase the multi-disciplinary nature of malnutrition and to stress its context-specificity. It was intended to be used in conjunction with program analysis, identified at the time as the Triple A approach of "assessment, analysis, and action", whenever malnutrition was identified in a particular context. The framework depicts malnutrition in children as an immediate consequence of sickness and poor food intake; these in turn are precipitated by inadequacies in health, care, and food security at the household level (UNICEF 1990). The framework introduced for the first time the concept of care as a potential cause of malnutrition, and not just food alone (Engle, Menon, and Haddad 1997).

The UNICEF framework has generally been adopted by international agencies as the basis for nutritional assessments in emergencies (WFP 2000, Valid International 2006, SPHERE 2011, UNHCR/WFP 2011) and yet it does not explicitly include factors associated with emergencies, such as the consequences of trauma, violence, or displacement on the underlying causes of malnutrition.

The third dissertation paper aims to fill this gap by shedding light on the importance of care in emergencies, along with food and health, in preserving children's nutritional status. Additionally, it aims to highlight to highlight the importance of the mental health and well-being of mothers who hold the primary responsibility for the provision care. The paper reviews how the main consequence of armed conflict, namely displacement and its associated stressors, affect maternal mental health and therefore mothers' ability to care for their children. It reviews how maternal mental health affects child malnutrition. And then it connects the ends by reviewing how emergencies affect care for children. The concept of care being the least studies

of the three main underlying the causes of malnutrition (food, care and health), we hope that this paper will contribute to bringing it back to the conversation on the causes of malnutrition in emergencies.

The three papers presented in this thesis seek to contribute to the body of evidence on malnutrition and food security in complex emergencies by addressing questions that have until now been mostly informed by anecdotal evidence and expert opinions, and this because of the difficulties intrinsic to conducting research in emergencies. Yet the lives of thousands of people affected by crises depend on successful programs. It is hoped that the results from the first two papers, which look into characteristics of vulnerability of emergency-affected populations, would inform defining needs and consequently defining target population groups or sub-groups. The results from the third dissertation paper, which reviews the concept of "care" in emergencies, are hoped to encourage practitioners to do more comprehensive causality analyses of malnutrition that are truly multi-sectorial and hopefully consequently implement programs that venture into linking interventions for synergistic results.

The second chapter of this dissertation presents the methods used. Chapters 2, 3 and 4 will each address one of the aforementioned research topics in the form of publishable papers. Chapter 5 will conclude and present recommendations.

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CHAPTER 2

REVIEW OF THE LITERATURE

This thesis looks into least researched areas in nutrition in complex emergencies, namely: the causality of malnutrition in emergencies, the determinants of food consumption in emergencies, and the role of care in the causality of malnutrition in emergencies.

In emergency situations, the rates of acute malnutrition are almost always measured. These figures (along with mortality rates) are mainly used as indicators of the severity of the crisis and for programmatic purposes, guiding decision-making and funds allocation (Prudhon and Speigel 2007). Although the rates of malnutrition can be found for almost every crisis affected population, there is a dearth of studies specifically investigating the determinants of malnutrition in emergencies. Most nutrition survey reports mention the underlying proximal causes of malnutrition –food, health and care– as spelled out in the UNICEF framework for the causes of malnutrition (UNICEF 1990) but only descriptively.

The food security of women-headed households (WHH) has been investigated in non-emergency settings only. Little is known about WHH's food security and/or the nutritional status of their children in emergency settings. This is an important gap to fill as crises often can also alter the demographic structure of affected areas resulting in a higher proportion of WHH as men migrate for search of work or to join the military. This renders the households even more vulnerable, with a higher proportion of older people and children to care for while at the same time having fewer assets and less access to resources (IFAD 1999).

While there is a wealth of studies and reviews on food security in emergencies (for example Maxwell et al 2003, Pingali et al 2005, Maxwell et al 2010), and similarly for public health in emergencies (for example Toole and Waldman 1997, Salama et al 2004) with standardized practice requirements and methodologies (SPHERE, SMART), there is almost no published research on the impact of emergencies on care that may precipitate child malnutrition. The concept of care, though, has remained unchanged since its early definitions. Its main components include feeding practices and breastfeeding, hygiene practices (food and personal hygiene), home-based health care (such as oral re-hydration therapy), and psycho-social practices including stimulation and responsiveness (Jonsson 1996).

I. Causes of Child Malnutrition in Emergencies

A. Child malnutrition and mortality in emergencies

Malnutrition increases dramatically, and kills most rapidly, in emergencies. Most children do not die due to conflicts or natural disasters themselves, but rather to resulting food shortages, lack of safe water, inadequate health care, and poor sanitation and hygiene. Acute malnutrition, as measured by weight-for-height is one area where rapid improvements can be seen. It is considered a good indicator for early crisis detection as it captures the consequences of the crisis on the health of children, much earlier than mortality which increases after a crisis has

already evolved (Young and Jaspars 2006)[1]. After examining data from around 100 anthropometric surveys conducted by their teams, Medecins Sans Frontieres confirmed that acute malnutrition, as measured by weight-for-height, was indeed the best tool for measuring acute malnutrition among children below five years of age (Brown et al 2008). Along with weight-for-height, height-for-age (or stunting) is sometimes used in long-standing protracted emergency settings (Young and Jaspars 2006).

Children under five years of age are disproportionately represented in the mortality figures of complex emergencies. Of all those who died in the 1991 Kurdish refugee crisis, two-thirds were under five years of age. Similarly, during the 1992 Somali famine, 74% of all children under age five in internally displaced people's (IDP) camps died. In 1996, 54% of all the deaths among refugees from Rwanda and Burundi who fled to eastern Zaire were under the age of five years (Burton 2006). The UNICEF estimated that half of the 4.7 million people affected by the conflict in Darfur, Sudan were children[2]. More recently, and in Syria, again the UNICEF estimates that 5.5 million children are in need of assistance, of whom 1.2 millions (or one in every ten children) are refugees (UNICEF 2014).

Malnutrition alone accounts for 45% of child deaths in children under five years of age globally (Lancet series on nutrition 2013) and these same childhood diseases (diarrhea, respiratory infection, malaria and measles) are basically responsible for increased morbidity and mortality in emergencies as well (Salama *et al* 2004).

B. Nutrition programs in emergencies

The principles of nutritional emergencies and the management of malnutrition in emergencies are well outlined (UNHCR/WFP 2011). The context in which an emergency happens dictates how the screening for or identification of malnutrition is done and the treatment methods and options available. Contexts can vary in the starting point of the malnutrition situation, in programmatic response, the food basket devised for the program, and in the indicators used for measuring malnutrition.

The pre-crisis prevalence of malnutrition influences how a nutritional crisis will develop. Some emergencies involve populations that are previously well-nourished but suddenly confronted with elevated risk of mortality from disease or violence (for example Bosnia, Kosovo), others involve an already serious situation, confounding chronic and acute malnutrition (for example Ethiopia, Bangladesh) and leading to spikes in the population or in children's mortality rates (WFP 2006). Emergency nutrition programs have traditionally been restricted to supplementary and therapeutic feeding programs carried in feeding centers set-up and run by non-governmental organizations (especially in complex emergencies). This resource-intensive approach, albeit still important for the treatment of severely malnourished children suffering from medical complications, has been almost entirely replaced by the community-based approach to therapeutic care that provides similar improvements in weight gain but with better coverage and to a larger number of children (Collins 2001, Brown et al 2008).

[1] The onset of an emergency is commonly defined as the doubling of mortality rate from the pre-crisis baseline, or the crossing of fixed thresholds, typically one death per 10,000 person-days (Salama et al 2004).
[2] http://www.unicef.org/infobycountry/sudan_darfuroverview.html

At the height of the conflict in Darfur in 2003-2004, the rates of global acute malnutrition[3] were at the high of 21.8% (WFP/CDC 2004). This was followed by extensive media coverage (and political attention) to the crisis leading to heightened humanitarian intervention and a similar hike in the number of humanitarian organizations operating locally. The rates of acute malnutrition dropped to a low of 11.9% in 2005 and 12.9% in 2006. This was not sustained however, and rates of acute malnutrition peaked again to 16% in 2007. The dramatic improvements in the nutrition situation seen in 2005 were attributed to a combination of factors, including the huge scale-up of humanitarian programs in the area, the improvement in the quality and regularity of the food basket, better availability of complementary feeding services, and better water and sanitation, as well as treatment of child diseases (WFP/UNICEF/CDC 2006). Improvements were yet undermined in 2007 by a persistently low coverage of health and complementary feeding services and inadequate sanitation[4] (WFP/UNICEF/CDC 2008) and malnutrition rates rose again to levels above the emergency threshold of 15%[5].

C. Malnutrition causality in Darfur

Studies on mortality during the 1985 refugee crisis in Darfur showed that the excess mortality was due to these same infectious diseases: measles, diarrhea, respiratory infections and malaria (Dondero 1985, Shears et al 1987). Another investigation into the epidemiology of disease in the area suggested that the excess mortality was mostly due to infectious diseases proliferating in crowded living environments especially measles; when measles was controlled by immunization programs however, the disease profile changed to malaria and tuberculosis as the leading causes of excess death (de Waal 1989).

More recent studies on the nutritional and health situation of refugees in Darfur during the crisis of 2003 showed that water and sanitation were lacking in the major internally displaced people (IDP) camps in all three states and communicable diseases (which, compounded by malnutrition, substantially increase the risk of mortality in children) were widespread (Depoortere et al 2004, Grandesso et al 2005). Furthermore, a case of pellagra, the result of niacin deficiency, was also reported in West Darfur but it remained an isolated incident (Spector 2005).

At the height of the conflict in Darfur in 2003-2004, the rates of global acute malnutrition[6] were at the high of 21.8% (WFP/CDC 2004). This was followed by extensive media coverage (and political attention) to the crisis leading to heightened humanitarian intervention and a similar hike in the number of humanitarian organizations operating locally. The rates of acute malnutrition dropped to a low of 11.9% in 2005 and 12.9% in 2006. This was not sustained however, and rates of acute malnutrition peaked again to 16% in 2007. The dramatic improvements in the nutrition situation seen in 2005 were attributed to a combination of factors, including the huge scale-up of humanitarian programs in the area, the improvement in the quality and regularity of the food basket, better availability of complementary feeding

[3] Global acute malnutrition (GAM) is defined as moderate and severe malnutrition, measured as WHZ<-2.
[4] UN News Service, 28 Dec 2007.
[5] Emergency levels set by the WHO (1997) and applied where benchmark data does not exist.
[6] Global acute malnutrition (GAM) is defined as moderate and severe malnutrition, measured as WHZ<-2.

services, and better water and sanitation, as well as treatment of child diseases (WFP/UNICEF/CDC 2006). Improvements were yet undermined in 2007 by a persistently low coverage of health and complementary feeding services and inadequate sanitation[7] (WFP/UNICEF/CDC 2008) and malnutrition rates rose again to levels above the emergency threshold of 15%[8].

The existing analysis of the nutritional situation in Darfur focuses on the prevalence rates of acute malnutrition. This approach leads to the assumption that acute malnutrition is the same among all population sub-groups and remains the same with time. A parallel investigation of the causality of malnutrition, disaggregating by population sub-group and over time would allow for a better understanding of the needs and consequently better programmatic decisions on prioritizing affected groups, designing interventions, and monitoring and evaluation of these.

II. Women and Food Security in Emergencies

Complex emergencies negatively impact girls' and women's safety, health, and psychosocial well-being (UNFPA 2010, UNICEF 2005). In addition women and men are affected differently by protracted crises in terms of access to social services, stress on livelihood strategies, and coping mechanisms (FAO 2010). Female headship is often used as an indicator of food insecurity despite the fact that the hardship born by women often does not translate into inadequacies in food intake as women tend to protect the food consumption of their families through various sacrifices (Webb and Lapping 2002).

Five main categories of emergencies that impact the food security of populations that may occur independently or in combination are often listed: sudden natural disasters, human-made emergencies, slow-onset events, sudden economic shock and complex emergencies (WFP 2005). In addition to varying types, the contexts in which operations are set also vary, from the acute disaster phase where relief and rehabilitation efforts are in place to settlement types where the emergency is still ongoing but with periodic deterioration followed by amelioration in the security environment. In Darfur, people have been subject to longstanding conflict in addition to unfavorable climatic conditions and draughts. The conflict has also affected the population both directly and indirectly through loss of life, displacement, loss of assets, or through insecurity, losses in livelihoods, lack of mobility, and failing markets.

The relationship between the sex of the household head and household food security has been described only in non-conflict situations. In such contexts, for example in the Dominican Republic (Rogers 1996), in South Africa (Lemke et al 2003), in Canada (McIntyre et al 2003), and in Kenya and Malawi (Kennedy and Peters 1992), studies have demonstrated that the nutritional status of WHH's children remained unaffected or sometimes even was better than their men-headed households' (MHH) counterparts. The higher poverty and food insecurity, and the lower access to certain types of labor and to credit (and the social networks needed for this) as compared to MHH did not necessarily translate into lower food security and/or worse nutritional status.

[7] UN News Service, 28 Dec 2007.
[8] Emergency levels set by the WHO (1997) and applied where benchmark data does not exist.

These positive results have been attributed to differences in expenditures, in care patterns or intra-household food allocation. While women generally have fewer resources than men, they tend to allocate more of their budget to basic goods for themselves and their children (Kennedy and Peters 1992, Quisumbing et al 1995, Handa 1996, Levin et al 1999). Care practices and other nurturing behaviors have been shown to play a role in improving nutritional status in a low-income environment (Kennedy and Peters 1992). And close family ties and the reliance on social networks were also deemed essential in compensating for WHH relative poverty and achieving equal or better nutrition security when compared to MHH (Staten et al 1998, Lemke et al 2003). In addition, differences in intra-household food allocation between WHH and MHH may explain how WHH maintain the nutritional status of their children. Women may eat less so that their children can eat more (McIntyre et al 2003, Rose 1999), or sometimes even justify certain food-related behaviors in order to protect their nutrition and that of their kids (Bentley et al 1999).

In an emergency context, women may even be more economically and socially vulnerable than in non-conflict situations. Whether WHH manage to maintain the nutritional status of their children (similar to non-emergency contexts) remains to be determined. Better understanding of the issue will allow for tailored humanitarian response to fit the needs of specific vulnerable groups and better policies supportive of women.

III. Care in Emergencies

The UNICEF framework for the causes of malnutrition illustrates how optimal nutritional status in children is a result of access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; and adequate health services and a healthy environment (UNICEF 1990). These factors directly influence nutrient intake and the presence of disease. The interaction between malnutrition and disease creates a vicious cycle of worsening illness and deteriorating nutritional status that can potentially be fatal (UNICEF 2013). Food, health and care at the household level are, in turn, affected by social, economic and political factors at the wider community level. The framework was first applied in the Iringa program in Tanzania in the 1980s, a community-based program that sought to improve the nutrition of women and children through sensitization, training and support for identifying the causes of malnutrition, both at the household and at the community levels (Pelletier and Jonsson 1994). The positive results from the Iringa program were a main driving force to the wide adoption of the framework as well to the UNICEF nutrition strategy for the nineties that called for identifying local causes and solutions to malnutrition (Dolan and Levinson 2000).

Care was first identified as a missing ingredient in the Iringa program. The program emphasized social mobilization and community involvement and demonstrated that enhanced care-giving could optimize existing resources to promote good health and nutrition in young children (Dolan and Levinson 2000). Consequently, the framework's innovation is that it introduced the concept of care -or lack of it- as a potential cause of malnutrition, and not just food and/or health alone (Engle, Menon, and Haddad 1997). But the concept of 'care' has not been elaborated in research to the same extent as health and food have, and neither has it similarly translated into programmatic action, in emergencies and non-emergency contexts alike.

The ten key caring practices related to child feeding have been enumerated by PAHO/WHO 2003 with the aim to assist in guiding policy and programmatic action. These guiding principles are: 1) Duration of exclusive breastfeeding and age of introduction of complementary foods, 2) Maintenance of breastfeeding, 3) Responsive feeding, 4) Safe preparation and storage of complementary foods, 5) Amount of complementary food needed, 6) Food consistency, 7) Meal frequency and energy density, 8) Nutrient content of complementary foods, 9) Use of vitamin–mineral supplements or fortified products for infant and mother, and 10) Feeding during and after illness. These have also been listed as critical elements of care by Engle at al 2007 and have been previously broadly mentioned in the UNICEF framework for the causality of malnutrition (UNICEF 1990). More recently, the evidence-base of these interventions have been re-evaluated and included in the framework for actions to achieve optimum nutrition and development (Black et al 2013).

Mothers are responsible for providing the bulk (if not all) of the care-giving activities in their households. Carrying these activities becomes the more difficult in emergencies when mothers are likely experiencing heightened psychological stress and vulnerability because of the consequences of war. If mothers are physically able and supported by social and family networks, they can provide the optimal care within their means for their children. But in crisis situations, mothers themselves are burdened by stress and the psychological consequences of war trauma which may prevent them from providing optimal care for their children at a time when they are likely to be vulnerable themselves.

Psycho-social wellbeing has been listed as a component of care since the early definitions (Jonsson 1996). Mental health has been recognized as a key public health issue in emergencies and is taking an increasingly important place in humanitarian interventions, (Brundtland 2000, Mollica et al 2004, Ommeren et al 2005, Jacobs 2007, IASC 2011). It is estimated that more than half of the refugees worldwide suffer from mental health problems of varying intensities (trauma, distress, chronic mental problems) as a result of the trauma and suffering they experience (Brundtland 2000). But this increased interest in psychological well-being has not yet caught up with established humanitarian interventions that address physiological needs, namely food and health.

Depression and post-traumatic stress disorder (PTSD) are the most common manifestations of mental health problems in emergencies (de Jong et al 2003). Poor mental health is quite prevalent among various war-affected populations in settings as diverse as Europe, the Middle East, and Africa. Living in camps, being internally displaced, poor economic opportunities and unresolved conflict are commonly negatively associated with mental health outcomes, the profile with the worst outcomes being observed among displaced persons who were older, female, more educated, or better off (Porter and Haslam 2005). Also, there is good evidence among civilian survivors of war trauma that being a female and of older age are risk factors to mental health problems and that some refugee variables may exacerbate and contribute to the maintenance of symptoms of PTSD while social and family support, and religious beliefs were found to be protective factors (Johnson and Thompson 2008). Deprivation of basic goods and services, traumatic events, and fear and uncertainty amongst internally displaced persons and crisis affected populations had negative effects on health in its broader physical, mental, emotional and social dimensions (Roberts et al 2009). The combined impact of gender disparities and sustained stressors, such as low socioeconomic status, are known critical

determinants of poor mental health, as are the effects of sexual violence, displacement, and livelihood disruption (Mollica et al 2004).

The Lancet Series on Global Mental Health (2007) reviewed the association between maternal depression and child nutrition and showed that the main affected outcomes were low-birthweight, underweight, and stunting (Prince et al 2007). There is consistent evidence from poor countries that infants of mothers who are depressed have poor growth and development outcomes (WHO/UNPFA 2009). Studies linking maternal depression and early childhood growth from eleven developing countries also concluded that maternal depression is associated with both sub-optimal early childhood development and stunting (Surkan et al 2011). There is strong indication that links between maternal depression in the general population (not just mothers with clinical depression but also sub-optimal mental health) and infant under-nutrition or poor growth (Rahman et al 2008). The long-term consequences of inadequate growth in childhood include reduced adult stature, low educational achievement (Glewwe and King 2001, Jukes 2005) and economic productivity (Martorell et al 2005, Hoddinott et al 2008), as well as increased disease risk (Victoria et al 2008).

Slow linear growth and stunting have been observed in young children of mothers with depressive symptoms, possibly through sub-optimal care-giving and nutrient intake (Black et al 2009). All the components of care, that is the behaviors performed by caregivers that affect nutrient intake, health, and the cognitive and psycho-social development of the child including maternal health (Engle, Lhotska and Armstrong, 1997), are affected in emergencies. Care-giving will inevitably be affected by the feelings of sadness, fatigue, and loss of interest in daily activities the mother is going through, and this in turn will negatively affect consistent and responsive care-giving (Engle et al 2007).

In conflict situations, care for children and therefore child malnutrition, is negatively affected through altered care practices resulting from the negatively affected mental health of mothers/caregivers. This care dimension is rarely assessed during investigations of the causes of malnutrition in emergencies. Programs targeting care for children also need to take into account maternal mental health (rather than focusing on feeding practices or hygiene practices alone) in order to achieve optimal benefit for children.

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CHAPTER 3

Methods

I. Data source

The following dissertation uses data from the World Food Programme (WFP)'s Emergency Food Security and Nutrition Assessment (EFSNA) conducted in Darfur, Sudan between 2004 and 2007.

Darfur, Sudan presents a good setting for investigating malnutrition in emergencies. The crisis that ravaged through the area in 2003 came after decades of instability leading to long-standing poverty and deprivation. The conflict that unfolded in the area of Darfur in Sudan in 2003 had claimed the lives of 300,000 people by 2010 and left around 2.5 million people displaced (UN 2010). At the height of the conflict in 2003-2004, the United Nations described the emergency as the "world's worst humanitarian crisis"[9] (BBC 2004). The rates of global acute malnutrition[10] then peaked at 21.8% (WFP/CDC 2004) – far above the notional threshold of 15%[11] for a public health emergency. The political and media attention to the conflict and its human consequences led to the injection of billions of aid money into the area, paralleled by an increase in the number of humanitarian organizations on the ground, and a drop in acute malnutrition rates to a low of 11.9% in 2005 and 12.9% in 2006. This drop was not sustained however, and rates of acute malnutrition peaked again to 16% in 2007 (WFP/UNICEF/CDC 2008).

The first two papers use data from the World Food Programme (WFP)'s Emergency Food Security and Nutrition Assessment (EFSNA) conducted in Darfur, Sudan in the years 2005 and 2007. The EFSNA survey was a yearly joint collaboration between the WFP, UNICEF, the government of Sudan (Ministries of Health and Agriculture), and non-governmental organizations conducted between 2004 and 2007. Its main objectives were to establish the rates of malnutrition among the conflict-affected population in Darfur, assess food aid needs, and inform humanitarian programs.

The sample size in all surveys was established based on the estimated prevalence of multiple malnutrition indicators. Surveys were representative of the conflict-affected population in the Darfur region. They were based on sample frames drawn from the lists and estimates provided by the International Committee of the Red Cross (ICRC) and the WFP and covering residents (rural and in towns) as well as the displaced population.

The development of the questionnaires followed the standard method of starting in English then translating into Arabic, and pre-testing. The caretaker in every selected household (usually the mother) answered the multiple-module household questionnaire that covered information on demographics, household circumstances, household assets, income, expenditures, food sources, food consumption, and food security coping. Anthropometric measurements were taken on

[9] "This is ethnic cleansing, this is the world's greatest humanitarian crisis, and I don't know why the world isn't doing more about it." Mukesh Kapila, United Nations co-ordinator for Sudan 2004.
[10] Global acute malnutrition (GAM) is defined as moderate and severe acute malnutrition, as measured by the weight-for-height/ length nutritional index with a cut-off of less than -2 Z scores (WHZ<-2).
[11] Emergency levels set by the WHO (1997) and applied where benchmark data does not exist.

children younger than 5 years of age. The data were cleaned and entered on-site in Darfur and the preliminary results of the EFSNA released while the EFSNA team was still in Sudan. The full reports were released a few months after the preliminary ones.

The survey results were used by various UN agencies for various purposes according to mandates but mostly for keeping updated on the food security and nutritional situation of the conflict-affected population in Darfur, for assessing (or re-assessing) the extent of coverage of nutrition, public health and food security programs and for determining assistance needs for the year as well as for recommending future relief interventions. The full reports give valuable details on the sample, the methodology and the aforementioned results (WFP/CDC, 2004; WFP/UNICEF/CDC, 2006; WFP/UNICEF/CDC, 2008).

The research questions addressed in the following papers were not covered nor addressed by the various EFSNAs.

The research was approved by the Internal Review Board of Tufts University.

II. Data Limitations

The EFSNA surveys used different sampling frames because of the expansion in the number of people affected by the crisis and the fluid security situation making some geographic areas accessible (or not) at different points in time. The first paper uses data from 2005 and 2007 from two surveys that are not longitudinal but nevertheless compares two cross-sectional snapshots taken at two different points in time and within a context of ongoing or protracted crisis and population movement. This limits the possibility of making longitudinal inferences or comparisons but still allows for identifying trends and comparing rates since both surveys were done at the same time of the year to control for seasonality.

III. Paper 1 - Predictors of child wasting during the Darfur crisis of the mid-2000s: changes and implications

The first dissertation paper aims to provide an analysis of the underlying causes of wasting in children in the crisis affected population of Darfur in the years 2005 and 2007 by answering the following questions:

1. What are the predictors of wasting in children under five years of age?
2. Have these predictors remained the same between 2005 and 2007?
3. Have these predictors remained the same between the different categories of displacement: displaced people living in camps, displaced people living with the host community, and the resident community?

Data from the EFSNA of 2005 and 2007 will be used. Both surveys were representative of the conflict-affected population in the Darfur region and at the State level (North, South and West). The methodology and survey instruments in the years 2005 and 2007 were almost identical and therefore these two years were selected for our study.

The surveys in 2005 and 2007 followed a two-stage cluster design: first, the clusters or villages were selected by probability proportional to size from conflict-affected village lists established jointly by WFP and the International Committee of the Red Cross and Crescent (ICRC). Then, at the cluster level, individual households were selected by random sampling (after enumeration or segmentation with the help of village leaders). At the household level, data were collected using a household questionnaire administered to the caretaker, usually the mother. The questionnaire was first developed in English then translated into Arabic and pre-tested to assess clarity, accuracy of the questions and length of the interview.

The child's care-taker answered a series of questions related to the nutrition and health of the child, in addition to questions on demographics, household displacement, household economic circumstances, household food consumption, and food aid. In polygamous households, one woman was chosen randomly and her household and all her children aged 6 to 59 months included in the survey. Children were weighed to the 0.1 kg, using portable Uniscales and measured to the 0.1 cm, using portable height boards. Anthropometric indices were then constructed using the National Center for Health Statistics/World Health Organization (WHO) reference data[12] and calculated using Epi-Info software (Centers for Disease Control).

Analytical approach

The key variables that determine a child's nutritional status will be identified and organized following the UNICEF framework for the causes of malnutrition (UNICEF 1990) which indicates that malnutrition in children under the age of five years is, in the immediate, determined by sickness and food intake, the underlying causes being household food security, care for women and children and the health services and healthy environment.

A household is defined as a group of people who regularly eat out of the same pot and live on the same compound; household size was the number of people living in a household. Dietary diversity was calculated as the cumulative days per week where foods from nine food groupings (cereals, legumes, meats, oil/fat, vegetables, fruits, milk and products, eggs, and sugar) were consumed, with a maximum score of 63. A set of five household durable goods (hoe/axe, plough, cart, bicycle, and radio) were added to form an assets score. The monthly percentage of household expenditures spent on food was derived from itemized expenditures data. A variable for food aid was constructed by assigning a grade point for every month on a scale with a grade for every month of food aid received in the past 6 months (with a maximum score of 6). Safe water sources were those coming from a piped source, public tap/standpipe, tube well/borehole or protected dug well and safe sanitation facilities were flush toilets or improved pit latrines (UNICEF 2006). Acute malnutrition or wasting was defined by weight-for-height z-score (WHZ) lower or equal to -2. Values above 4 and below -4 were excluded from the analysis following the World Health Organisation's recommendation (WHO 1986). Cases of edema were negligible and were therefore excluded from the analysis. Disease status was defined as the cumulative incidence of fever, diarrhea, and cough in children below five years of age in the past two week (with a maximum possible score of 3).

[12] The new WHO anthropometric standards released in 2007 were not used in the Darfur 2007 survey, for issues of comparability with the results from previous years.

Key household characteristics will be described and summarized for the survey years 2005 and 2007: means, standard deviations, ranges, and confidence intervals. Student's t-test will be used for comparison between means, ANOVA tests will be performed for comparisons between means of different groups, chi-square tests for comparison between proportions in the various sub-groups. Significance was set at $p<0.05$.

The power of these key immediate and underlying variables to determine whether a child under five years of age was malnourished (children 6 to 59 month old with whz<=-2 SD) will be tested with stepwise binary logistic regression models, and this for both years and for every category of displacement (considered the most important and measurable basic factor in conflict situations): displaced living in camps, displaced living with the host community and non-displaced residents. The variables that are statistically different in the ANOVA analysis will be entered in the predictive equations. Correlations and confounding between variables will be evaluated by creating and fitting interaction terms into the regression. All statistical analyses were performed using the statistical software SPSS 15.0.1.

IV. Paper 2 - Women-headed households in conflict: An analysis of how poverty and food consumption manifested during the Darfur conflict of the mid-2000s

The second dissertation paper aims to understand the relation between household headship and household food security in the conflict-affected area of Darfur, specifically:

- Is the food security situation of households headed by women different than that of households headed by men?
- Does the displacement status of a household being internally displaced or not) affect household food security among the different categories of headship?

Data from WFP's EFSNA of 2005 were used. The data were collected between August and September 2005 and covered the conflict-affected population in the three states of Darfur (North, West and South), based on a sample frame drawn from the lists and estimates provided by the International Committee of the Red Cross (ICRC) and the WFP. The sample covered rural and town dwellers and the displaced population.

The sample size was established based on the estimated prevalence of multiple malnutrition indicators. Villages or camps (101 clusters total) were selected by probability proportional to size and the households at that level were randomly selected (using segmentation or enumeration techniques). The final surveyed sample consisted of 2920 households. The caretaker in every selected household answered the multiple-module household questionnaire that covered information on demographics, household circumstances, household assets, income, expenditures, food sources, food consumption, and food security coping.

Analytical Approach

A conceptual framework will be developed to illustrate potential relations between household headship and food consumption, taking into account the impact of conflict on these.

In the immediate, household food consumption is determined by market purchases, households' own food production, food transfers (whether in the form of food assistance or food gifts from relatives), and food-related coping strategies (such as skipping meals or decreased consumption of preferred high-economic value foods).

Differences in expenditures patterns between WHH and MHH can affect food purchases, the unfavorable land ownership (or access) opportunities to WHH can impact their own food production (IFAD, 1999), the reliance of WHH on social networks might mean more food transfers than for MHH, and the resilience that WHH develop to cope in the face of food shortages might be different from the strategies employed by their male counterparts.

Conflict, in turn, alters household food consumption. Conflicts disturb markets leading to shortages in certain foods, spikes in prices or decreases in the variety of items available for purchase. For consumers this translates into spikes in price and insecurity on the way to markets. If WHH are poorer than MHH then their market purchases will be affected differently. A prominent feature of conflict is also the restricted access to land due to displacement, consequently restricting food production to men and women equally. Being traditionally classified as a vulnerable group, WHH might benefit more than MHH from relief transfers including food aid.

All the variables defining these factors will be included in predictive models.

Regression modeling will be performed to test the potential association between household headship and household food consumption as measured by dietary diversity, and for every category of displacement: IDPs living in camps, IDPs living with the community and resident households. The factors included in the regression model (as identified above) are: expenditures on food, total monthly expenditures and household assets (to control for total expenditures), land cultivated, months of food aid received, remittances received and coping strategies. Household headship, the variable of interest, is an integral part of the model with male headship considered the reference and female headship *de facto* and *de jure* the added variables.

V. Paper 3 - Malnutrition in emergencies: when care is equally important as food and health

The third dissertation paper aims to shed light on the importance of care in emergency settings in determining child malnutrition, along with food and health. It also aims to shed light on the importance of the mental health and well-being of mothers who hold the primary responsibility for the provision care to children. Through a literature review, it reviews:

1. How do the main consequence of armed conflict, namely displacement and its associated stressors, affect maternal mental health and therefore mothers' ability to care for their children?
2. How does maternal mental health affect child malnutrition?
3. How do emergencies affect care for children?

Analytical framework

In order to identify and analyze the causes of malnutrition, nutritionists commonly use the UNICEF framework for the causes of malnutrition (UNICEF 1990) as a guide. The framework depicts malnutrition in children of pre-school age as an immediate consequence of sickness and poor food intake; these in turn are precipitated by inadequacies in three broad elements: food, health, and care (UNICEF 1990, figure 1). The model highlights the complexity and inter-connectivity of underlying elements so that malnutrition is seen as a complex consequence of inadequacies in food, health, and care, rather than just one element acting alone. This in turn influences how the causality of malnutrition is identified and addressed through policies, strategies, and/or programs.

The framework was mainly meant to be used in development or non-emergency contexts but since its first presentation more than twenty years ago, it has undergone many adaptations to serve the multiple objectives including nutritional assessments in emergencies precipitated by conflict (Valid/Concern 2006, IASC 2008, Sphere Project 2011, UNHCR/WFP 2011).

Care refers to the way women and children are looked after. In emergencies, children are vulnerable to changes in caring practices as they are largely dependent on their caregivers (usually the mother) to provide for their needs in feeding, hygiene and psychosocial stimulation, while at the same time, caregivers might be directly or indirectly affected by crisis.

Infant and young child feeding practices can be compromised in an emergency situation as breastfeeding can be reduced or ceased due to psychological stress, due to time constraints, or due to new demands (economic, new household responsibilities) placed on the mother. The psycho-social context may also change with fear, stress, and anxiety of both women/caregivers and children can affect the way care is provided. Some challenges to women's roles, status and rights can also happen thorough the loss of the community and family networks and support structures that provide an informal support system to care.

Literature search

An electronic search of the Medline, PubMed and Web of Science databases will be conducted using the terms: nutrition, emergencies, causes, conflict, war, displacement, child, care, maternal mental health, and psychosocial. The search will encompass the years from 1975 to 2012. Studies written in a language other than English will be excluded from the literature review. Articles representing expert opinions or commentaries were also excluded. Manual searches of reports, articles, and bibliographies listed on Google Scholar will also be conducted. Studies pertaining to the following keywords will be reviewed: “malnutrition and care”, “displacement and mental health”, “maternal mental health and child care”, “maternal mental health and child nutrition”. Studies in non-emergencies will be assessed for applicability during emergencies. The grey literature will also be searched with these same terms. Google and Google Scholar will be used to look for international agencies and organizations policy papers, discussion papers and reviews.

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CHAPTER 4

Predictors of child wasting during the Darfur crisis of the mid-2000s: changes and implications.

ABSTRACT

Most previous analyses of the nutritional situation in Darfur have focused on the prevalence rates of wasting and paid limited attention to its causes. In this paper, we aim to provide a causal analysis of child wasting in the crisis-affected population of Darfur. Using data from Sudan's joint WFP/UNICEF/CDC/Ministry of Health annual Emergency Food Security and Nutrition Assessments, we identify predictors of wasting and assess how they differed between 2005 and 2007, and across different categories of crisis-affected populations: i) internally displaced people (IDPs) in camps, ii) IDPs living within the host community, and iii) residents (not displaced). Binary logistic regression was used to analyze the predictors of wasting (whz<=-2) for children 6-59 month old. Results show that wasting increased between 2005 and 2007 in all categories of displacement, despite improvements in access to clean water, sanitation and many health outcomes. In camps, food aid availability was the predictor of wasting in 2005, but in 2007 the most significant contributor was communicable diseases. For IDPs living in the community, wasting was predicted by access to safe water in 2005, but by 2007 food aid access and disease accounted for most of the variance. For residents, asset ownership was the major predictor of wasting in 2005, but by 2007 it was food aid and food expenditure levels. We conclude that predictors of nutritional outcomes like wasting are neither static nor universal, they differ across time and place according to the prevailing circumstance of vulnerable people. As a result, assessments of need and relief programs should be tailored to these changing circumstances and pay particular attention to variations in displacement conditions. Access to targeted food rations appears to have played a significant role in preserving nutritional outcomes, but more attention is needed in emergency nutrition assessments to the disease environment and water supply of crisis-affected populations, not to food needs alone.

I. INTRODUCTION

Malnutrition accounts for thirty-five percent of the disease burden in children under five years of age in developing countries (Black *et al* 2008) and the same diseases –diarrhea, respiratory infections, malaria, and measles– are responsible for increased morbidity and mortality in children in complex emergencies (Salama *et al* 2004). Complex emergencies are crises with "total or considerable breakdown of authority resulting from internal or external conflict and which require a multi-sectoral, international response that goes beyond the mandate or capacity of any single agency and/or the ongoing United Nations country program" (ReliefWeb 2008). The humanitarian response in complex emergencies is generally geared towards immediate life-saving and life-preserving goals with food aid being the most ubiquitous form of relief (Maxwell *et al* 2010). Meeting the nutritional needs of the population and providing nutritional support to those suffering from malnutrition are also core interventions (SPHERE 2004). Acute malnutrition in children, i.e. wasting, is one outcome where rapid improvements can be achieved and monitored. The indicator for wasting, weight-for-height in children under five years of age, has been adopted as one of the key indicators of humanitarian effectiveness in emergency response as set by the SPHERE Minimum Standards in Emergency Response (SPHERE 2004), the Standing Committee on Nutrition (SCN 2006), the SMART initiative, and the Global Nutrition Cluster.

The crisis that hit Darfur in 2003 had claimed by 2007 the lives of more than 200,000 people and left 2.5 millions displaced (Washington Post 2007). By 2010, the death toll rose to 300,000 people and 2.6 millions were driven out of their homes (UN 2010). At the height of the conflict in 2003-2004 while the UN described the emergency in Darfur as the "world's worst humanitarian crisis" (BBC 2004) and amidst the displacement, the rates of global acute malnutrition[13] soared at 21.8% (WFP/CDC 2004). The political and media attention to the conflict and its human consequences led to the injection of billions of aid money into the area, paralleled by an increase in the number of humanitarian organizations on the ground. This was followed by a drop in acute malnutrition rates to a low of 11.9% in 2005 and 12.9% in 2006; the drop was not sustained however, and rates of acute malnutrition peaked again to 16% in 2007. The dramatic improvements in the nutrition situation seen in 2005 were attributed to a combination of factors, including the huge scale-up of humanitarian programs in the area, the improvement in the quality and regularity of the food basket, better availability of complementary feeding services, and better water and sanitation, as well as treatment of child diseases (WFP/UNICEF/CDC 2006). Improvements were yet undermined in 2006 by severe budget cuts in the funding of the WFP Emergency Operation and the subsequent food aid ration cuts by 50% (in weight) for cereals, blended fortified food and oil, and 75% for pulses, sugar and salt (table 3.1; WFP 2006a, 2006b). In 2007, a persistently low coverage of health and complementary feeding services and inadequate sanitation was noted[14] and malnutrition rates rose again to levels above the emergency threshold of 15%[15] (WFP/UNICEF/CDC 2008).

Studies on mortality and malnutrition of refugees in Darfur during the crisis of 2003 showed that water and sanitation were lacking in the major internally displaced people (IDP) camps in all

[13] Global acute malnutrition (GAM) is defined as moderate and severe acute malnutrition, as measured by the weight-for-height/ length nutritional index with a cut-off of less than -2 Z scores (WHZ<-2).
[14] UN News Service, 28 Dec 2007.
[15] Emergency levels set by the WHO (1997) and applied where benchmark data does not exist.

three states and communicable diseases were widespread (Depoortere *et al* 2004, Grandesso *et al* 2005). These diseases, compounded by malnutrition substantially increase the risk of mortality in children (Caulfield *et al* 2004). Much of the existing analysis of the nutritional situation in Darfur focuses on the prevalence rates of acute malnutrition or wasting and little on its causality. These figures (along with mortality rates) are mainly used as indicators of the severity of the crisis and for programmatic purposes, guiding decision-making and funds allocation (Prudhon and Speigel 2007). In this paper, we aim to fill this gap and provide an analysis of the underlying causes of wasting in children in the crisis affected population of Darfur in the years 2005 and 2007. Specifically, we identify the predictors of wasting in children under five years of age; we assess whether these predictors remained the same through both years; and we assess whether these predictors remained the same between the different categories of displacement: displaced people living in camps, displaced people living with the host community, and the resident community.

Table 4.1. General food distribution (GFD) rations in Darfur.

	2004	2005 Jan-Feb	2005 revised in March*	2006 revised in June**
Cereals, g	450	450	500	250
Pulses, g	50	50	50	13
Vegetable oil, g	30	30	30	15
Salt, g	5	10	10	2.5
Corn soy blend (CSB), g	50	50	50	25
Sugar, g	-	25	25	6
Total, g	585	615	665	311
Total, Calories	2,130	2,226	2,400	1,050

*To account for milling losses.
** Due to budget cuts.

II. MATERIALS AND METHODS

Study Design and Data

The study used data from the joint WFP/UNICEF/CDC and the Ministry of Health in Sudan's annual Emergency Food Security and Nutrition Assessments (EFSNA) from the years 2005 and 2007. The EFSNA was conducted yearly between 2004 and 2007 in order to establish the rates of malnutrition in the conflict-affected populations in Darfur, assess food aid needs, and inform humanitarian programs. The sample size in all surveys was established based on the estimated prevalence of multiple malnutrition indicators. Surveys were representative of the conflict-affected population in the Darfur region and at the State level (North, South and West) except the first survey in 2004 that was representative at the regional-Darfur level. The methodology and survey instruments in the years 2005 and 2007 were almost identical and therefore these two years were selected for our study. According to the 2000 census, the total population of Darfur was estimated at approximately 6 million people distributed in three administrative

districts: 1.46 millions in North Darfur, 1.78 millions in West Darfur and 2.76 millions in South Darfur (Schimmer 2008).

The surveys in 2005 and 2007 followed a two-stage cluster design: first, the clusters or villages were selected by probability proportional to size from conflict-affected village lists established jointly by WFP and the International Committee of the Red Cross and Crescent (ICRC). Then, at the cluster level, individual households were selected by random sampling (after enumeration or segmentation with the help of village leaders). At the household level, data were collected using a household questionnaire administered to the caretaker, usually the mother. The questionnaire was first developed in English then translated into Arabic and pre-tested to assess clarity, accuracy of the questions and length of the interview. The survey results were used by various UN agencies for various purposes according to mandates but mostly for keeping updated on the food security and nutritional situation of the conflict-affected population in Darfur, for assessing (or re-assessing) the extent of coverage of nutrition, public health and food security programs and for determining assistance needs for the year as well as for recommending future relief interventions. The full reports give valuable details on the sample, the methodology and the aforementioned results (WFP/CDC, 2004; WFP/UNICEF/CDC, 2006; WFP/UNICEF/CDC, 2007; WFP/UNICEF/CDC, 2008). Table 4.2 summarizes the sampling characteristics from the four years.

Table 4.2. Summary sampling characteristics- EFSNA, Darfur.

	2004	**2005**	**2006**	**2007**
Sampling frame	1.66 million people in 140 locations	3.2 million people in 657 locations	3.74 million people in 400 locations	3.55 million people in 484 Locations
Clusters x Households	55 x 20	87 x 25: North: 33x25 South: 28x25 West: 28x25	30 x25 by state (and 5 additional replacement clusters per state)	30 x 25 by state (and 7 additional replacement clusters per state)
Representation level	Darfur region (all 3 states)	North, South and West Darfur States	North, South and West Darfur States	North, South and West Darfur States
Total number of HH surveyed	880	2090	2155	2167
Total number of children 6-59 months measured	888	1947	2180	2247
Survey month(s)	2-20 September 2004	26 August to 14 October 2005	2-24 September 2006	13 August to 5 September 2007

The child's care-taker answered a series of questions related to the nutrition and health of the child, in addition to questions on demographics, household displacement, household economic circumstances, household food consumption, and food aid. In polygamous households, one woman was chosen randomly and her household and all her children aged 6 to 59 months included in the survey. Children were weighed to the 0.1 kg, using portable Uniscales and measured to the 0.1 cm, using portable height boards. Anthropometric indices were then

constructed using the National Center for Health Statistics/World Health Organization (WHO) reference data[16] and calculated using Epi-Info software (Centers for Disease Control).

Analytical Approach

The key variables that determine a child's nutritional status were identified and organized following the UNICEF framework for the causes of malnutrition (UNICEF 1990). The UNICEF framework identifies causes of malnutrition in non-conflict situations but is advocated also for emergencies by UN agencies and SMART. It indicates that malnutrition in children under the age of five years is, in the immediate, determined by sickness and food intake, the underlying causes being household food security, care for women and children and the health services and healthy environment. The basic bottom-line causes relate to resources, politics and institutions (UNICEF 1990).

The power of these key immediate and underlying variables to determine whether a child under five years of age was malnourished was tested with stepwise binary logistic regression models, and this for every category of displacement (considered the most important and measurable basic factor in conflict situations): displaced living in camps, displaced living with the host community and non-displaced residents (figure 4.1).

A household was defined as a group of people who regularly eat out of the same pot and live on the same compound; household size was the number of people living in a household. Dietary diversity was calculated as the cumulative days per week where foods from nine food groupings (cereals, legumes, meats, oil/fat, vegetables, fruits, milk and products, eggs, and sugar) were consumed, with a maximum score of 63. A set of five household durable goods (hoe/axe, plough, cart, bicycle, and radio) were added to form an assets score. The monthly percentage of household expenditures spent on food was derived from itemized expenditures data. A variable for food aid was constructed by assigning a grade point for every month on a scale with a grade for every month of food aid received in the past 6 months (with a maximum score of 6). Safe water sources were those coming from a piped source, public tap/standpipe, tube well/borehole or protected dug well and safe sanitation facilities were flush toilets or improved pit latrines (UNICEF 2006). Acute malnutrition or wasting was defined by weight-for-height z-score (WHZ) lower or equal to -2. Values above 4 and below -4 were excluded from the analysis following the World Health Organisation's recommendation (WHO 1986). Cases of edema were negligible and were therefore excluded from the analysis. Disease status was defined as the cumulative incidence of fever, diarrhea, and cough in children below five years of age in the past two week (with a maximum possible score of 3).

[16] The new WHO anthropometric standards released in 2007 were not used in the Darfur 2007 survey, for issues of comparability with the results from previous years.

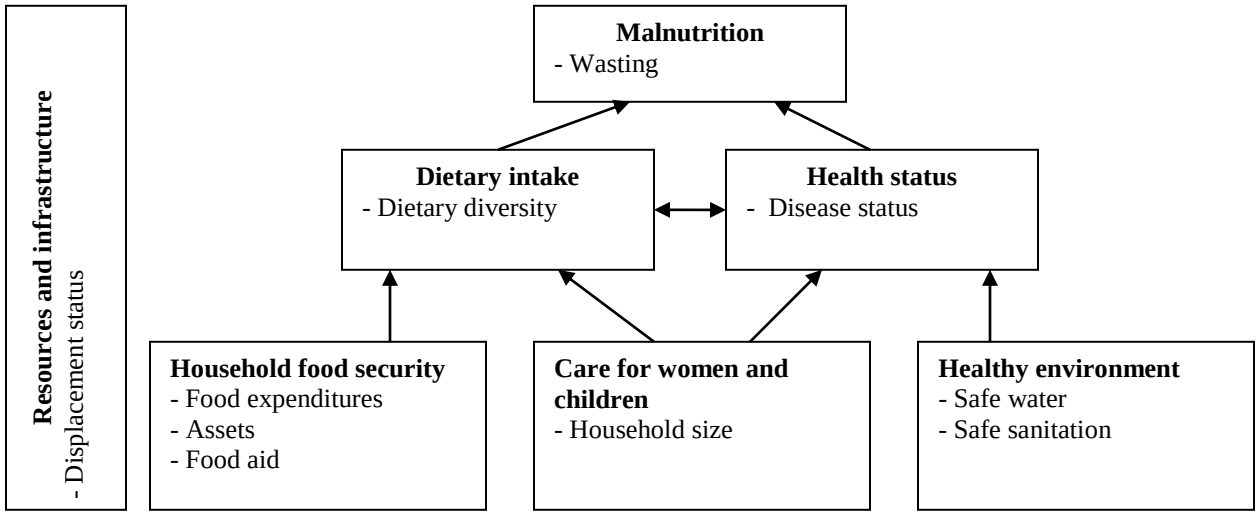

Figure 4.1. Conceptual framework for the analysis of malnutrition (with key variables used in the analysis), adapted from the UNICEF framework for the causes of malnutrition (UNICEF 1990).

Key household characteristics were described and summarized for the survey years 2005 and 2007: means, standard deviations, ranges, and confidence intervals. Student's t-test was used for comparison between means, ANOVA tests were performed for comparisons between means of different groups, chi-square tests for comparison between proportions in the various sub-groups. Significance was set at $p<0.05$. Binary logistic regression was used to assess the predictors of wasting in children 6 to 59 month old (whz<=-2) in both years and for all displacement categories (displaced living in IDP camps, displaced living with the host community, and the resident community). The variables that were statistically different in the ANOVA analysis were entered in the predictive equations. These variables were: household size, household assets, percent monthly expenditures on food, and months of food aid received, safe water, safe sanitation, dietary diversity and disease. Correlations and confounding between variables were evaluated by creating and fitting interaction terms into the regression. The details of the final models were tabulated. All statistical analyses were performed using the statistical software SPSS 15.0.1.

The regression model predicting wasting was constructed as follows:

$$\text{Wasted} = \text{Constant} + \beta_1 \text{ household size} + \beta_2 \text{ food expenditures} + \beta_3 \text{ assets} + \beta_4 \text{ food aid} + \beta_5 \text{ water} + \beta_6 \text{ sanitation} + \beta_7 \text{ dietary diversity} + \beta_8 \text{ disease.}$$

Ethical Considerations

The survey protocol was approved by the Ministry of Health in Sudan. All data collection was done after endorsement of the community leaders and informed verbal consent of the household head. This analysis was approved by the Internal Review Board of Tufts University.

Limitations

The EFSNA surveys used different sampling frames because of the expansion in the number of people affected by the crisis and the fluid security situation making some geographic areas accessible (or not) at different points in time. The present study uses data from 2005 and 2007. It is not longitudinal but compares two cross-sectional snapshots taken at two different points in time and within a context of ongoing or protracted crisis and population movement. This limits the possibility of making longitudinal inferences or comparisons but still allows for identifying trends and comparing rates since both surveys were done at the same time of the year to control for seasonality.

III. RESULTS

Important changes were noted when comparing the aggregate characteristics of the conflict-affected population in Darfur between 2005 and 2007 (table 3.3). Wasting had worsened in 2007 as compared to 2005, despite the fact that both access to safe water and sanitation were better in 2007 and the prevalence of common infectious diseases (fever, upper respiratory tract infections and diarrhea) had decreased.

The distribution of the place of residence of the population had changed between the two points in time: in 2007 we saw more IDPs in camps than in the community (46% in 2007 vs. 39% in 2005). There was a decrease in the share of expenditures spent on food between 2005 and 2007 (from 75% in 2005 to almost 60% in 2007). For livelihoods, we noted a drop in the reliance on the sale of food aid as a livelihoods strategy, a shift towards wage labor and an increase in the percent of households who relied on the sale of firewood for a living.

Table 4.3. General household characteristics from survey years 2005 and 2007.

	2005	2007
Mean weight-for-height z-score	-1.05 (+/- 0.87)	-1.15 (+/- 0.87)
Household size, mean	7.01 (+/- 2.42)	6.97 (+/- 2.52)
Number of children under 5 years of age, mean	1.39 (+/- 0.97)	1.89 (+/- 0.78)
Household head		
% male	72.0%	71.9%
% female	27.8%	28.1%
Place of residence		
% IDPs in camps	39.0%	45.7%
% IDPs outside camps	18.3%	14.8%
% residents	42.7%	38.7%
Assets owned[17] (out of 5 items), mean	0.95 (+/- 0.86)	1.30 (+/- 1.00)
% expenditures spent on food	75.42 (+/- 24.06)	59.23 (+/- 20.19)
Households main source of income		
% wage labor (in agriculture and other)	31.7%	49.3%
% sale of firewood	11.3%	17.9%
Food aid sales	18.5%	4.7%
Sale of agricultural products	13.9%	9.9%
Other	24.6%	18.2%
Number of months food aid received (out of 6), mean	3.42 (+/- 2.07)	3.56 (+/- 2.37)
% HH receiving remittances	6.1%	7.1%
% Employed coping strategies with risk to livelihoods	59.1%	55.5%
Dietary diversity score (9-item scale, cumulative times/week, out of 63)[18], mean	26.88 (+/- 7.65)	33.33 (+/- 8.37)
Animal-source foods (times/week)	3.31 (+/- 3.65)	4.98 (+/- 2.26)
% Households with access to safe water	54.0%	77.6%
% Households with access to safe sanitation	56.1%	66.7%
% children with fever	63.2%	55.5%
% children with diarrhea (watery or bloody)	55.1%	43.3%
% children with cough	53.1%	36.6%
Average morbidity (total of 3: diarrhea, cough, fever)	1.71 (+/- 1.05)	1.39 (+/- 1.10)
% children vaccinated against measles	71.4%	73.2%
% children supplemented with vitamin A	42.8%	53.9%

These household characteristics were further disaggregated by place of residence in order to determine any independent effect of the place of resident on the different variables. The results are displayed in table 4.4 (for the year 2005) and table 4.5 (for the year 2007). Results show that wasting rates had worsened in 2007 as compared to 2005 in all categories of displacement. The water and sanitation situation was significantly better in camps than for the host community in both years; it also improved for all in 2007 in comparison with 2005. These improvements however were not paralleled by a decrease in wasting in children. Access to food aid was better in IDP camps than in the resident community (for both IDPs living with the host community or residents) as shown by the values of the total months of food aid received over the past 6

[17] Assets in the scale include: hoe, plough, cart, bicycle and radio.
[18] The 9 food groupings are: cereals, legumes, oil, fruits, vegetables, meats, eggs, milk and sugar.

months. In 2005, IDPs in camps and outside of camps had comparable expenditures on food (around 79% of total monthly expenditures), higher than the residents (whose food expenditures were at 73%). In 2007, IDPs in the community and residents had comparable food expenditures (around 57% of total monthly spending) lower than that of IDPs in camps (who were spending around 62% of their monthly budget on food). In 2005 and 2007, residents fared better than IDPs in their dietary diversity score (in 2005 around 28 points for the residents vs. around 26 points for the IDPs in both groups and in 2007 (34 points for the residents vs. 32 for the IDPs living in the community and 33 for the IDPs in camps).

Table 4.4. General household characteristics by place of residence breakdown: Darfur, Sudan EFSNA 2005 (IDP in camp n=706, IDP in community n=332, Residents n=774).

	IDPs in camp Mean (95% CI)	**IDPs in community Mean (95% CI)**	**Residents Mean (95% CI)**
WHZ**	-1.00 [a,b] (-1.07 to -0.94)	-0.93 [a] (-1.02 to -0.84)	-1.10 [b] (-1.16 to -1.03)
Household size**	6.71[a] (6.54- 6.88)	6.88 [a] (6.64- 7.12)	7.39 [b] (7.21- 7.58)
Number of children under 5 years of age**	1.24 [a] (1.17- 1.31)	1.36 [a,b] (1.25- 1.46)	1.45 [b] (1.38- 1.52)
Assets owned (number of items, out of 5)**	0.61 [a] (0.56-0.65)	0.97 [b] (0.91- 1.04)	1.31 [c] (1.25- 1.36)
Percent monthly expenditures on food**	77.91 [a] (76.17- 79.64)	77.70 [a] (75.18- 80.23)	73.29 [b] (71.65- 74.93)
Total months of food aid (received in the last 6 months)**	3.97 [a] (3.83- 4.12)	3.57 [b] (3.34- 3.80)	2.70 [c] (2.56- 2.84)
Dietary diversity score (cumulative times/week)**	26.42 [a] (25.98- 26.87)	26.36 [a] (25.65- 27.08)	27.78 [b] (27.33- 28.24)
Animal source foods (times/week)**	2.54 [a] (2.31- 2.77)	3.05 [a] (2.66- 3.44)	4.38 [b] (4.09- 4.66)
Households with access to safe water source (%)**	62.8%	63.3%	40.4%
Households with access to safe sanitation (%)**	70.8%	57.9%	47.3%
Disease (p=0.053)	1.79 (1.69- 1.88)	1.75 (1.62- 1.88)	1.64 (1.55- 1.72)

Sample means were compared with ANOVA tests
**significant at p<0.00 , *significant at p<0.05
[a,b,c] different initials refer to statistically different values

Table 4.5. General household characteristics by place of residence breakdown: Darfur, Sudan EFSNA 2007 (IDPs in camp n=997, IDPs in community n=325, Residents n=852).

	IDPs in camp Mean (95% CI)	**IDPs in community Mean (95% CI)**	**Residents Mean (95% CI)**
WHZ*	-1.10 (-1.15 to -1.04)	-1.24 (-1.33 to -1.14)	-1.18 (-1.24 to -1.12)
Household size**	6.75[a] (6.61- 6.89)	6.97[a,b] (6.68- 7.27)	7.24[b] (7.07- 7.43)
Number of children under 5 years of age*	1.86 (1.80- 1.91)	1.84 (1.77- 1.92)	1.94 (1.89- 1.99)
Assets owned (number of items)**	0.98[a] (0.92- 1.04)	1.36[b] (1.26- 1.47)	1.65[c] (1.58- 1.71)
Percent monthly expenditures on food**	61.83[a] (60.58- 63.07)	57.52[b] (55.46- 59.59)	56.69[b] (55.31- 58.06)
Total months of food aid (received in the last 6 months)**	4.81[a] (4.69- 4.93)	3.25[b] (2.99- 3.52)	2.25[c] (2.12- 2.38)
Dietary diversity score (cumulative times/week)**	32.94[a] (32.43- 33.45)	31.74[a] (30.79- 32.68)	34.38[b] (33.85- 34.92)
Animal source foods (times/week)**	4.32[a] (4.06- 4.57)	4.67[a] (4.24- 5.09)	5.84[b] (5.55- 6.14)
Households with access to safe water source (%)**	88.4%	69.1%	69.4%
Households with access to safe sanitation (%)**	80.1%	66.4%	53.0%
Disease*	1.45 (1.38 to 1.52)	1.36 (1.24 to 1.48)	1.33 (1.26 to 1.40)

Sample means were compared with ANOVA tests
** significant at p<0.00 , * significant at p<0.05
[a,b,c] different initials refer to statistically different values

To get to the core aim of this paper, which is to identify the predictors of wasting and assess whether they changed from 2005 to 2007, several stepwise binary logistic regression models were performed first as aggregate for the years 2005 and 2007, and second further split for every category of displacement (IDPs living in camps, IDPs living outside of camps and resident households). These predictors were identified in the conceptual framework in figure 4.1 and described in detail in tables 4.4 and 4.5.

Only the factors/indicators that were statistically different among the different displacement categories were used in the predictive equation. These were: household size, household assets, percent monthly expenditures on food, and months of food aid received, safe water, safe sanitation, dietary diversity and disease. Tables 4.6 and 4.7 summarize the details of the final models. Table 4.8 provides the details.

Table 4.6. Factors predicting child wasting (weight-for-height z-scores ≤-2) among the conflict-affected population of Darfur in 2005 and 2007.

	Year 2005	
Factor	**Coefficient (B)**	**Odds Ratio**
Safe sanitation	-.542*	.581
	*Model**	

	Year 2007	
Factor	**Coefficient (B)**	**Odds Ratio**
Food aid	-.070**	.932
Disease	.214**	1.239
	*Model***	

Table 4.7. Factors predicting child wasting (weight-for-height z-scores ≤-2) in the three categories of displacement for the years 2005 and 2007.

	IDPs in camp		**IDPs in community**		**Residents**	
Factor	**Coefficient (B)**	**Odds Ratio**	**Coefficient (B)**	**Odds Ratio**	**Coefficient (B)**	**Odds Ratio**
Year 2005						
Food aid	-.212*	.809				
Safe water			-2.322**	.098		
Assets					-.442*	.643
	*Model**		*Model***		*Model**	
Year 2007						
Disease	.239**	1.270	.344*	1.410		
Food aid			-.134*	0.875	-1.52**	0.859
Food expenditures					-.010*	0.990
	*Model***		*Model***		*Model***	

*p<.05 and **p<.01

Table 4.8. Details of the binary regression models (stepwise) for the years 2005 and 2007.

Model Year 2005		**IDPs in camp**			**IDPs in community**			**Residents**		
		Score	Sig		Score	Sig		Score	Sig	
Step 0										
Variables not in the equation	HH size	.978	.323		.101	.751		.188	.664	
	Assets	.160	.689		1.601	.206		4.963	.026	
	% food expenditures	.275	.600		1.798	.180		.439	.508	
	Food aid	6.639	.010		.138	.710		.146	.702	
	Safe water	.009	.925		12.231	.000		.655	.418	
	Safe sanitation	1.462	.227		.503	.478		3.606	.058	
	Dietary diversity	.002	.967		1.912	.167		1.046	.307	
	Disease	.199	.656		.150	.699		.745	.388	
Overall Statistics		10.260	.247		18.265	.019		10.305	.244	
Step 1		B	Sig	Exp(B)	B	Sig	Exp(B)	B	Sig	Exp (B)
Variables in the equation	Food aid	-.212	.011	.809						
	Constant	-1.135	.001	.322						
	Safe water				-2.322	.003	.098			
	Constant				-1.473	.000	.229			
	Assets							-.442	.027	.643
	Constant							-1.265	.000	.282

Model Year 2007		**IDPs in camp**			**IDPs in community**			**Residents**		
		Score	Sig		Score	Sig		Score	Sig	
Step 0										
Variables not in the equation	HH size	1.728	.189		.429	.512		4.077	.043	
	Assets	.485	.486		.421	.516		.015	.903	
	% food expenditures	.310	.578		1.418	.234		6.030	.014	
	Food aid	.178	.673		5.768	.016		9.126	.003	
	Safe water	.011	.918		.256	.613		.125	.724	
	Safe sanitation	.008	.929		.479	.489		.028	.868	
	Dietary diversity	.219	.640		.939	.333		.054	.817	
	Disease	9.193	.002		6.969	.008		2.530	.112	
Overall Statistics		12.125	.146		12.412	.134		16.610	.034	
Step 1		B	Sig	Exp(B)	B	Sig	Exp(B)	B	Sig	Exp (B)
Variables in the equation	Disease	.239	.003	1.270	.376	1.456	1.456			
	Constant	-2.122	.000		-2.268	.103				
	Food aid							-.167	.003	.847
	Constant							-1.389	.000	
Step 2					B	Sig	Exp(B)	B	Sig	Exp (B)
Variables in the equation	Food aid				-.134	.041	.875	-.152	.007	.859
	Disease				.344	.021	1.410			
	Constant				-1.825	.000		-.858	.003	
	% food expenditure							-.010	.043	.990

Whether a child was wasted seemed to be determined in 2005 by the availability of safe sanitation in their household with an odds ratio of 0.58 or 42%. But when the data were disaggregated by displacement status, the predictors of wasting were unique and different for every category of displacement. For IDPs living in camps, total months of food aid received by a household predicted whether the child was wasted or not. The prediction was negative and of 0.81 or 19% magnitude, meaning that for every additional monthly ration received by a household, the likelihood of the child of that household being acutely malnourished decreased by 19%. For IDPs living outside the camps and with a host in the community, access to water predicted wasting and the relationship was negative with a very strong odds ratio of 0.10. For residents it was the number of assets that held the predictive power for wasting, with every additional item owned by the household predicting a decrease in the odds of wasting by 36%.

Two years later in 2007, food aid and disease were the main predictors of wasting at the aggregate level with odds ratios of 0.93 and 1.24 respectively, and a negative relation for food aid and positive for disease. The picture was different again at the disaggregate level. Only disease was a predictor of wasting in children under 5 years of age for IDPs living in camps. The direction of the relation was negative. According to the model, every unit increase in the morbidity index (which corresponds to being affected by an additional infectious disease) increased the likelihood of a child being wasted by 27%, all other variables being equal. For every unit increase in the disease score (which is the equivalent of an additional incidence in fever, diarrhea or cough) increased the likelihood of wasting by a factor of 1.40 or 40%. Similarly, every additional month of receiving food aid decreased the likelihood of wasting by 12.4%. For the resident population, food aid and food expenditures were negatively associated with child wasting. According to the model, every additional month of food aid received decreases the likelihood of wasting by an OR 0.86 or 14%. The same relation was observed for percent monthly expenditures on food, though the magnitude much smaller (OR of 1%).

IV. DISCUSSION

Our analysis shows differences in wasting rates and causality between the three main categories of displacement (IDPs in camps, IDPs outside of camps with the host community and residents) and in both years. Most studies that address malnutrition in emergencies do so mostly within refugee camps (for example Kemmer *et al* 2003, Grandesso *et al* 2005, Seal *et al* 2005, Olwedo *et al* 2008). Very few make comparisons between groups of displacement or with the host community (for example Guerrier *et al* 2009) though this was noted as an issue of research priority on the agenda of emergency nutrition practice (Banatvala and Zwi 2000, Mason 2002, Salama *et al* 2004).

Our results indicate that the prevalence of wasting in 2005 was best among IDPs living in the community and worst among the resident population; wasting rates in IDPs in camps bridged both ends. This highlights the generally very poor nutritional situation among the population in Darfur residents and IDPs alike. The fact that IDPs living within the community fared best in 2005 might be a reflection of the support they got from social networks (Pyle 1992). It might also be a reflection of the fact that IDPs who relocated with hosts were better-off possibly also socio-economically than those who did not. This “gradient” among the IDPs themselves is again reflected in their better-off figures (as compared with the host community) with regards to access to safe water and safe sanitation, which might be in turn affecting nutrition. In 2007, the

differences in the prevalence of wasting were still significant at the 0.05 level (p=0.042), and this time the IDPs living in the community fared the worst (with mean z-score of -1.24 vs. -1.10 in IDPs living in camps and -1.18 in the host community). The fact that the surveys in 2005 and 2007 were cross-sectional makes it difficult to draw conclusions about the magnitude of these changes, but the trend is noted: there are differences in wasting rates between children living in different settlement conditions, even among the IDP group itself depending on whether relocation was to a camp or the community.

The predictors of wasting also varied between the displacement group and between years. In 2005, wasting in IDP children living in camps was predicted by food aid with a negative relation; in 2007, communicable disease became the main predictor of wasting. This suggests that in the first stages of the Darfur emergency, access to an essential food ration played a significant role in preserving the nutritional status of displaced children living in camps. As the emergency progressed, especially following the major wave of displacement in 2006[19], overcrowding in camps and the precarious living situation there increased the risk of contracting communicable diseases, and the links between malnutrition and disease are well established (Caulfield *et al* 2004, Black *et al* 2008). The direction of the predictive relation was as expected: negative for food aid and positive for disease.

For IDPs living in the community, wasting in 2005 was predicted by access to safe water, in line with the finding that the better z-scores were correlated with better access to water and sanitation as compared to non-displaced residents. In 2007 the picture changed with wasting becoming a function of disease and food aid.

For residents, assets were the major predictor of wasting in 2005; in 2007 it was food aid and food expenditures. That food was the most important predictor of wasting for residents comes as no surprise and in line with the better dietary diversity and food aid expenditures patterns for this group.

Access to water and sanitation between 2005 and 2007 improved, so did the prevalence of common infectious diseases (fever, upper respiratory tract infections and diarrhea). These improvements were attributed to the increase in public health services and coverage most probably due to the expanding number of NGOs acting on the ground in Darfur (WFP/UNICEF/CDC 2008). But these improvements were not in themselves sufficient to prevent the deterioration in wasting observed between 2005 and 2007 suggesting that food or other factors may have been the more important causes of wasting as time progressed. The roles of food and disease in determining malnutrition were ascertained by the predictive models. Studies on mortality during the 1985 refugee crisis in Darfur showed that the excess mortality was due to infectious diseases: measles, diarrhea, respiratory infections and malaria (Dondero 1985, Shears *et al* 1987). Another temporal investigation into the epidemiology of disease in the area suggested that the excess mortality was mostly due to infectious diseases proliferating in crowded living environments especially measles. When measles was controlled by immunization programs, the disease profile changed to malaria and tuberculosis as the leading causes of excess death (de Waal 1989). Two decades later, this situation seems unchanged. More recent

[19] The signature of the Darfur Peace Agreement in May 2006 in Abuja between the government of Sudan and only part of the Darfur rebels, led to increased violence and another wave of displacement in the months that followed: http://www.opendemocracy.net/democracy-africa_democracy/darfur_talks_3950.jsp

studies on the nutritional and health situation of refugees in Darfur during the crisis of 2003 showed that water and sanitation were lacking in the major internally displaced people (IDP) camps in all three states and communicable diseases, which compounded by malnutrition substantially increase the risk of mortality in children (Caulfield *et al* 2004), were widespread (Depoortere *et al* 2004, Grandesso *et al* 2005).

V. CONCLUSION

Our study shows that the predictors of wasting vary with the different displacement categories and the various years of the crisis in Darfur. The key predictors of nutrition outcomes are neither static nor universal, they differ across time and place according to the prevailing circumstance of vulnerable people. While the multi-causal nature of malnutrition is generally well recognized, less attention is given to the fact that causes vary within a population and particular subsets of this population. To be effective, adequate nutrition assistance should be tailored to the changing needs and particular displacement conditions of conflict-affected people. Emergency planners therefore must consider how needs differ within the emergency-affected population, and not assume a certain homogeneity of needs and consequently rely on fixed blanket programs.

Of those predictors, access to an essential food ration plays a significant role in preserving the nutritional status of children in the early stages of a complex emergency. The disease environment and water supply of the crisis-affected populations are equally important and require more attention in emergency nutrition assessments, along with assessing food needs. A causal analysis of wasting should encompass all predictors and all population sub-groups.

A major area for further research in emergency nutrition remains the analysis of the causes of wasting and the use of this information in decision making and nutrition program design.

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CHAPTER 5

Women-headed households in conflict: An analysis of how poverty and food consumption manifested during the Darfur conflict of the mid-2000s.

ABSTRACT

Conflict alters the affected population's demographic structure leading to a high proportion of women headed households (WHH) as men migrate for work or join the military. Little is known about the food security of WHH in comparison to men-headed households (MHH) in conflict situations. This paper aims to fill this gap by analyzing female headship in relation to food consumption and by displacement status (displaced in camps, displaced with the host community, and residents) in the conflict-affected region of Darfur, Sudan. Data from Darfur's 2005 Emergency Food Security and Nutrition Assessment covering nearly 3000 households were used. Roughly 70% of the households were MHH, 19% were *de facto* WHH (husband alive but absent), and 12% *de jure* WHH (widowed or single). Men-headed households owned more assets than WHH, spent a lower share of their expenditures on food (75% for MHH vs. nearly 80% for both *de jure* and *de facto* WHH) and had better dietary diversity scores. *De jure* headship was a determinant of dietary diversity in all categories of displacement, negative for displaced people and positive for residents. Expenditures and assets were positive predictors of dietary diversity whereas coping strategies were negative and this in all categories of displacement. Receiving food aid was a positive predictor of dietary diversity whereas receiving remittances was negative among IDPs living in camps and residents. Subtle differences among predictors of food consumption need to be taken into account while conducting large-scale or comprehensive assessments and subsequently designing and implementing relief food security programs.

I. INTRODUCTION

With the growing frequency and intensity of humanitarian emergencies and the number of people they affect, especially with respect to food access, food security in humanitarian contexts came to the forefront of the humanitarian agenda. The role of food aid in humanitarian emergencies was examined (Barrett, 2006), the challenges and trends as well as the policy reform needed to effectively address chronic and transitory food insecurity in humanitarian contexts were reviewed (Maxwell *et al*, 2008) and the Food and Agriculture Organisation of the United Nations devoted its latest annual State of the World Food Insecurity report to issues and challenges surrounding food insecurity in protracted crises (FAO, 2010).

Simply defined, food insecurity is the absence of food security, and food security is achieved when "all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preference for an active and healthy life" (FAO, 1996). Hunger (sometimes also referred to as undernourishment) is the result of food insecurity, specifically of access to food to meet a person's energy requirements needed to maintain activity and health. Hunger is a daily reality for nearly one billion people around the world (FAO, 2010).

Crises and conflicts often alter the affected population's demographic structure leading to a high proportion of women headed households (WHH) as men migrate in search of work or leave their households to engage in military activities. Little is known about the food security of WHH (in comparison to men-headed households (MHH)) in conflict situations. The bulk of the evidence on the relationship between the gender of the household head and household's food security and/or nutritional situation comes from studies in non-conflict settings. Households headed by women tend to be poorer than those headed by men, more food insecure, have less access to certain types of labor, to credit and to the social networks needed for these. And yet, various studies in different locations around the world have demonstrated that the nutritional status of children from WHH remains unaffected or can even be better. Examples come from the Dominican Republic (Rogers, 1996), South Africa (Lemke *et al*., 2003), Canada (McIntyre *et al*., 2003), Kenya and Malawi (Kennedy and Peters, 1992).

This better or unchanged food and/or nutrition situation has been attributed to differences in expenditures, in care patterns or in intra-household food allocation. While women generally have fewer resources than men, they tend to allocate more of their budget to basic goods for themselves and their children (Kennedy and Peters, 1992; Quisumbing *et al.*, 1995; Handa, 1996, Levin *et al.*, 1999).The ability to improve nutritional status in a low-income environment was also shown to be related to care practices and other nurturing behaviors (Kennedy and Peters, 1992). Maintaining close family ties and the reliance on social networks were shown to be essential in compensating for WHH relative poverty and achieving equal or better nutrition security when compared to men headed households (Staten *et al.*, 1998; Lemke *et al.*, 2003). In addition, differences in intra-household food allocation between the two may explain how WHH maintain the nutritional status of their children. Women may also eat less in order to avail more food for their children (McIntyre *et al*., 2003; Rose, 1999) or even in times of stress, they can justify certain usually tabooed food-related behaviors in order to protect their nutrition and that of their kids (Bentley *et al.*, 1999).

The seriously negative impact of armed conflict on the safety, health, and psychosocial well-being of women and girls is well established and the gender and protection literature is rich in evidence of the hardship inflicted on non-combatant women who are often targets to gender-based violence and abuse (see for example UNICEF, 2005; UN, 2009; UNFPA, 2010). The food security literature in conflicts is also extensive (see for example Maxwell *et al.*, 2008; FAO, 2010). Studies bridging the two areas of food security and household headship in conflict settings are virtually non-existent. This paper aims to fill this gap in the literature by specifically looking at female headship and food security in the conflict-affected region of Darfur, Sudan (see box 5.1 for a short background on the conflict). Specifically, it aims to explore the nature of vulnerability in relation to the food security situation (the access dimension measured by food consumption) in households headed by women in the conflict affected area of Darfur in Sudan[20]. It also aims to see whether this vulnerability varies with households' displacement status (internally displaced living in camps, internally displaced living with the host community, and residents). The following hypotheses will be tested:

- In the conflict-affected areas of Darfur, the food security situation of households headed by women is different than that of households headed by men.
- Displacement status (being internally displaced or not) affects household food security among the different headship categories.

Understanding women-headed households' vulnerability in relation to their food needs and how they access these foods in a conflict situation (and in comparison to men-headed households) allows us ultimately to better address these needs through tailored programs and gender-aware relief aid policies.

Box 5.1: The Darfur conflict, in brief.

For many years Darfur has faced tensions over land and grazing rights between the mostly nomadic Arabs and farmers from the Fur, Massaleet and Zaghawa communities (Darfur in Arabic literally translates to "land of the Fur"). In early 2003, the Sudan Liberation Army and Justice and Equality Movement began attacking government targets, accusing the government of oppressing black Africans and favoring Arabs. Khartoum retaliated by supporting what it calls "self-defense militias" but reports from refugees point to air raids by government aircraft followed by attacks from the Janjaweed militia, known for riding on horses and camels, and for killing, raping, looting and terrorizing entire villages. It is estimated that more than 2.7 million people have fled their homes and now live in camps near Darfur's main towns. In addition, around 200,000 people have taken refuge in Chad. Up to 300,000 people have died from the combined effects of war, hunger and disease. Numerous aid agencies have been working in Darfur under major security constraints to their reach and access (BBC, 2010).

[20] The discussion of the broader vulnerabilities facing women in conflict, especially with regards to their safety and protection, is beyond the scope of this paper.

II. MATERIALS AND METHODS

Study Design and Data

Data from the World Food Programme (WFP)'s Emergency Food Security and Nutrition Assessment (EFSNA) conducted in Darfur, Sudan in 2005 were used. The EFSNA survey is a yearly joint collaboration between the WFP, UNICEF, the government of Sudan, and non-government organizations (WFP/UNICEF/CDC, 2006). Its main objectives are to establish rates of malnutrition among the conflict-affected population in Darfur, assess food aid needs, and inform programs. The data were collected between August and September 2005. The survey covered the conflict-affected population in the three states of Darfur (North, West and South) and was based on a sample frame drawn from the lists and estimates provided by the International Committee of the Red Cross (ICRC) and the WFP. The sample covered rural and town dwellers and the displaced population. The sample size was established based on the estimated prevalence of multiple malnutrition indicators. Villages or camps (101 clusters total) were selected by probability proportional to size and the households at that level were randomly selected (using segmentation or enumeration techniques). The final surveyed sample consisted of 2920 households. The caretaker in every selected household answered the multiple-module household questionnaire that covered information on demographics, household circumstances, household assets, income, expenditures, food sources, food consumption, and food security coping.

The data were cleaned and entered on-site in Darfur and the preliminary results of the EFSNA released while the EFSNA team was still in Sudan. The full report was released a few months later. The research questions this paper addresses were not covered nor addressed in the report and therefore the paper will contribute to better understanding the vulnerability of WHH in conflicts. The research was approved by the Internal Review Board of Tufts University.

Analytical Approach and Framework

The conceptual framework in figure 5.1 was developed for the purpose of this analysis and is used for setting the relationships between household headship and food consumption. It covers the immediate determinants of consumption and the impact of gender differentials and conflict on these.

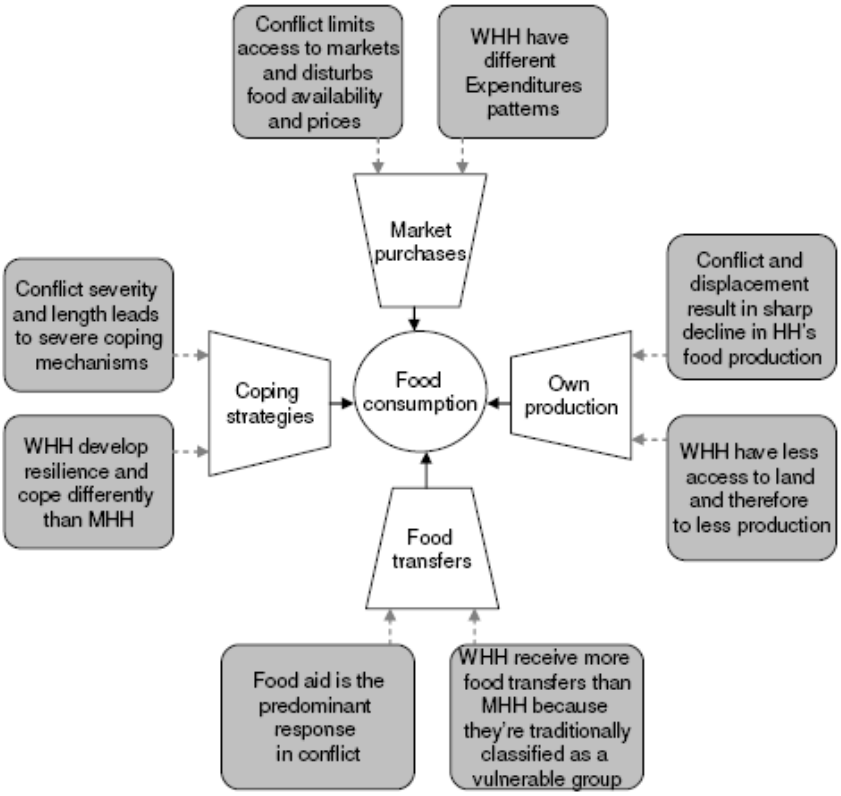

Figure 5.1. Conceptual framework for the immediate determinants of food consumption.

In the immediate, household food consumption is determined by market purchases, households' own food production, food transfers (whether in the form of food assistance or food gifts from relatives), and food-related coping strategies (such as skipping meals or decreased consumption of preferred high-economic value foods). Household headship, conflict and displacement status could affect a household's access to food and consequently its consumption.

Differences in expenditures patterns between WHH and MHH can affect food purchases, the unfavorable land ownership (or access) opportunities to WHH can impact their own food production (IFAD, 1999), the reliance of WHH on social networks might mean more food transfers than for MHH, and the resilience that WHH develop to cope in the face of food shortages might be different from the strategies employed by their male counterparts. Displaced people living in camps have little or no access to land further reducing food production.

Conflict, in turn, alters household food consumption. Conflicts disturb markets leading to shortages in certain foods, spikes in prices or decreases in the variety of items available for purchase. For consumers this translates into spikes in price and insecurity on the way to markets. If WHH are poorer than MHH then their market purchases will be affected differently. A prominent feature of conflict is also the restricted access to land due to displacement, consequently restricting food production to men and women equally. Relief aid (and food aid in

particular) is characteristic of emergencies. Being traditionally classified as a vulnerable group, WHH might benefit more than MHH from relief transfers including food aid and especially if living in camps where they are easier to reach than when living with the host community. Also in times of distress, aggravated by conflict, coping strategies related to food can affect consumption probably equally for MHH and WHH.

Variable Definition

The variables defining each of the factors in figure 5.1 are the following:

- Food consumption: Food consumption is best measured by dietary intake data but collecting such information requires time and resources (both capital and technical skills) that are beyond what is possible or feasible in conflict situations. Dietary diversity was therefore used as a measure of food consumption, used here as proxy for food security. It is less data intensive than other dietary intake measures, and a more varied diet is associated with positive health outcomes such as improved birthweight and child anthropometric status (Hoddinott and Yohannes, 2002). Dietary diversity was defined and calculated as the weekly frequency (cumulative days per week) of a household[21] consumption of foods from 9 food groupings: cereals (sorghum, millet, and other cereals), pulses, meats, oil/fat, vegetables, fruits, milk and products, eggs and sugar (with a total possible score of 63).

- Market purchases: Purchasing food on the market is a function of the total purchasing power of a household, the amount of food that is received for free and the amount of food that is grown by the household itself. The dataset included itemized expenditures (weekly for food expenditures and either monthly or weekly for non-food items). These were used to construct total monthly per capita expenditures on food and non-food items, as well as percent expenditures on food. Percent expenditures on categories of non-food essentials were also derived. Assets were used as a control variable for expenditures. A score was calculated as a simple count from 12 durable household items: bed, table, chair, lantern, cooking utensils, bicycle, cart, hoe, axe, *muharat*, radio and jewelry.

- Household's own food production: This variable was not available from the dataset. The questionnaire included questions on the cultivated land, types of crops and the expected yield. It cannot be assumed however that the cultivated land will yield the expected yields and that this will entirely go into household's own consumption, more so in conflict situations where mobility and access to land are restricted by security threats and intimidation. The total amount of land cultivated by a household (*mukhamas*) was therefore retained as a proxy for displacement (as a result of the conflict) rather than as a production indicator.

- Food transfers: The questionnaire included a question on the history of receiving food aid for each of the six months preceding the survey date. A figure was derived by adding the total number of months when food aid was received. The present study will not test for food transfers in the form of meals eaten at neighbors or family's place as this information was deemed of minimal added value in this particular conflict context.

[21] A household is defined as: "people who regularly eat from the same pot and live on the same premise."

- Coping strategies: An index was constructed as a simple count from a series of 10 questions on food-related coping mechanisms including eating less preferred foods, fewer meals, purchasing food on credit, selling assets, borrowing, migration or distress work (Maxwell, 1996). The more coping mechanisms employed, the higher the value of the index.

- Household head: the variable of interest was defined as the self-declared, man or woman. Women-headed households were further disaggregated into *de facto* and *de jure* and a new variable constructed. Women were considered as *de facto* heading households when the husband is alive but away for an extended period of time (due to war, work, migration or other). They were classified as *de jure* heads of household when the woman is widowed, divorced or never married (Kennedy and Peters, 1992; Levin *et al.*, 1999).

Regression modeling was performed to test the potential association between household headship and household food consumption (as measured by dietary diversity) for every category of displacement: IDPs living in camps, IDPs living with the community and resident households. The factors included in the regression model (as identified in the conceptual framework, figure 4.1) were the following: expenditures on food, total monthly expenditures and household assets (to control for total expenditures), land cultivated, months of food aid received, remittances received and coping strategies. All variables were continuous, except for remittances that was binary. Household headship, the variable of interest, was an integral part of the model with male headship considered the reference and female headship *de facto* and *de jure* the added variables.

All statistical analysis was performed using SPSS 15.0.1.

III. RESULTS [22]

Demographic Characteristics

The sample consisted of 69.3% MHH (n=2011), 19.1% *de facto* WHH (n=555) and 11.6% *de jure* WHH (n=336). Men-headed households had a mean of 6.84 persons per household (table 5.1), significantly larger than *de facto* WHH who had 6.36 persons per household and *de jure* WHH with 5.0 persons per household. *De jure* WHH also had fewer children per household: a mean of 0.97 compared to 1.22 and 1.27 for MHH and *de facto* WHH respectively.

Socio-economic Variables

Assets and expenditures:
Table 5.1 shows that at the time of the survey in 2005 MHH fared better than WHH (both *de facto* and *de jure*) on the characteristics related to economic status (Table 5.1). WHH owned significantly fewer assets on average than MHH with a mean of 2.76 items (out of 12 possible durable household goods) for *de facto* WHH and 2.98 items for the *de jure* WHH vs. 3.84 items for MHH. As to expenditures, in absolute values, the total monthly per capita expenditures of *de facto* WHH were about 30% less than those of either MHH and *de jure* WHH: 1886 Sudanese Dinars (SD) for *de facto* WHH vs. 2526 SD for MHH and 2784 for *de jure* WHH. In terms of percent of monthly expenditures spent on food, both WHH *de jure* and *de facto* faired significantly worse than MHH: MHH spent about 75% of their total monthly cash on food vs. nearly 80% for both *de jure* and *de facto* WHH. Men-headed households also cultivated more land than both types of WHH (table 5.1) with an average of 1.93 mukhamas, compared to 1.28 mukhamas for *de facto* WHH and 0.94 mukhamas for *de jure* WHH.

Sources of income:
The primary source of income for IDP households, whether living in camps or with the host community and whether men- or women-headed, was wage labor followed by food aid sale then firewood sale (table 4.2). For resident households however, the differences between MHH's and WHH's main sources of income were visible: MHH lived off sale of agricultural produce (21.7% of households) followed by wage labor (~20%) then salaried work and food aid sale (each at ~10%). Women-headed households, on the other hand, had a different profile: *de facto* WHH's main sources of income were wage labor (~30%), salaried work (~19%) and sale of cereals and other agriculture products (each at ~10%). De jure WHH's main sources of income were wage labor (~26% of households) and sale of other agricultural products (~21%). A large proportion of households in the resident community, whether IDPs living with a host or resident dwellers relied on a multitude of "other" sources of income (from 32 to 46% of households) as a main means of living.

[22] Only statistically significant results (at the p=0.05 and p=0.01 level) are reported in the text. For the confidence intervals (CI) and exact p values, please refer to the corresponding tables.

Table 5.1. General household characteristics by headship breakdown: Darfur, Sudan EFSNA 2005 (MHH n=2011, de factoWHH n=555, de jure WHH n=336; total N=2902).

	MHH Mean (95% CI)	***de facto*WHH Mean (95% CI)**	***de jure*WHH Mean (95% CI)**	**p**
Household size**	6.84 [a] (6.73 to 6.99)	6.36[b] (6.15 to 6.57)	5.02[c] (4.73 to 5.32)	.000
Number of children under 5 years of age**	1.22 [a] (1.17 to 1.26)	1.27 [a] (1.19 to 1.36)	0.97[b] (0.87 to1.07)	.000
Assets owned (number of items)**	3.84 [a] (3.74 to 3.94)	2.76 [b] (2.62 to 2.90)	2.98[b] (2.78 to 3.17)	.000
Animals owned	4.61 [a] (4.10 to 5.11)	2.87 [b] (2.36 to 3.37)	3.31[a,b] (0.76 to 5.86)	.008
Total per capita monthly expenditures**	2526.51[a] (2426 to 2627)	1885.97[b] (1692 to 2080)	2783.79[a] (2430 to 3138)	.000
Percent monthly expenditures on food**	74.57 [a] (73.48 to 75.66)	79.01[b] (77.05 to 80.96)	80.24[b] (77.70 to 82.78)	.000
Total land cultivated (in *mukhammas*)	1.93 [a] (1.81 to 2.05)	1.28 [b] (1.11 to 1.45)	0.94 [b] (0.75 to 1.13)	.000
Total months of food aid (received in the last 6 months)	3.35 [a] (3.26 to 3.44)	3.76 [b] (3.60 to 3.93)	3.26 [b] (3.02 to 3.49)	.000
Coping strategies index	1.66[a] (1.58 to 1.74)	1.63 [a,b] (1.48 to 1.77)	1.38[b] (1.22 to 1.53)	.022
Dietary diversity score (cumulative times/week)	27.36 [a] (27.04 to 27.69)	25.88 [b] (25.28 to 26.48)	25.92 [b] (24.98 to 26.86)	.000
Animal source foods (times/week)	3.49[a] (3.32 to 3.65)	2.70 [b] (2.43 to 2.98)	2.69 [b] (2.53 to 3.35)	.000

Sample means were compared with ANOVA tests
[a,b,c] Different initials refer to statistically different values (Bonferroni Post Hoc test, alpha .05).

Table 5.2. Households' main source of income.

5.2.a. Aggregate, all displacement categories (valid cases: MHH n=2009, WHH de facto n=552, and WHH de jure n=335).

	MHH		WHH *de facto*		WHH *de jure*	
	%	n	%	n	%	N
Main source of income:						
Wage labor	27.6	555	38.2	211	34.3	115
Food aid sale	17.6	353	22.6	125	15.5	52
Sale of agricultural products	12.5	251	4.2	23	9.6	32
Firewood sale	11.5	231	10.2	50	10.7	36
Other*	30.8	619	24.8	143	29.9	93

*Other income categories include: sale of cereal products, sale of livestock, skilled labor, salaried work, petty trade, grass sale, kinship, begging, borrowing, remittances, and other.

5.2.b. IDPs living in camps.

	MHH		WHH *de facto*		WHH *de jure*	
	%	n	%	n	%	N
Main source of income:						
Wage labor	35.9	243	46.4	115	40.5	53
Food aid sale	29.6	200	29.0	72	26.7	35
Firewood sale	12.3	83	10.5	26	16.8	22
Other*	22.1	150	14.0	35	16.3	21

*Other income categories include: sale of cereal products, sale of agricultural products, sale of livestock, skilled labor, salaried work, petty trade, grass sale, kinship, begging, borrowing, remittances, and other.

5.2.c. IDPs living with the host community.

	MHH		WHH *de facto*		WHH *de jure*	
	%	n	%	n	%	N
Main source of income:						
Wage labor	31.9	115	37.2	29	42.1	24
Food aid sale	19.4	70	12.8	10	15.8	9
Firewood sale	12.5	45	17.9	14	10.5	6
Other*	36.1	131	32.1	25	31.8	18

*Other income categories include: sale of cereal products, sale of agricultural products, sale of livestock, skilled labor, salaried work, petty trade, grass sale, kinship, begging, borrowing, remittances, and other.

5.2.d. Residents.

	MHH		WHH *de facto*		WHH *de jure*	
Main source of income:	%	n	%	n	%	N
Sale of cereals			9.0	15	7.9	11
Sale of other agri products	21.7	181	10.2	17	20.7	29
Wage labor	19.9	166	30.5	51	25.7	36
Firewood sale	9.8	82				
Salaried work	9.7	81				
Food aid sale			19.2	32		
Other*	38.8	325	40.2	67	45.6	64

*Other income categories include: sale of livestock, skilled labor, petty trade, grass sale, kinship, begging, borrowing, remittances, and other.

Food Security Variables

Coping Strategies:
The extent of coping strategies employed by MHH and *de facto* WHH was significantly higher than that of *de jure* WHH with a mean score of 1.66 and 1.63 respectively compared with 1.38 for *de jure* WHH (table 5.1).

Dietary Diversity:
MHH had significantly better dietary diversity than both categories of WHH (table 5.1) consuming almost once a week more animal source foods (consumption is 3.49 times/week for MHH vs. 2.70 times/week and 2.94 times/week for WHH *de facto* and *de jure* respectively). There were no differences between MHH and WHH in the consumption of non-animal source foods (results not reported).

Place of Residence

The distribution of MHH and WHH (both types) was almost identical in the resident community and among IDPs living with the displaced community (table 5.3). Seventy-three percent of the residents were MHH, nearly 15% were *de facto* WHH and 12% *de jure* WHH. Similarly, the IDP population living with the host community was comprised of just under 73% MHH, nearly 16% *de facto* WHH and 12% *de jure* WHH. In contrast, the IDP population of the camps consisted of significantly less MHH and more *de facto* WHH: 64% MHH and nearly 24% de facto WHH. The *de jure* WHH proportion of the population remained the same among all displacement categories at 12%.

Table 5.3. Place of residence.

	MHH		*de facto* WHH		*de jure* WHH		Total		P*
Place of residence:	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**N**	
									0.000
IDPs living in IDP camp	64.0	677	23.6	249	12.4	131	100	1057	
IDPs living with host community	72.6	361	15.7	78	11.7	58	100	497	
Residents	73.0	835	14.8	169	12.2	140	100	1144	

*Categorical variables compared with Chi-square test.

The same socio-economic characteristics described above were disaggregated and compared by displacement status: IDPs living in camps, IDPs living with the host community and residents. The results are reported in table 5.4.

Table 5.4. Key household characteristics by household headship and displacement status (means compared by ANOVA).

		IDP in camp			IDP in community			Residents		
		MHH	**FHH *de facto***	**FHH *de jure***	**MHH**	**FHH *de facto***	**FHH *de jure***	**MHH**	**FHH *de facto***	**FHH *de jure***
Assets owned (number of items)	Mean	2.71[a]	2.13[b]	1.95[b]	3.70[a]	2.82[b]	2.78[b]	5.05[a]	3.81[b]	4.08[b]
	95% CI	(2.59-2.83)	(1.96-2.30)	(1.74-2.17)	(3.49-3.90)	(2.46-3.19)	(2.34-3.21)	(4.89-5.21)	(3.51-4.10)	(3.73-4.37)
	p	p=0.000			p=0.000			p=0.000		
Total per capita monthly expenditures	Mean	2385.23[a]	1646.56[b]	1952.91[a,b]	2496.79[a]	1776.17[b]	3184.17[a]	2767.33[a]	2461.91[b]	3471.11[b]
	95% CI	(2229-2541)	(1311-1752)	(1902-2301)	(2250-2743)	(1408-2144)	(2026-4342)	(2601-2934)	(2131-2792)	(2866-4075)
	p	p=0.000			p=0.007			p=0.002		
Percent expenditures spent on food	Mean	75.90[a]	79.49[a,b]	85.25[b]	75.62[a]	83.93[b]	81.55[a,b]	73.49[a]	79.21[a]	74.80[a,b]
	95% CI	(74.03-77.77)	(76.55-82.43)	(81.96-88.53)	(73.10-78.14)	(79.60-88.27)	(74.88-88.22)	(71.87-75.09)	(76.02-82.40)	(70.48-79.11)
	p	p=0.000			p=0.009			p=0.017		
Total land cultivated (in mukhamas)	Mean	0.66[a]	0.34[b]	0.14[b]	1.15	0.75	0.64	3.20[a]	2.37[a]	1.79[b]
	95% CI	(0.52-0.80)	(0.22-0.46)	(0.04-0.24)	(0.97-1.34)	(0.49-1.00)	(0.36-0.91)	(2.98-3.42)	(1.98-2.76)	(1.41-2.18)
	p	p=0.000			p=0.018			p=0.000		
Food aid total	Mean	3.94	4.10	3.72	3.45	3.90	3.81	2.76	2.89	2.58
	95% CI	(3.79-4.08)	(3.85-4.36)	(3.39-4.08)	(3.23-3.67)	(3.49-4.31)	(3.22-4.40)	(2.63-2.89)	(2.59-3.19)	(2.23-2.92)
	p	p=0.200			p=0.146			p=0.400		
Dietary diversity	Mean	27.29[a]	25.69[b]	23.88[b]	27.21[a]	24.46[b]	23.66[b]	27.87	26.75	26.64
	95% CI	(26.74-27.83)	(24.78-26.60)	(22.65-25.10)	(26.39-28.04)	(22.83-26.09)	(21.44-25.87)	(27.35-28.38)	(25.68-27.81)	(27.03-30.26)
	p	p=0.000			p=0.001			p=0.093		
Animal-source food consumption	Mean	2.79[a]	2.17[b]	1.73[b]	3.56[a]	2.35[b]	2.21[b]	4.31	3.76	4.46
	95% CI	(2.55-3.02)	(1.81-2.53)	(1.26-2.19)	(3.15-3.97)	(1.72-2.98)	(1.34-3.07)	(4.04-4.57)	(3.15-4.36)	(3.71-5.21)
	p	p=0.000			p=0.004			p=0.216		

[a,b,c] Different initials refer to statistically different values (Bonferroni Post Hoc test, alpha .05).

In the aggregate analysis, WHH (both *de facto* and *de jure*) fared worse than MHH on almost all socio-economic indicators, namely: assets, percent food expenditures and land cultivated (table 5.1). This remained true when comparisons were made across displacement categories (table 5.4). Table 5.5 presents a visual summary of these results. Our food consumption indicator, dietary diversity, however, displayed a different pattern when compared across the different displacement categories. Both categories of WHH fared worse than MHH but only among the displaced population whether living in camps or with the host community. There were no significant differences in the dietary diversity scores among MHH and WHH in the resident population. The results of consumption of animal-source foods echoed those of the dietary diversity score.

Table 5.5. Who is the worst-off? Summary comparison of households across headship and displacement categories (based on results reported in table 5.4).

AGGREGATE	MHH	de facto WHH	de jure WHH
Assets owned		✓	✓
Total expenditures		✓	✓
Percent food expenditures		✓	✓
Total land cultivated		✓	✓
Dietary diversity score		✓	✓
Animal source foods		✓	✓
Months of food aid	✓		✓
Coping strategies index	✓	✓	

IDPs in CAMPS	MHH	de facto WHH	de jure WHH
Assets owned		✓	✓
Total expenditures		✓	
Percent food expend.		✓	✓
Total land cultivated		✓	✓
Dietary diversity score		✓	✓
Animal source foods		✓	✓
Months of food aid	ns	ns	ns
Coping strategies index	ns	ns	ns

IDPs in the COMMUNITY	MHH	de facto WHH	de jure WHH
Assets owned		✓	✓
Total expenditures	✓	✓	
Percent food expend.		✓	✓
Total land cultivated			
Dietary diversity score		✓	✓
Animal source foods		✓	✓
Months of food aid	ns	ns	ns
Coping strategies index	ns	ns	ns

RESIDENTS	MHH	de facto WHH	de jure WHH
Assets owned		✓	✓
Total expenditures	✓	✓	
Percent food expend.		✓	✓
Total land cultivated			✓
Dietary diversity score	ns	ns	ns
Animal source foods	ns	ns	ns
Months of food aid	ns	ns	ns
Coping strategies index	ns	ns	ns

✓: significantly worst
ns: non-significant differences

Effect of Household Headship on Food Consumption

The factors believed to affect household food consumption, as previously identified in figure 5.1, were fitted in a linear model and backward regression applied; these factors are: per capita monthly expenditures corrected for by percent food expenditures and household assets, land cultivated, months of food aid and coping strategies. Household headship, the variable of interest, was an integral part of the model with male headship considered the reference and female headship *de facto* and *de jure* the added variables.

Interaction terms were created for all possible variable combinations in all categories and introduced to the models to test for possible interactions. None of the results were significant at the 0.05 level, suggesting that each of the variables in the final models were acting independently. Table 5.6 shows the details of the final models.

Table 5.6. Factors associated with food consumption in all categories of displacement (backward regressions).

	IDPs in camp		**IDPs in community**		**Residents**	
Variable	**B**	**Sig.**	**B**	**Sig.**	**B**	**Sig.**
Constant	23.184		23.190		21.794	
Monthly expenditures	.001	.000	.001	.000	.001	.000
% food expenditures	-	-	-.029	.031	-	-
Assets	.620	.000	1.317	.000	.944	.000
Land cultivated	-	-	-	-	-	-
Months of food aid	.440	.000	-	-	.230	.029
Received remittances (yes, no)	-2.322	.002	-	-	-1.836	.043
Coping strategies index	-.498	.000	-.488	.003	-.822	.000
Female headship *de facto*	-	-	-	-	-	-
Female headship *de jure*	-2.369	.027	-2.811	.005	1.543	.021
Model	Adj. R-square= .15 SE Estimate= 6.647 Sig.= .000		Adj. R-square= .28 SE Estimate= 6.724 Sig.= .000		Adj. R-square= .21 SE Estimate= 6.907 Sig.= .000	

Total expenditures were significantly but very weakly associated with food consumption across the 3 categories of displacement. Household assets were significant, positive and strong predictors of food consumption. The strongest association was observed among the IDPs living with the host community. Receiving food aid was also positively associated with food consumption but among IDPs living in camps (and not those living with the host community) and residents. Receiving remittances was a strong and negative predictor of dietary diversity among IDPs living in camps and residents (and not IDPs living in the community). The coefficient for remittances in IDPs living in camps was negative 2.3 meaning that all variables held equal, receiving remittances predicted a dietary diversity score of 2.3 points lower than other households. Coping strategies were also negatively and strongly associated with food consumption but among all categories of displacement suggesting that all households (even residents) were employing food related negative strategies in order to preserve consumption.

The relation between food consumption and female headship, the variable of interest, was strong and negative for IDPs whether living in camps or with the host community. The coefficient was -2.37 for IDPs living in camps, meaning that all variables equal, *de jure* WHH (i.e. widowed or single) had a dietary diversity score lower than that of other households by 2.37 points. Among the residents, however, this relationship was reversed: being a *de jure* WHH predicted better food consumption by 1.54 points.

IV. DISCUSSION

This paper explored the relationship between household headship and households' food security of the population living in the conflict-affected area of Darfur in Sudan. Dietary diversity, a measure of food consumption, is a good indicator of the access dimension of food security (Hoddinott and Yohannes, 2002). It is relatively simple to collect and it measures the extent of variety in a household's diet, which is associated with improved nutritional outcomes such as improved birth-weight and anthropometric indices (FANTA, 2002). In addition, there is a clear positive correlation between socio-economic status and household food security: because food security is partially dependent on purchasing power, an increase in economic status can lead to an increase in food security (Broca, 2002), this in turn can lead to an increase in dietary diversity.

Our results show that household headship, namely being a *de jure* WHH (widowed, divorced or single) was an independent and strong predictor of dietary diversity and this in all categories of displacement. For displaced people living in IDP camps, being a *de jure* WHH predicted a dietary diversity score lower than that of other households by 2.3 points (all other variables being equal). Other negative predictors included whether the household received remittances and whether food consumption related coping strategies were employed. On the opposite direction, positive predictors of dietary diversity included the number of non-productive assets owned and total amount of food aid received. For displaced people living with the host community, similar negative predictors remain as for camp dwellers are observed (and with the same magnitude), namely *de jure* headship and employing food consumption coping strategies. Receiving food aid was not a significant predictor of dietary diversity for IDPs in community, household assets was a positive predictor but with double magnitude coefficient than for IDPs in camps (1.3 for IDPs in the community vs. 0.62 for IDPs living in camps). The picture for the resident population was different. *De jure* headship was an independent predictor of dietary diversity but the association was positive. *De jure* headship predicted better dietary diversity among the resident group (a score 1.5 points higher than for the rest, all other variables being equal). Other positive predictors included household assets and the receipt of food aid, while the negative predictors were receiving remittances and employing coping strategies.

The fact that only *de jure* headship predicted poorer household food consumption implies that *de facto* WHH (husband absent) were still getting network or financial support either directly or indirectly from the husband or in-law family despite the men being physically absent from the household. Families might have elected to separate the household and live in IDP camps for personal safety and/or security reasons (husbands might be part of the warring fractions, engaged directly or indirectly in war economies and their presence in the camps a threat to their

families' safety). In the communities on the other hand, traditional forms of support have likely developed and WHH living with a host family (whether relatives or friends) were likely to tap into these networks.

Our findings suggest that not all WHH are similar with regards to food consumption, there are different implications for the different circumstances leading to female headship in households. While all WHH appear to be poorer than MHH -WHH (both *de jure* and de *facto*) spent a larger proportion of their income on food and owned less assets- this translated into worse dietary consumption only in the *de jure* WHH group. These subtle differences need to be taken into account while conducting large-scale or comprehensive assessments and subsequently designing and implementing large-scale food security programs.

The effectiveness of food aid in long term crises has been a subject of longstanding debate. It is argued that the main role for food aid is fulfilled when it is used to protect the immediate right to food of populations affected by acute humanitarian crises. Beyond this acute stage, other non-food forms of relief might be preferable, especially when market failures and availability of food are no longer a barrier (Barrett and Maxwell, 2005). The effectiveness of the humanitarian response as a whole to the conflict in Darfur has also been questioned as sectoral coverage of services remained low and much below the actual needs (except for food and primary health care where coverage was nearly for 70% of the conflict-affected population) (Minear, 2004). Yet in our analysis, food aid appears to be playing an important role in the food security of the population in Darfur. This is mainly due to the lack of alternative means to access food.

Food aid has been the dominant and best funded response to food insecurity in Darfur (and all humanitarian crises for that matter). Although food security interventions can also be of non-food nature (such as cash and voucher transfers, and protection and restoration of productive assets), food aid remains the most ubiquitous form of relief in crisis situations (Maxwell *et al.*, 2008). Households in Darfur reported a limited set of income-earning activities but different trends were observed between IDPs and residents. For IDPs, the main sources of income were wage labor, food aid sale and firewood sale. The absence of agriculture-related activities is a consequence of the altered livelihoods inflicted by displacement and limited mobility as the freedom of movement of the displaced population is a function of the security situation. For residents, sale of agricultural products (cereals and other crops) topped the list of main sources of income for MHH and *de jure* WHH; *de facto* WHH still relied on wage labor and food aid sale. Activities related to the war and war economy were not disclosed. It is not surprising to find food aid sale in the main sources of income of a crisis-affected population. The sale of parts of a food aid ration has long existed (WHO, 1988). It usually stems from a need to diversify the diet (sale of food for other food), to purchase non-food items or services, to benefit from the high market value of certain ration items (such as sugar and canned foods), or simply because certain food items (such as non-staple cereals) are not familiar to the beneficiaries (Hilderbrand *et al.,* 1998). Some counter-measures have been implemented such as the WFP's gender policy that specifies that rations be distributed directly to women in order to minimize food aid sale and ensure that food is being used for its intended purpose to the benefit of all household members (WFP, 2002). Sale of part of the ration improves the quality of the diet but leads to caloric loss (Reed and Habicht, 1998; WFP/UNHCR, 2006) but also maybe more importantly, for households to rely on food aid sale as a livelihoods-preserving strategy means they are exposing themselves to constant economic and nutritional risk by relying on a ration that may well be inconsistent in terms of quantity, quality and timeliness of delivery. Stability, predictability and timing of a food

aid intervention are its most fundamental principles as they enable beneficiaries to make informed decisions about how to manage and respond to risks based on their/households' assessment of the timing and size of available resources but remain a huge challenge in food security interventions (Maxwell *et al*., 2008). Addressing the issue of dependence on food aid (and relief aid in general) in Darfur transcends the realm of humanitarian action to the political resolution of the conflict at all levels (Harvey and Lind, 2005). In more pragmatic and programmatic terms, making explicit links between protection and assistance and taking response strategies beyond food aid and into livelihoods support, have been persistent recommendations in moving forward (Young, 2007).

Remittances were significantly and negatively associated with dietary diversity in this study. In the absence of formal or institution-sponsored safety nets, informal or private transfers such as remittances play an important role in strengthening the short-term capacity of households to access food and other basic services (Pingali *et al.*, 2005). Studies from various countries in Africa (but none in conflict contexts) suggest that remittances lead to a decrease in poverty in recipient households (Mohapatra and Ratha, 2011). In Mali, households used a major part of remittances as a form of insurance against unexpected events (Ponsot and Obegi, 2010). In Nigeria, remittances were shown to greatly improve the food security of rural households (Babatunde and Martinetti, 2010). Our results suggest that the relation between remittances and food security (the access/consumption dimension) is negative. IDP households who reported receiving remittances or resorting to coping strategies fared worse on the dietary diversity indicator than other households. This might be an effect of the conflict and displacement that offsets the positive effects of remittances in the absence of constant and reliable sources of income. We do not know whether households received remittances regularly before the conflict or whether the remittances were a response to the acute effect of the crisis, loss of livelihoods and income shortfall. This is an area that requires further research.

All households, displaced and residents, resorted to coping strategies in order to preserve food consumption. This is an indication of the broad effect of the crisis and implies a need for a corresponding broad-based relief targeting. Our results show that coping strategies were significantly and negatively associated with dietary diversity. The impact of a shock on a household's food security is a function its coping capabilities (Webb and von Braun, 1994). In emergency situations, what households do in the short-term to preserve food consumption can accurately reflect their food security situation (Maxwell *et al*, 2003). Coping strategies (and other ways to minimize the intensity and duration of a shock, including also reliance on social networks) strengthen the resilience of households to shocks, allowing them in the short-term to fend adversity and preserve socially acceptable livelihoods (Swift 1993; Davies 1996).

V. CONCLUSION

The main conclusions from this study are the following: 1) in Darfur WHH are poorer than their men counterparts but poverty translated into poorer food consumption only in displaced *de jure* WHH whether living in camps or within the host community, and 2) coping strategies and reliance on remittances negatively impacted food consumption. The subtle differences in the vulnerability profiles of both IDPs and residents, including the different categories of household

headship, need to be taken into consideration when assessing vulnerabilities, needs, as well as when designing food aid interventions. It is also important to understand the coping strategies employed by all households affected by conflict (regardless of headship or displacement status) and support households in building their resilience in order to preserve food consumption.

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CHAPTER 6

Malnutrition in emergencies: when care is equally important as food and health.

ABSTRACT

Malnutrition is a complex consequence of inadequacies in food, health, and care; care as a concept remains the least studied of all three. Mothers bear the primary responsibility for child care provision and, in crisis situations, they are themselves burdened by the psychological consequences of war, which may prevent them from providing good child caring practices to their children. This paper reviews the effect of displacement on maternal mental health, the relation between maternal mental health and child malnutrition, and in this light, the effect of complex emergencies on the care of children. A systematic search of the literature in Medline, PubMed and Web of Science was performed for all studies done to investigate child caring practices in relation to malnutrition and in complex emergencies between the years 1975 and 2012. It used the keywords "malnutrition and care", "displacement and mental health", "maternal mental health and child care", "maternal mental health and child nutrition". This search was complemented by a manual search of reports, articles, and bibliographies from international agencies and organization's policy papers, discussion papers and reviews. Results show enough evidence to suggest that maternal mental health directly affects the care dimension and consequently the other related causes of malnutrition. When analyzing malnutrition in complex emergencies, there is need to go beyond the analysis of food and health and give the care dimension the attention it deserves.

I. INTRODUCTION

The main objective of nutrition interventions in emergency situations remains to manage acute malnutrition and reduce mortality, the end manifestations of extreme physiological stress precipitated by crises. Most of the relief interventions in the acute phase of an emergency are directed towards immediate needs: water supply, sanitation, and hygiene promotion; food security and nutrition; shelter and non-food items; and health action (Sphere Project 2011). However, in addition to physical needs, mental health has been recognized as a key public health issue in emergencies and is taking an increasingly important place in humanitarian interventions, (Brundtland 2000, Mollica et al 2004, Ommeren et al 2005, Jacobs 2007, IASC 2011). It is estimated that more than half of the refugees worldwide suffer from mental health problems of varying intensities (trauma, distress, chronic mental problems) resulting from the massive suffering they experience (Brundtland 2000).

While there is a wealth of studies and reviews on food security in emergencies (for example Maxwell et al 2003, Pingali et al 2005, Maxwell et al 2010), and similarly for public health in emergencies (for example Toole and Waldman 1997, Salama et al 2004) with standardized practice requirements and methodologies (SPHERE, SMART), there is almost no published research on the impact of emergencies on care that may precipitate child malnutrition. The concept of care, though, has remained unchanged since its early definitions. Its main components include feeding practices and breastfeeding, hygiene practices (food and personal hygiene), home-based health care (such as oral re-hydration therapy), and psycho-social practices including stimulation and responsiveness (Jonsson 1996).

The concept of care as a potential cause of malnutrition, expanding the understanding that malnutrition was not just a 'food' problem, was introduced for the first time by the UNICEF framework for the causes of malnutrition (UNICEF 1990; Engle, Menon, and Haddad 1997). But despite the acknowledgement of the role of care for women and children in the protection of the nutritional status of children, that role (in terms of concepts and measurement) has not been well elaborated in research (Arimond and Ruel, 2001) or in practice, in emergencies and non-emergency settings alike. Moreover, the mother who is usually the primary caregiver, bears much of the responsibility for child care provision. All the components of care listed by Jonsson 1996 (and repeated thereafter in other publications, for example Engle 2007, PAHO/WHO 2003) namely: feeding and breastfeeding, hygiene, home-based health care, and child stimulation, are included in her duties. If mothers are physically able and supported by social and family networks, they can provide the optimal care within their means for their children. But in crisis situations, mothers themselves are burdened by stress and the psychological consequences of war trauma which may prevent them from providing optimal care for their children at a time when they are likely to be vulnerable themselves.

In contrast, the parts played by food and health in preserving children's nutritional status have been heavily documented (Lancet volume 364, 2004). At the field level and in emergencies, this has translated into humanitarian interventions being dominated by food aid such as general food distributions, selective feeding and, to a larger extent, community-based nutrition programs, as well as by basic public health measures such as the provision of clean water and sanitation, measles immunization, and control of communicable diseases (Toole and Waldman 1997).

In this paper, we seek to assess the role of care for children in emergencies, along with food and health. Additionally, we hope to get insight on the value of mental health and well-being of mothers who hold the primary responsibility for the provision care. In doing so, we hope to fill a gap in research on the role of care in preserving child nutritional status in emergency settings. First, we review how the main consequence of armed conflict, namely displacement and its associated stressors, affect maternal mental health and therefore mothers' ability to care for their children. Second, we review how maternal mental health affects child malnutrition. And third, we connect these two ends by reviewing how emergencies affect care for children. We limit our review and analysis to conflict-related complex emergencies defined as "humanitarian cris(es) in a country, region or society where there is total or considerable breakdown of authority resulting from internal or external conflict and which requires an international response that goes beyond the mandate or capacity of any single agency and/ or the ongoing United Nations country program." (IASC, December 1994). A simple illustration of the hypothetical relationships (listed above) between care for children and nutrition can be found in figure 6.1.

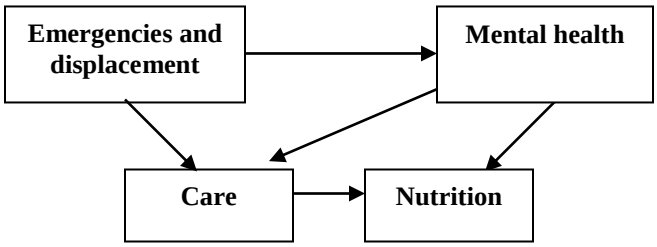

Figure 6.1. Illustration of the relations between emergencies, maternal mental health, care and child nutritional status.

This paper is part of a PhD thesis dissertation investigating the causes of malnutrition in complex emergencies. The first paper analyzed the causes of child wasting in the conflict-stricken region of Darfur, Sudan between 2005 and 2007 and across categories of affected populations (internally displaced people in camps, internally displaced people with the host community, and non-displaced residents). The second dissertation paper analyzed the determinants of dietary diversity in female headed households (as compared to male headed households) in the same population.

Understanding the Relationship between Care and Malnutrition

Analyzing Malnutrition

In order to identify and analyze the causes of malnutrition, nutritionists commonly use the UNICEF framework for the causes of malnutrition (UNICEF 1990) as a guide. The framework depicts malnutrition in children of pre-school age as an immediate consequence of sickness and poor food intake; these in turn are precipitated by inadequacies in three broad elements: food, health, and care (UNICEF 1990, figure 6.2). The model highlights the complexity and inter-connectivity of underlying elements so that malnutrition is seen as a complex consequence of

inadequacies in food, health, and care, rather than just one element acting alone. This in turn influences how the causality of malnutrition is identified and addressed through policies, strategies, and/or programs.

The framework was mainly meant to be used in development or non-emergency contexts but since its first presentation more than twenty years ago, it has undergone many adaptations to serve the multiple objectives of the adopting/adapting agencies using it. These adaptations include jump-starting discussions on malnutrition, using it for advocacy purposes, as a research template, for targeting interventions, using it to guide program implementation, for analyzing emergency and crisis situations, and for exploring emerging topics in nutrition and health (Karas 2010). This broad spectrum of potential and actual uses has generally allowed the framework to be used by international organizations and agencies as the basis for nutritional assessments in emergencies precipitated by conflict (Valid/Concern 2006, IASC 2011, Sphere Project 2011, UNHCR/WFP 2011). Also, the framework has been largely and regularly used by practitioners and emergency nutritionists as the main analytical tool for investigating a nutrition situation in complex emergency settings. The emphasis though has constantly been placed on investigating the immediate causes of malnutrition (disease and food intake) as well as the underlying causes (food and health, with the exception of care) and not the basic causes as these are quite difficult to attribute or to define the causality pathways in which they operate.

Understanding "Care"

Care refers to the way women and children are looked after, "the provision in the household and community of time, attention, and support to meet the physical, mental, and social needs of the growing child" (Engle et al 1997, p. 2). Care practices are determined by cultural factors, knowledge of caregivers, time available to dedicate to caring, and income. In emergencies, children are vulnerable to changes in caring practices as they are largely dependent on their caregivers (usually the mother) to provide for their needs in feeding, hygiene and psychosocial stimulation and caregivers might be directly or indirectly affected by crisis.

As such, "care" also refers to caring for women as they might need to be supported physically, financially, psychologically and socially, especially when pregnant or lactating (IASC 2011). Adequate maternal nutrition, health and physical status are crucial to the children's nutritional status, growth and development (from fetal development, to low birth-weight, to subsequent stunting (World Bank 2006, Engle et al 2000, PAHO/WHO 2003, Black and Aboud 2011). Pregnancy increases maternal needs for nutrients (both macro- and micro-nutrients), and at the same time, deficiencies are not solely the result of inadequate dietary intake; disease can impair absorption of nutrients and reduce appetite, and environmental and psychosocial stress affecting the mother can contribute to child under-nutrition (Walker et al 2011).

Infant and young child feeding practices can be compromised in an emergency situation as breastfeeding can be reduced or ceased due to psychological stress, due to time constraints, or due to new demands (economic, new household responsibilities) placed on the mother. Disruptions to child care and feeding practices can occur as caregivers spend more time searching for income, water, and food, than what they were normally engaged in before the crisis. This can disrupt or reduce the usual time and resources allocated for the care of young children. The psycho-social context may also change with fear, stress, and anxiety of both women/caregivers and children can affect the way care is provided. In addition, children need

cognitive stimulation and emotional support that might not be available if their caregivers are themselves under constraints. Some challenges to women's roles, status and rights can also happen thorough the loss of the community and family networks and support structures that provide an informal support system to care. Because the societal factors play an important role in care, any disruption to societal structure or norms, as happens in emergencies, is likely to affect care as well (WHO 2004).

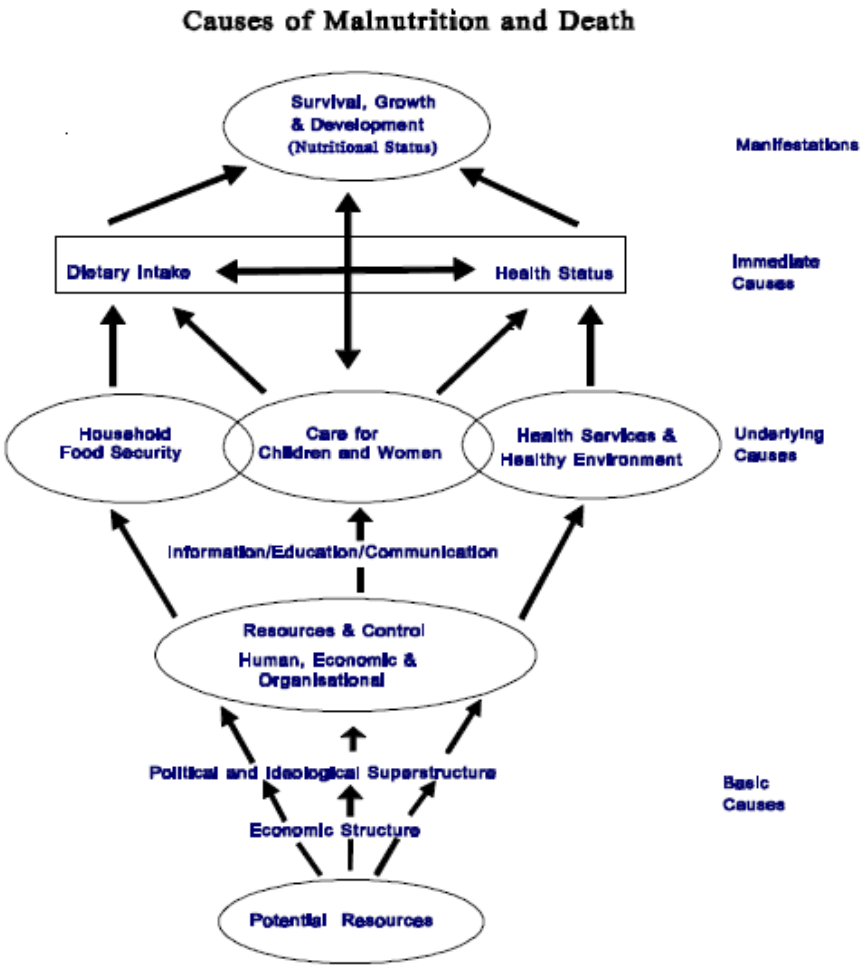

Figure 6.2. The original framework for the causes of malnutrition as presented in UNICEF's Strategy for Improved Nutrition of Children and Women in Developing Countries (UNICEF 1990).

Figure 6.3, adapted from FAO 2005 and UNHCR/WFP 2011 summarizes potential effects of conflict on the underlying causes of malnutrition.

II. METHODS

Because of the absence of peer reviewed studies that explore the relation between care for children and malnutrition in an emergency context, and because of the absence of systematic assessment of this particular field in the literature, a systematic review of the literature was proposed. An extensive electronic search of the Medline and PubMed and Web of Science databases was conducted using the terms: nutrition, emergencies, causes, conflict, war, displacement, child, care, maternal mental health, and psychosocial, as previously identified. The search encompassed the years from 1975 to 2012. Studies written in a language other than English were excluded from the literature review. Articles representing expert opinions or commentaries were also excluded. Manual searches of reports, articles, and bibliographies listed on Google Scholar were also conducted. Studies pertaining to the following keywords were reviewed: “malnutrition and care”, “displacement and mental health”, “maternal mental health and child care”, “maternal mental health and child nutrition”. Studies in non-emergencies were assessed for applicability during emergencies. The grey literature was also searched with these same terms. Google and Google Scholar were used to look for international agencies and organizations policy papers, discussion papers and reviews. Of note is the rather scarce peer reviewed literature relating to malnutrition in emergencies and the absence of studies on care in emergencies. With this literature review, we hope to identify key areas of research and set a foundation for future empirical studies wishing to examine care in emergencies.

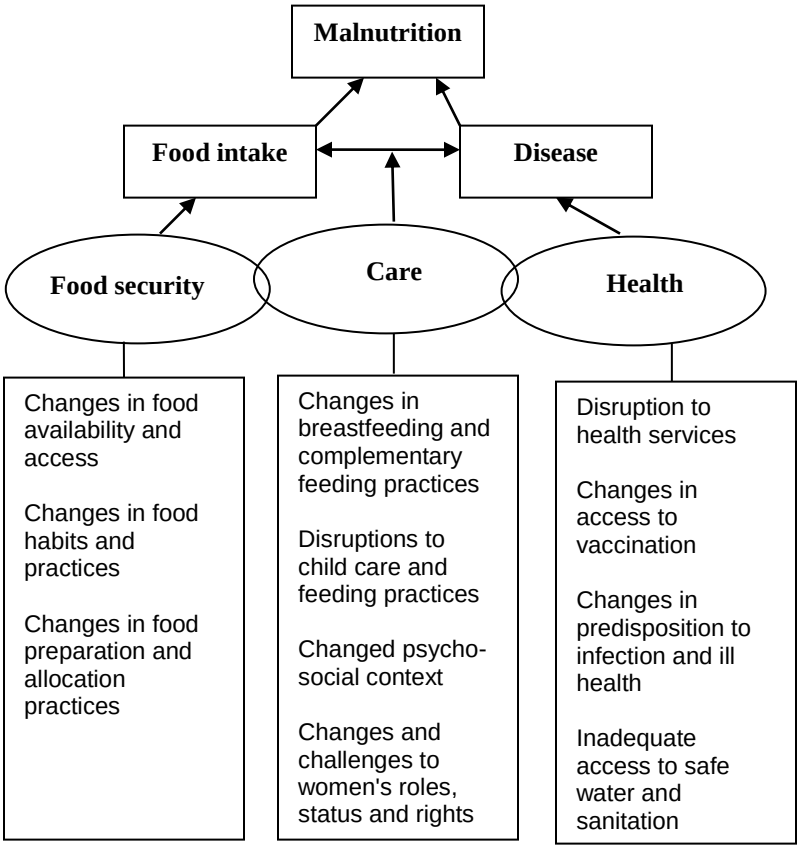

Figure 6.3. Framework for the effects of emergencies on the immediate and underlying causes of malnutrition (Adapted from FAO 2005 and UNHCR/WFP 2011).

III. RESULTS

In the following sections we present the results of the literature review to answer the three questions this paper seeks to answer: 1) How does displacement affect mental health?; 2) How does maternal mental health affect child malnutrition?; and 3) How do emergencies affect care for children, a major dimension in the causality of malnutrition?.

Displacement and Mental Health

The most common and well documented manifestations of mental health problems in emergencies are depression and post-traumatic stress disorder (PTSD) (de Jong et al 2003). PTSD is associated with witnessing or experiencing traumatic events, and its symptoms include intrusive recollections of the traumatic events, avoidance behavior, hyper-arousal and reduced functioning (Karunakara et al 2004). Similarly, depression is manifested by a variety of symptoms affecting a person's behaviors, thoughts, feelings and physical well-being. It is usually assessed by a score rating the prevalence of these symptoms. Poor mental health, when highly prevalent, affects not only the functioning of individuals, but also of communities and societies, both during and after a conflict as the social functioning of individuals and their ability to support themselves could be affected as well as their attitude towards reconciliation post-conflict (Roberts et al 2009).

Poor mental health in emergencies is quite prevalent among various war-affected populations in settings as diverse as Europe, the Middle East, and Africa. A meta-analysis investigating the extent of compromised mental health among refugees and internally displaced people (IDPs) as compared to residents (Porter and Haslam 2005) found that mental health outcomes were moderated by post-displacement conditions. Living in camps, being internally displaced, poor economic opportunities and unresolved conflict were negatively associated with mental health outcomes. Displaced persons who were older, female, more educated, or better off had the worst outcomes. Johnson and Thompson (2008) reviewed studies in the period 1970–2005 pertaining to the development and maintenance of PTSD in civilian survivors of war trauma and found good evidence of a dose-response relationship between cumulative trauma and the development and maintenance of PTSD, evidence that female gender and older age are risk factors to mental health problems and that some refugee variables may exacerbate and contribute to the maintenance of symptoms of PTSD. Protective factors included social and family support, and religious beliefs.

The earliest and most extensive country-specific evidence on mental health and displacement comes from the Balkan region. Following the war in Kosovo, poor mental health and impaired social functioning were observed (Cardozo et al 2000); mental health and social functioning were inversely related to the amount of exposure to traumatic events; the risk for psychiatric morbidity was highest for the elderly, those with previous chronic health or psychiatric conditions, and internally displaced people; populations at risk for poorer social functioning were living in rural areas, were unemployed, or had a chronic illness. Similarly, following the war that led to massive displacement in Bosnia, loss of life, and loss of assets, a quarter of the IDP population reported being constantly nervous with common feelings of fatigue, apathy and widespread depression (Carballo et al 2004). Even 10 years after their relocation to the United

Kingdom, Bosnian refugees still experienced more psychological trauma symptoms than non-refugees (Hunt and Gakenyi, 2005). And perhaps most noteworthy, in Bosnia-Herzegovina, a study evaluating the effect of a psychosocial intervention to IDP mothers exposed to severe trauma on their children showed that the intervention had positive effects, not only on mother's mental health and child psychosocial functioning, but also on children's weight gain (Dybdahl 2001).

In Afghanistan, prevalence rates of depression, anxiety, and PTSD at the national level were high, (68%, 75% and 40% respectively) and women had significantly poorer mental health status than men did (Cardozo et al 2004). And in Iraq, the prevalence of mental illness among internally displaced people was of concern, particularly among children, due to the ubiquitous exposure to violence that accompanies displacement (Morton and Burnham 2008).

Also recently, a study investigating the prevalence of depression and PTSD among the war-affected population in Juba, South Sudan concluded that deprivation of basic goods and services, traumatic events, and fear and uncertainty amongst IDPs and crisis affected populations had negative effects on health in its broader physical, mental, emotional and social dimensions (Roberts et al 2009). Specifically gender and marital status had a strong negative association with physical and mental health measures of depression and PTSD: being female and single increased the likelihood of both depression and PTSD. More than one third of the respondents met the symptom criteria of PTSD while half of the respondent met the symptom criteria of depression. These rates are consistent with earlier studies among residents and refugees in the area (Karunakara et al 2004) that showed a substantial mental health burden among the population (around 50% PTSD prevalence regardless of displacement status) attributed by the authors to the high level of traumatic event exposures. And in South Darfur, nearly one third of the population of internally displaced people living in camps presented symptoms of major depression (Kim et al 2007). These elevated rates remain comparable to other groups affected by emergencies (Mollica et al 2004).

The combined impact of gender disparities and sustained stressors, such as low socioeconomic status, are known critical determinants of poor mental health, as are the effects of sexual violence, displacement, and livelihood disruption (Mollica et al 2004).

Maternal Mental Health and Child Malnutrition

There is consistent evidence from poor countries that infants of mothers who are depressed have poor growth and development outcomes (WHO/UNPFA 2009). Depression is the "common cold" of mental health, in other words, the most common mental health disorder (Engle 2009). Almost all the evidence on the effect of maternal mental health on child nutritional outcomes focuses on depression as the key risk factor (Engle 2009; Rahman et al. 2008). The World Health Organisation (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 1948). It defines maternal mental health as "a state of well-being in which a mother realizes her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her community" (Herman and Swartz 2007). It is also important to note that good mental health or wellbeing is not the same as the absence of mental illness (Prince et al. 2007). The measurements of symptoms of maternal depression are usually done with

recognized standardized questionnaires such as the WHO Self-Reporting Questionnaire (WHO 1994). In a normal population, there is a range of scores with a small percentage of women showing severe or clinical depression, and a larger number being distressed (Rahman et al. 2008).

The association between maternal depression and child nutrition was reviewed in the Lancet Series on Global Mental Health (2007) showing that the main effects were observed on low-birth-weight, underweight, and stunting (Prince et al. 2007). A recent systematic review and meta-analysis looking at studies linking maternal depression and early childhood growth from eleven developing countries also concluded that maternal depression is associated with both sub-optimal early childhood development and stunting (Surkan et al. 2011). There is strong indication of the links between maternal depression in the general population, not just mothers with clinical depression but also sub-optimal mental health, and infant under-nutrition or poor growth (Rahman et al. 2008).

The long-term consequences of inadequate growth in childhood are well known, they extend from reduced adult stature, to low educational achievement (Glewwe and King 2001, Jukes 2005) and economic productivity (Martorell et al. 2005, Hoddinott et al. 2008), to increased disease risk (Victoria et al 2008).

Infancy is the period when children are depending on their primary care-giver, usually the mother, for nutritional needs and psychosocial stimulation. It is also a time of rapid physical growth and development. This complete dependence makes infants and young children most vulnerable to their mother's mental health problems (Engle et al. 2007).

The associations between maternal mental health and child nutritional outcomes can be mediated through a variety of mechanisms and more research, especially prospective studies, is needed on this end. The possible mechanisms or pathways through which maternal depressive symptoms could be linked to poor infant growth include sub-optimal child care, early cessation of breastfeeding, higher rates of child morbidity, and psycho-neurohormonal changes. The demands for care of young children may be difficult to meet by mothers affected by depression leading to inconsistent response and child stimulation as the mother herself struggles with symptoms of sadness, fatigue, loss of interest in daily activities, difficulty thinking clearly, and bouts of withdrawal (McLennan and Kotelchuk 2000, Leiferman 2002, Black et al. 2007, Black et al. 2009). Post-natal depressive symptoms in mothers have also been associated with early cessation of breastfeeding (Henderson et al. 2003) as well as higher rates of infant diarrhea (Rahman et al.2007), likely due to difficulties in attending to the child's needs, including feeding. Psycho-neurohormonal pathways have also been advanced as animal and human studies indicate that maternal mental stress during pregnancy is associated with poor fetal growth, possibly through changes affecting the hypothalamic-pituitary-adrenal axis (Wadhwa 2005). Whatever the pathway or the combination of pathways, these studies suggest that infants and children of depressed mothers might not be receiving either the care and/or nutrients they need for their optimal growth and development.

Since mothers are the primary caretakers of children, in emergency situations, when their own mental health and wellbeing is at stake, there is need to look at how care for children is affected by compromised maternal wellbeing. All the responsibility for the "care" element seems to be incumbent on the mothers at a time when they are themselves struggling with keeping up.

These relations are almost always overshadowed by visible public health crises and/or acute household food insecurity.

Conflict Situations and Care for Children

The concept of care itself remains the least studied of all three underlying causes of malnutrition: food, health, and care. Most of the core indicators for infant and young child feeding were summarized in a consensus report by the World Health Organization (WHO 2008) acknowledging the difficulties in measuring indicators for care of children beyond breastfeeding and frequency of meals and dietary diversity.

Care refers to all of the behaviors performed by caregivers that affect nutrient intake, health, and the cognitive and psycho-social development of the child, including maternal health (Engle, Lhotska and Armstrong, 1997), all of which are affected in emergencies.

Women's capacity to provide care depends on the resources available at the household level and at the community level. These are generally grouped as "human resources" that include the health, nutrition, employment, and education of the caregiver, and "household economic resources" that include household income, food security, water and sanitation (Engle and Lhotska 1999). Such resources can either support or hinder the translation of knowledge into appropriate care practices such as infant and young child feeding, use of health care services, and safe hygiene practices (Armar-Klemesuet al 2000). In emergencies, both of these types of resources are negatively affected.

Good care practices have a large positive effect on children's nutritional status (Ruel et al. 1999, Arimond and Ruel 2002), particularly among children from poorer families and among children whose mothers have less than secondary schooling. Optimal growth, especially early in life has been shown to positively impact children's academic performance and behavior (Berkman et al 2002). Good child feeding practices and use of preventive health services were strongly associated with children's chronic malnutrition as measured by stunting especially among children from lower socio-economic backgrounds and with mothers of lower education (Ruel et al, 1999).

Care-giving demands when the mother's mental health and well-being are compromised may be very difficult to meet. Care-giving will inevitably be affected by the feelings of sadness, fatigue, and loss of interest in daily activities the mother is going through, and this in turn will negatively affect consistent and responsive care-giving (Engle et al 2007). Slow linear growth and stunting have been observed in young children of mothers with depressive symptoms, possibly through sub-optimal care-giving and nutrient intake (Black et al 2009).

This role of care and its impact on child nutritional status is conceptually well elaborated but its quantification and measuring its associations with simple and reliable tools is still lacking, largely because child feeding practices is a term that includes many inter-related behaviors that are difficult to sum up in one or few variables (Arimond and Ruel, 2001). The authors suggest to focus on breastfeeding and complementary feeding in measuring feeding practices, and to use observational methods (as opposed to recall) in measuring hygiene practices. In addition, they

note the importance of non-dietary factors involved in child feeding, particularly the interactions between the primary caregiver (mostly the mother) and the child.

A method to measure child feeding practices using a composite indicator from key variables readily collected in the Demographic and Health Surveys (DHS) proved promising, especially that desirable (and also non-desirable) care practices tend to cluster. It had the potential to be used as a program and policy tool for the identification of target vulnerable groups and for promotion of key desirable feeding practices (Ruel and Menon, 2002).

Older reports suggest that low maternal confidence levels and psychological factors such as depression are associated with poor care-giving behaviors particularly complementary feeding and lower achievements in children (Gibbons and Griffith 1984, Rutter 1990). Newer studies are also consistent with older ones suggesting similar risk factors and highlighting the inverse relation between the length of breastfeeding and child outcomes (Balk et al 2005).

At the level of "basic" causes of malnutrition, and even with the difficulty to obtain reliable measurements at the community level, two basic determinants were found to be important for child malnutrition: per capita national incomes and democracy (Balk et al 2005), and the two priority areas for further reductions in child malnutrition were identified as per capita food availability and women's education (Smith and Haddad 1999). In fact, maternal education has been consistently shown to be critically important for child health and nutrition (Caldwell and McDonald 1982; Cleland and van Ginneken 1988; Alderman 1990; Cebu Study Team 1991) probably through knowledge and practices. It was also shown to be a strong determinant of good hygiene practices (Gorter et al. 1998).

In emergency contexts, much of the data necessary for measuring childcare practices is lacking or not publicly available. DHS data are hard to find or outdated and specific observational data are rarely collected. Besides, most of the peer-reviewed literature on the malnutrition in emergencies centers on prevalence rates of malnutrition and the role of nutrition as a contributing factor towards the increased prevalence of disease in complex emergency situations. Reports in the grey literature also address malnutrition from a descriptive, and not analytical, perspective. They mostly stress the need for going beyond the immediate causes of malnutrition and onto addressing the underlying causes for programs and interventions to have lasting impact (WFP 2006) but without really suggesting how.

IV. DISCUSSION

This literature review confirms that care for children is affected by maternal mental health, that displacement negatively affects mental health, and that care for children is negatively affected in conflict situations. The logical consequence is that in conflict situations, care for children and therefore child malnutrition is negatively affected through altered care practices resulting from the negatively affected mental health of mothers/caregivers. This care dimension therefore needs to be assessed during investigations of the causes of malnutrition in emergencies. Programs targeting care for children also need to take into account maternal mental health

(rather than focusing on feeding practices or hygiene practices alone) in order to reach a holistic benefit for children.

Maternal mental health and child health in poor countries (non-emergency contexts) was the subject of a consultation of the World Health Organisation in 2008 (WHO 2008)). The consultation examined the requirements for meeting the Millennium Development Goals (MDGs) and noted that maternal mental health is a pre-requisite for achieving five out of the eight MDGs. It makes specific recommendations for the early detection of mental health problems in women, for interventions that seek to enhance mother's sensitivity and responsiveness to young children's development needs, and for improvements in social support to women. The relatively high prevalence of maternal depression in low- and middle-income countries is often attributed to women's exposure to multiple mental stressors and risk factors including conflict, disasters, violence and displacement (Wachs et al 2009). Although poverty and economic stress are associated with maternal depression in high-, middle- and low-income countries alike, the rates of poverty and economic stress are much higher in poorer countries (UNICEF 2004). Therefore a multilevel approach for response is recommended to ensure the health and well-being of young children in poor settings (Black et al 2009). The Lancet Series on Child Development documented a number of randomized controlled trials comparing psychosocial interventions with nutritional interventions alone in Jamaica, China, South Africa and Bangladesh. It showed that interventions that focus on strengthening mother-and-child interactions (for example through play and other activities) are more effective than nutrition interventions alone (for example through supplementation) in improving child growth and development (Engle et al 2007).

In emergency contexts these psycho-social factors need to be highlighted, not only because of their effect on the well-being of women but also for their important effect on the well-being of their children. As it stands currently, it seems that the "care" factor is not considered central to the causes of malnutrition as much as "food" and "health", and as it was originally intended. The original UNICEF framework states "household food security", "care for women and children", and "health services and the healthy environment" as interlinked factors (all the bubbles are connected) to explain malnutrition. One factor alone or a combination of only two is not in itself sufficient for reaching good nutritional status.

There is enough evidence in the literature to suggest that maternal mental health directly affects the care dimension and consequently the other related causes of malnutrition. In emergency situations, maternal mental health is affected by displacement and the general trauma caused by war stressors and violence. These are manifested at the level of the basic causes, structurally at the bottom of the UNICEF framework. Importantly, this is where most of the adaptations to the framework have been made. The adaptability of this level stems from the fact that these basic causes operate at the level of the society and cover all the factors that are not under the control of the individual or the household (Karas 2010), consequently making direct attributions and linkages becomes much more difficult to track and the effects much more difficult to capture. Factors associated with emergencies (with potential impact on nutrition, morbidity and mortality) such as displacement fall under the "basic" causes of malnutrition in the causality framework and therefore are rarely addressed in analysis of malnutrition, especially in emergencies.

Nutrition survey reports often point out to the need to understand and investigate the underlying factors leading to excess death and malnutrition (Prudhon and Spiegel 2007) but do not provide guidelines on methodology or interpretation. In fact, at the acute stage of an emergency, the main concern of relief practitioners remains getting the kind of relief aid needed to where it is needed when it is needed and in a reliable manner in order to fulfill the primary objective of saving lives. But with complex emergencies typically lasting longer and commonly hitting already resource-poor areas (Spiegel et al 2007), identifying strategies to address the underlying causes of malnutrition becomes particularly relevant. The overarching rationale is that when malnutrition is viewed from a public nutrition perspective (Young et al 2004), it may be better addressed by first identifying and then addressing its underlying causes. Often emergency programs concentrate on infant and young child feeding practices, stressing the importance of these and of good hygiene practices without for as much giving due attention to the state and context the mother is in. Information and education programs targeted at children could also benefit (to the benefit of the children as well) from a nod towards the mother.

V. CONCLUSION AND RECOMMENDATIONS

The concept of care is broad and has been the least studied of the three underlying causes of malnutrition in children (food, health, and care) in development as well as in emergency situations despite the ample evidence of its functional importance in determining child malnutrition. Adequate dietary intake and health status are the immediate determinants of good nutrition, but caregiving ultimately determines the delivery of adequate food and health to the child.

The fact that the concept of care has been the least investigated of the three underlying causes of malnutrition points towards difficulties in deconstructing the notion, in measuring it, in operationalizing it, or in all at the same time. The scarcity in programs addressing care, especially in emergency situations, in turn leads to a scarcity in identifying best practices, in evaluating these programs, in developing working measurement tools, etc., leading to a vicious circle of avoiding such programs simply because they carry too many “unknowns”.

At the same time, care might not be all important in all settings. The combination and relative importance of each of the underlying factors of malnutrition differ from country to country and depending on context. A careful reading of the situation, with a careful causality analysis should determine the relative weight of each of the causal factors of malnutrition and their inter-relatedness. And if care is found to be important, a quantitative analysis would be useful and would have to have programmatic implications. This is indeed the original spirit of the UNICEF framework, that malnutrition is multi-factorial, multi-sectorial in nature, and that it requires identification of local causes and solutions to the problem of malnutrition. But this exact strength might be the weakness in how the framework has been used in practice in analyzing the causality of malnutrition. The fact that it categorizes causes has compartmentalized also analysis and interventions. Using the tested and tried quantitative tools of “what we know” has led to only finding “what we are looking for”. It is this sort of prescriptive spirit that has taken the analysis of malnutrition to analysis of compartments that fail to add up to a whole.

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CHAPTER 7

SUMMARY AND DISCUSSION

Conducting research in emergency situations is very difficult, the main argument against it being that all available resources should be geared towards saving lives, research being considered secondary or even sometimes not appropriate. This necessarily implies that project implementation is based, for the most part, on best practices identified through trial and error rather than on formal research-generated evidence.

The data available from the Darfur EFSAs offer a unique opportunity for evidence-building, in that they were collected using rigorous sampling and survey methods, in addition to being extensive and offering both food security and nutrition information for the same households. This allows for an analysis that goes beyond a generation of prevalence figures and the usual health profiles.

It is important for practice to be based on sound empirical evidence if only because of the sheer amount of money spent on humanitarian aid (in 2009, Sudan was the top receiver of humanitarian assistance with a total of USD1.3 billion[23]). Perhaps more importantly, the lives of thousands of people depend on successful programs.

The three papers presented in this thesis have sought to contribute to the body of evidence on malnutrition and food security in complex emergencies by addressing questions that have until now been mostly informed by anecdotal evidence and expert opinions because little or no hard evidence existed.

The first paper analyzed the determinants of acute child malnutrition among different displacement groups, and over time. It showed that the predictors of wasting vary with different displacement categories and as the crisis evolved. For IDPs living in camps, access to food aid was the predictor of wasting in 2005, but in 2007 the most significant contributor was communicable diseases. For IDPs living in the community, wasting was predicted by access to safe water in 2005, but by 2007 access to food aid and disease accounted for most of the variance. For residents, asset ownership was the major predictor of wasting in 2005, but by 2007 it was food aid and food expenditure levels. As a result of this variability, more attention needs to be given to tailoring assistance to the changing needs and particular displacement conditions of conflict-affected people without assuming that needs are homogenous within a population or particular subsets of this population and without relying on fixed programs that remain static throughout the duration of a crisis. In certain contexts, it might be more appropriate to go for smaller scale surveys of needs rather than the full large scale assessments that generate also aggregated results. It is also important to pay due attention to the situation and needs of the resident population whose situation, as evident from the paper, was not much better than that of the displaced.

[23] http://www.globalhumanitarianassistance.org/wp-content/uploads/2011/02/Sudan-Aid-Factsheet-2011.pdf

The paper confirmed that access to an essential food ration plays a significant role in preserving the nutritional status of children in the early stages of a complex emergency as does the disease environment and water supply. The results ascertain the importance of the initial humanitarian programs - namely food aid and interventions addressing health, water and sanitation - in preventing wasting in children. A causal analysis of wasting should encompass all predictors and all population sub-groups (including residents) in order to be able to use the derived results in decision making and nutrition program design for these interventions to be effective.

The second paper analyzed the relationship between gender of the household head and household food consumption in a conflict situation. The results showed that in Darfur, as in other non-emergency settings, male-headed households owned more assets than women-headed households, spent a lower share of their expenditures on food and had better dietary diversity scores. But even though WHH were poorer than their men counterparts, poverty translated into poorer food consumption only in the displaced *de jure* category (widowed or single) whether living in camps or within the host community. Coping strategies and reliance on remittances negatively impacted food consumption. While it is not surprising to see that coping strategies were a negative predictor of food consumption, the relation between remittances and consumption was counter-intuitive, and this might be explained by the fact that in a conflict context, the flow of remittances may be interrupted or unpredictable therefore negatively affecting food consumption.

Subtle differences among predictors of food consumption exist and denote similar small differences in the vulnerability profiles of both IDPs and residents, including the different categories of household headship. Not all WHH are the same as much as not all IDPs are the same. The quasi automatic profiling of all WHH as vulnerable in emergency contexts needs to be revisited. Large-scale comprehensive assessments, and consequently large-scale relief food interventions, need to be more fine-tuned to context in order for interventions to be successful. If this is difficult to apply with large-scale surveys, there might then be a role for complementary smaller-scale assessments or qualitative research.

The third paper explored the concept of 'care' in emergencies and its role in determining malnutrition in these non-development settings. Adequate dietary intake and health status are the immediate determinants of good nutrition, which are in turn determined by the underlying household food security, care, and the health environment. Care-giving is an important determinant of the delivery of adequate food and health to the child, but so far in emergencies, it has been largely restricted to breastfeeding promotion and complementary feeding support. The psychosocial aspect of care has been largely overshadowed by infant and young child feeding, as well as by pressing food and health needs.

The UNICEF framework for the causes of malnutrition illustrates how malnutrition is multi-factorial and multi-sectorial and therefore calls for identification of local causes and solutions to the problem of malnutrition. However, the concept of care has been one of the least investigated of the three major underlying causes of malnutrition because of difficulties in deconstructing the notion, in measuring it, and in practically applying it. This has led to few best practices identified, programs evaluated, or working measurement tools. The fact that the framework suggests clusters of causes contributes to a rather silo-ed approach to intervention, analysis and response which pays inadequate attention to the way clusters inter-relate. In emergencies, at the operational level, this has been fostered by the way the different inter-

agency theme clusters (or sectors) are set-up and operate. On the other hand, at the analytical level, this compartmentalization has encouraged looking at causes in areas where they are supposed to be. To be comprehensive, causal analysis needs to take into account all possible causes or clusters of causes of malnutrition that are contextual, including food security and water and sanitation.

The Lancet Series on Maternal and Child Nutrition (2013) further provides evidence that nutrition is crucial for optimum fetal and child nutrition and development, and that achieving this desired impact requires a multi-sectorial approach. Nutrition-specific interventions address the immediate causes of malnutrition (poor dietary intake and disease) as well as some of the underlying causes including feeding behavior and simulation. Nutrition-sensitive interventions do not have nutrition as their primary objective but do have the potential to improve the food security and nutrition of program participants. Most of the nutrition-sensitive programs address the underlying causes of nutrition such as food security, agriculture, health, education, water and sanitation and psychosocial programs including maternal mental health.

While nutrition-specific programs are essential to directly address the problem of malnutrition, it is becoming clearer that having a multi-sectorial approach to malnutrition is also key, and that nutrition-sensitive programs can provide such a platform.

The consensus for multi-sectorial programming, even though present, has yet to translate into programs on the ground and into programs implemented in emergencies. This has been rendered difficult by the sectorial and vertical approach to the underlying causes of malnutrition (food, health, and care) especially in emergencies when related inter-agency clusters such as food security and livelihoods, health, nutrition, and water and sanitation often act independently.

In the end, it can be said that one overarching conclusion from this dissertation is that humanitarian needs vary in emergency contexts – according to location, vulnerable groups affected, and time. This is particularly challenging operationally, because in their urge to be prepared for emergencies practitioners rely on ready-made assessment tools, ready-made analysis frameworks, and more often than not, ready-made programs that tend to be implemented with minimal insight from actual conditions on the ground. This is not to say that humanitarian conditions are easy to capture; on the contrary, dynamism is difficult to capture in ways that allow interventions to be precisely tailored to need. Flexibility in programming and continuing monitoring and reassessment are key to effectively meeting the identified needs.