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Factors Affecting Defaulting in Children's Supplemental Feeding Programs in Chad, Kenya, and  
Sudan

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## ABSTRACT

Factors Affecting Defaulting in Children's Supplemental Feeding Programs in Chad, Kenya, and Sudan

By Megan S. Schroeder

**Background.** One key measure of supplemental feeding program (SFP) effectiveness is the recovery rate. Defaulting is a main factor undermining the recovery rate and very common in SFPs. However, to date, no studies have quantitatively investigated factors associated with defaulting in SFPs.

**Objective.** This study evaluated baseline factors associated with defaulting in children's SFPs in an urban and semi-urban community in Chad, a rural, semi-nomadic community in Kenya, and an internally displaced persons (IDP) camp in Sudan.

**Methods.** Data were collected from questionnaires (N = 687 (Chad), N = 297 (Kenya), N = 808 (Sudan)) administered to caregivers of children with moderate acute malnutrition (MAM) ages 6-59 months upon their admission into an SFP. The questionnaire collected information on household characteristics, SFP accessibility, opportunity costs to attend the SFP, knowledge of the SFP, and reasons for attending. Country-specific multivariate logistic regression models were built using backward elimination to evaluate factors associated with the outcome of interest, SFP defaulting.

**Results.** Program defaulting was common (48.5% (Chad), 25.6% (Kenya), 42.9% (Sudan)). In multivariable analyses, the primary factors ( $p < 0.05$ ) reducing the risk of defaulting included: children were refused admission to SFPs previously, the precipitating reason for becoming MAM was illness, keeping livestock, food insecurity, a familial support system in the same house, the caregiver's age, an IDP residency status, and trying to register a child for the SFP previously. The primary factors increasing the risk of defaulting included: higher opportunity costs and possible stigma/shame in community.

**Conclusions.** We found factors associated with SFP defaulting were locale-specific. Our data indicate that program implementers should address locale-specific opportunity costs, stigma/shame associated with malnutrition, and caregivers with little/no familial support systems in the same households by identifying and providing additional support to these households and implementing community level stigma reducing programs.

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## LITERATURE REVIEW

### Acute Malnutrition

In 2014, around 50 million children in the world under the age of 5 years were wasted, which is about 1 in 13 children worldwide (Levels and Trends 2015). Acute malnutrition is clinically characterized by wasting (marasmus) and/or bilateral pitting edema (kwashiorkor). Acute malnutrition occurs in individuals experiencing inadequate nutritional intake, recent illness, inappropriate childcare practices, or a combination of these factors (Phelps 2011). The degree of acute malnutrition, moderate or severe, is determined by anthropometric and clinical measurements (Dent 2011). Weight-for-height Z-score (WHZ) and mid-upper arm circumference (MUAC) are indicators used to classify acute malnutrition. Moderate acute malnutrition (MAM) is defined by MUAC between 115 mm and 124.9 mm and/or a WHZ between -3 and -2.1 according to the World Health Organization (WHO) 2006 child growth standards. Severe acute malnutrition (SAM) is defined by a WHZ < -3 and/or a MUAC < 115 mm and/or bilateral pitting edema (Sphere Handbook 2011). The global burden of MAM is high and affects about 34 million children under 5 years of age worldwide (Levels and Trends 2015). Moderately malnourished children have a risk of death 3 times that of healthy, well-nourished children, and an increased vulnerability to disease and possible progression to SAM (Black 2008). Acute malnutrition is addressed through interventions implemented by governments, non-governmental organizations (NGOs), and the United Nations (UN).

### Interventions Addressing Acute Malnutrition

Interventions addressing acute malnutrition can be broadly classified as preventative or curative approaches. They can also include addressing the underlying causes of malnutrition such as improved breastfeeding and complementary feeding practices, improving access to healthcare, improved sanitation and access to clean water, and improving livelihood and food

security (Guidelines for Selective Feeding 2011). However, the majority of interventions to prevent and/or treat acute malnutrition in emergencies involve a general food distribution or using selective feeding programs. General food distributions target households with a food ration in acute and severe food shortages, while selective feeding programs targets selective groups or individuals with food rations (Guidelines for Selective Feeding 2011). Selective feeding programs include supplementary feeding programs (SFPs) to address MAM and in-patient or out-patient/community-based therapeutic feeding programs (TFPs) to address SAM (Guidelines for Selective Feeding 2011; Dent 2011). Many times, SFPs will link to TFPs and possibly other services such as other health systems, HIV/AIDS and Tuberculosis networks, and food security programs (Sphere Handbook 2011).

Severely malnourished individuals are admitted to TFPs. If they have no other medical complications, they are admitted to outpatient/community-based TFP. These patients attend weekly or every two weeks to receive a supply of ready-to-use-therapeutic food (RUTF) and medical care. Otherwise, they are admitted to in-patient TFP due to the complexity of their care (Collins 2006; Saboya 2011). Patients are discharged after achieving a certain percent weight gain and/or a fixed length of stay and/or MUAC barrier and are without other medical complication (Collins 2006).

SFPs are implemented in emergency and non-emergency settings to treat and/or prevent MAM. SFPs can be divided into blanket and targeted SFPs. Blanket SFPs provide a supplement food ration to all members of a target population, regardless of whether they are malnourished, to prevent MAM and restore the nutritional status of those moderately malnourished (Dent 2011; Navarro-Colorado 2008; Guidelines for Selective Feeding 2011). Targeted SFPs are primarily curative providing a supplement food ration to members of the target population that are

moderately malnourished and prevent them from becoming severely malnourished (Dent 2011; Navarro-Colorado 2008; Guidelines for Selective Feeding 2011). This study will focus on targeted SFPs.

### Targeted Supplemental Feeding Programs

In targeted SFPs, beneficiaries are admitted based on a diagnosis of MAM determined by anthropometric measurements as defined by each program's guidelines. Once admitted, beneficiaries receive food rations in a take-home dry ration distributed weekly or every two weeks to be prepared at home or eaten as is (more common), or in an on-site wet ration with daily distribution of at least one meals (less common) (Guidelines for Selective Feeding 2011; Dent 2011). Rations can include RUTF (500 kcal/day), a new ready-to-use food (RUF) commodity (500kcal/day), complementary food supplements (i.e. food-based complements mixed into consumed food for additional nutrition value) (250 kcal/day) plus staple foods, or fortified blended foods with sugar, oil, and possibly skimmed milk powder (de Pee 2009). There is currently no standardized discharge criteria for SFPs. However, beneficiaries may be discharged based a minimum length of stay or their anthropometric measurement according to the program's criteria (Guidelines for Selective Feeding 2011). However, some individuals fail to recover. These beneficiaries are classified by additional outcome criteria (Dent 2011).

Classification of beneficiaries by outcome criteria is different for each study and program. Beneficiaries are considered recovered or cured if they met the program's discharge criteria (Dent 2011; Guidelines for Selective Feeding 2011; Navarro-Colorado 2008). Deaths are beneficiaries that were lost to follow-up, died while admitted to the program, and whose death was confirmed by a family member or neighbor (Navarro-Colorado 2008). Defaulters are beneficiaries lost before meeting the program's discharge criteria and whose status (death, recovered, or other) is unknown (Dent 2011; Navarro-Colorado 2008). For most programs,

beneficiaries absent two consecutive visits are declared defaulters. Ideally, a home visit would be coordinated to determine reasons for defaulting, including if the child had died (Dent 2011).

Non-response can include beneficiaries transferred to TFPs, beneficiaries transferred to hospitals, and beneficiaries that did not meet the discharge criteria after a given length of time (between 2 to 4 months) (Dent 2011; Navarro-Colorado 2008).

### Efficacy of Feeding Programs

The strategies used to manage SAM have become more standardized. Since the 2000s, the products and approaches to treat SAM have been rapidly advancing (Lenters 2013). TFPs began to shift more from in-patient to community-based due to an increased coverage and reduced opportunity costs to caregivers (Collins 2006). This was primarily due to the focus on early case finding, community sensitization and reduction of barriers, and community mobilization (Collins 2006). Researchers and the WHO now recommend community-based TFPs for SAM cases without medical conditions, and SAM cases with medical conditions should be treated in in-patient TFPs (Guideline: Updates to the Management of SAM 2013). The use of RUTF increased a child's likelihood to recover and a greater average height gain, MUAC gain, and weight gain compared to the standard therapy in an in-patient TFP (Lenters 2013).

However, there are no standardized strategies for management of MAM (Lenters 2013). Therefore, the efficacy and effectiveness of SFPs for MAM is a huge controversy. Many critics question the cost of establishing a separate program from general food distribution because it may be inefficient when rations are as small as 700 kcals for each admitted patient (Navarro-Colorado 2008). Critics question the use of SFPs in place of other or complementary interventions. Some researchers argue the justification for continuing to implement SFPs with high implementation and running costs is inefficient with little understanding of their impact and little investment in understanding the causes of malnutrition (Levine 2004). However, Langendorf et

al (2014) showed that all strategies that combined a nutritious supplementary food with cash or a family ration had an incidence of MAM two times less than those given cash only. The findings also suggested that the directly receiving nutritional supplementary food for children had a greater benefit than the comparable amount of food would in terms of “nutritional security” for the child. Similarly to TFPs, the use of RUTFs have changed the management of MAM. In van der Kam et al (2016) in Uganda, RUTFs reduced the incidence of negative nutritional outcomes, and both RUTF and micronutrient powders (MNPs) had a positive effect on anthropometric indicators. There is also a possibility that RUTF had a lower risk of hospital admissions and mortality. Also, van der Kam et al (2016) found the use of RUTF and MNPs had no effect on the incidence of malnutrition or anthropometric indicators in Nigeria. While there are questions on the best method of management of MAM, there is also some emerging products and research that may be changing this.

### Defaulting

One key measure of SFP effectiveness is the recovery rate, the percent of individuals discharged as recovered from the SFP to the total number of discharges (Sphere Handbook 2011). Defaulting, which occurs when a program beneficiary is absent two or three consecutive visits, is a principle factor undermining the recovery rate (Navarro-Colorado 2008). High defaulting rates affect the effectiveness of nutrition programs, especially in emergency settings. However, very little research has investigated the causes of defaulting, either generally or contextually, especially for SFPs. Many studies and programs will include defaulting rates, but nothing more. Most published papers or evaluations discussing defaulting are specific to TFPs in comparison to only a few published papers and grey literature for SFPs.

## Defaulting Rates

Studies use the rate of defaulting as a measure of program adaptation, especially in emergency settings, according to The Sphere Project (2011). Many studies worldwide will report the defaulting rate to show the program's adaptation, but fail to discuss the reasoning for the found defaulting rate (Collins, 2002; Doocy 2011; Lenters 2013; Singh 2014). While providing the program adaptation is useful, it fails to identify the underlying factors affecting program's performance. Without this understanding, as researchers and public health professionals, SFPs may continue to have high defaulting rates, ineffective results, and use limited resources. The remainder of this literature review will discuss reasons for defaulting in TFPs and SFPs due to the limited amount of literature specific to defaulting in SFPs.

## Factors affecting Defaulting in Therapeutic Feeding Programs for SAM

In a sub-Saharan African context, Belachew et al (2007) discussed their experience and lessons learned while implementing an outpatient therapeutic program (OTP) addressing SAM in three regions of Ethiopia, including understanding defaulting. Researchers used 36 key informant interviews and 30 focus groups from 13 health centers in the three regions of Ethiopia. They also reviewed the health facility, its reports, and program documents for more information. The results were summarized into thematic areas of program initiation and implementation process, community mobilization, program effectiveness and acceptance, program outcomes, strengths and weaknesses, problems encountered and solutions sought, and sustainability of the program. Researchers discovered areas with better community mobilization had higher cured rates and smaller default rates. In one region with better community mobilization, the cure rate (66.4%) was larger, and the default rate (13.1%) was smaller. However, in another region, the percent of defaulters (44.8%) was higher than cured individuals (33.2%) due to interruption of the service from lack of supplies, the attrition of trained staff, and the poor community mobilization. This

study provides a defaulting rate as a figure and hypothesizes potential causes for those figures. Also, it provides potential understandings of factors affecting defaulting based on both qualitative and quantitative data in a sub-Saharan Africa context. However, the difference in how programs are run or the severity of malnutrition addressed by TFPs and SFP may affect the validity of applying findings from this study, for a TFP, to an SFP context. Many of the study's findings were specific to the type of feeding program. For example, while community mobilization appears to be important for TFPs, SFPs may not have similar findings due to the severity of the disease, different programs, and different structures affecting the way a community mobilizes.

Another sub-Saharan African context includes a coverage assessment of an integrated TFP in Uganda conducted by Action Contre Faim (ACF) in July, 2011 (ACF-Uganda 2011). ACF conducted a coverage survey to better understand how well health services were reaching the intended target population. In three districts of the Karamoja region in Uganda, 48 villages were randomly selected using a Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage combined with components of Semi Quantitative Evaluation of Access and Coverage. Researchers looked at information from health centers in those selected villages to assess their performance, active case finding for malnourished children in villages surrounding the health centers to assess coverage of health services, and qualitative interviews with health center staff and beneficiaries to understand the program implementation. Poor attendance, related to defaulting, was found to be related to end of the lean season and/or beginning of crop harvests, other priority activities, lack of food rations, and distance from the health center (> 1 hour walk) (ACF-Uganda 2011). The defaulting rate varied, but during times of high defaulting it ranged from 39% in Kaabong in September, 2010 to 45% in Moroto in October, 2010 (ACF-Uganda

2011). This assessment provides support for seasonal and environmental factors and opportunity costs affecting defaulting. These findings may be more transferable as they are probably less specific to the type of program. However, this assessment focused on defaulting as a figure of program performance and only provided hypothesized reasons for those figures using data collected using qualitative methods. It was for a TFP, which may still be limiting. While these last two programs were in sub-Saharan Africa, the contextual factors changed significantly from country to country indicating defaulting risks may vary from country to country. For example, the reasoning for defaulting in this study were different than those found in the study in Ethiopia (Belachew et al 2007), but even these are hard to compare because different methods were used and the programs varied.

Considering another context on the Indian sub-Continent, Burza et al (2015) was one of the few studies interested in specifically identifying causes for defaulting, and the only study modeling risk factors with defaulting as an outcome. This study was trying to better understand how community-based management of acute malnutrition (CMAM) addressing SAM would work in Bihar, India. The program admitted 8,274 children between the ages of 6 and 59 months between February 2009 and September 2011 with an interest in the characteristics and outcome of the children enrolled in the CMAM. Children were enrolled in the program based on anthropometric measurements. Caregivers and children came weekly so caregivers could attend an educational class and children could have anthropometric measurements taken and receive basic medical triage. If the children had medical complications, they remained at the center for special care. Children without medical complications received their weekly supply of RUTF. After completing data collection, researchers analyzed the data using a multi-variate logistic regression model to determine risk factors significantly associated with defaulting using a



bivariate analysis. If the variables were a priori or associated with defaulting from other studies, they were added in a stepwise manner. In this study, the resulting default rate was 37.2%.

Researchers discovered younger children (< 12 months), those with an admission WHZ less than -3, a lower admission MUAC, a residence outside of a block in Bihar, and a non-referral to the program by an Accredited Social Health Advocate were significantly associated with defaulting. However, sex and cast were not associated with a higher risk of defaulting. In the analysis, all the variables that were significant in the bivariate analysis were still significant after the multiple logistic regression analysis (Burza 2015). This study demonstrates similar quantitative techniques that can be used to investigate defaulting factors in SFPs. However, the Indian sub-Continent context and type of intervention, TFP, make it difficult to apply to SFP with different programming and this study's sub-Saharan Africa contexts.

Looking at causes of defaulting in the same study across different countries could provide a better understanding if these defaulting causes are contextual. Médecins Sans Frontières (MSF) International conducted a study to identify key factors associated with high defaulting rates in their ambulatory therapeutic feeding program (ATFP) in 5 countries (van der Velden 2008). MSF looked at 22 programs in South Sudan, Darfur, Myanmar, Ivory Coast, and Ethiopia. Of these programs, 15 (68%) of the ATFPs had defaulting rates greater than 15%, 3 ATFPs (14%) had defaulting rates between 10 and 15 %, and 4 ATFPs (18%) had a defaulting rate less than 10%. Researchers conducted semi-structured, in-depth interviews with caretakers of enrolled children about their personal and the community's attitude about ATFP and barriers affecting their decision to participate. Observations were done. Information was taken from program reports, registration, and patient files to analyze characteristics of defaulters like time of default, gender, and distance to the ATFP (van der Velden 2008). MSF discovered there was no difference

among defaulters and non-defaulters by age, gender, or weight or height at admission. Defaulting was not related to irregular attendance and reasonable distance from the health center (< 8 hour donkey ride or 2 days walk), but was related to the intensity of community outreach. For example, programs with well-established community workers had defaulting rates less than 10%, whereas those with poor or absent outreach had rates greater than 30%. A little under half defaulted after the first or second visit (van der Velden 2008). Also, a higher intensity of community mobilization was related to lower defaulting rate similarly to Belachew et al. (2007). Researchers learned that caregiver's understanding of malnutrition, target weight, and treatment was poor, which could have possibly affected defaulting. Caregivers experienced barriers due to insecurity, reliability of opening hours, and food availability. The direct costs had little influence on their decision to come to the ATFP as the indirect costs did, such as long waiting times, long travel times, and opportunity costs (van der Velden 2008). These results provide support for factors affecting and not affecting defaulting across several contexts using similar methods making comparison more feasible. These results used quantitative methods to calculate certain factors among defaulters and non-defaulters and used qualitative method to understand possible reasons for higher versus lower defaulting rates. However, the analysis were simplistic and did not look at specific associations between factors and defaulting as an outcome. Also, these results are specific to TFPs and not SFPs and their applicability in SFPs is unknown.

### Factors affecting Defaulting in Supplemental Feeding Programs

Similarly to TFPs, most studies do not specifically investigate the cause of defaulting in SFPs, but only hypothesize reasons for high defaulting rates. Vantier et al (1998) discusses a study by MSF Belgium to understand the low coverage rates and high defaulting rates in their TFP and SFP in Wadijir, Kenya. This study provides an example of SFPs in a more nomadic pastoralist community. The investigators used four focus group discussions with women in

different bullas to discuss the main problems faced by families, the women's perception of the role of health and feeding centers for children, and the reasons for not coming to the feeding centers. MSF learned mothers were reluctant to come to feeding centers due to clan-related issues, the centers were very far away, and the admission criteria was not made clear to potential beneficiaries. Mothers were especially reluctant to go if: they were busy, they felt it was a loss of their dignity to go to another bulla for help and food, they did not like the children being measured in front of others because they thought that they would die, they thought that there was a risk of infection and a lack of hygiene, and children were being sent to other areas where there was milk. The program made changes including information dissemination, screening procedures in bullas, and service delivery at the health center. As a result, the defaulting rate decreased from 21.6 % in April to 19% at the end of May in 1998 (Vantier 1998). The decrease in the defaulting demonstrated the linkage of some factors to defaulting in an SFP. However, the multiple changes to the program make it difficult to know with certainty which changes actually affected or did not affect the defaulting rate. The study used qualitative methods to identify factors affecting defaulting specific to this context. While it can either confirm or contradict the research, the context may affect the generalizability to this research's population. Also, the information is a bit outdated from almost 20 year ago, and many policies and protocols have changed.

Vautier et al (1999) wrote a review paper to analyze the effectiveness of dry-food SFPs in crisis situations in Liberia, Burundi, and Goma (Democratic Republic of Congo). This study looked at default rates as figures of program performance and hypothesized causes of defaulting to explain those figures. The study included 40,223 children (18,978 from Liberia, 14,673 from Burundi, 19,489 from Goma) who were admitted to the SFPs between September, 1993 to May, 1994 in Liberia, March to September, 1995 in Burundi, and August 1994 to February, 1995 in

Goma. Participants were enrolled in an SFP based on their weight for height. Depending on the clinical status, some participants were referred to a therapeutic feeding center if they presented with edema, which at this time were only inpatient care centers. The default rates resulting from this study include 15.7% in Liberia, 29.2% in Burundi, and 11.4% in Goma. This study found that defaulters were higher in rural areas where tracing was more difficult due to distance and infrastructure than in camps. They thought that defaulting was influenced by distance, food acceptability, level of security, and distrust of potential beneficiaries (Vantier 1999). This paper discusses defaulting in the context of an SFP. However, this is an older article and much of the technology and protocols have changed slightly.

Navarro-Colorado et al (2008) was one of the first published paper to look specifically at the efficacy and effectiveness of emergency SFPs, looking in-depth at defaulting as a figure of program efficacy at the individual level in a standardized method for multiple contexts. From 16 participating agencies, researchers collected reports from 82 SFPs with 8 SFPs in Asia, 1 SFP in Central America, and all others in Africa, and 67 were included in the study. The reports included “needs assessments, funding proposals, nutrition protocols, internal reports, internal and external evaluations, intermediary and final donor reports, nutrition surveys as well as internal monthly reports, statistical reports from the centers and/or from the programs and financial reports” (Navarro-Colorado, 2008). Data also included other relevant information such as internal communication and lists of materials used at the centers. All the data was extracted from reports using standard forms developed to include variables relevant to the study. All were entered into a database. The data was checked and validated. This study presents many major findings about defaulting in an SFP and in multiple contexts. The defaulting rate was higher and varied more from month to month than non-response rates. However, the defaulting rate appears

to be influenced by seasonal factors with higher rates in cultivation and harvest season or when access to programs is less due to rains, flood, or snow. The median (interquartile range (IQR)) of defaulting among all 67 SFPs examined was 16.4% (IQR: 6.6 – 29%), but in some months the default rates exceeded 80%. Researchers determined certain contextual factors play a significant role in determining defaulting rates: the presence of a general ration, the chronic nature of the emergency, whether the beneficiaries are displaced populations (Navarro-Colorado 2008). This study provides valuable data about defaulting in SFPs, in multiple contexts, and was analyzed using standardized methods.

More recently in 2012, Talley et al investigated a study aimed to assess the nutritional impact of a lipid-based nutrient supplement (LNS) and an improved dry ration (IDR) in a blanket SFP in South Darfur, Sudan. This study looked at defaulting rates among the two different groups of food rations and proposed possible explanations for the difference. This was a longitudinal, quasi-experimental, non-randomized study which enrolled children ages 6 to 36 months to receive one of the supplemental rations, either LNS or IDR, between May and August 2009. In the Otash camp, 658 children received IDR, while 893 children in the Al-Salaam Camp received the LNS. Each child enrolled had anthropometric measurements taken and received a monthly ration. The data was analyzed looking at the difference of the weight for height at the baseline and end of the study using difference in difference and comparing the mean difference in weight for height at each time between the two groups. Investigators learned no difference existed between non-defaulters and defaulters by sex, mean weight-for-height, or mean age (Talley 2012). Thus, this re-enforced the findings of MSF in their TFP (van der Valden 2008), possibly demonstrating similar nonfactors across contexts and type of program. Similarly to the MSF findings' of their TFPs (van der Valden 2008), the largest amount of defaulting occurred

after the first and second ration distributions demonstrating similar characteristics across context and type of program. Also, researchers speculated that defaulting was affected by communication misunderstanding about the number of distributions, which may be similar to findings of community mobilization in TFPs. Among this population, the poor understanding of MAM as a sickness may have contributed to the defaulting (Talley 2012), similarly to some of MSF's TFPs (van der Valden 2008). The study concluded that while defaulting was high in both cohorts, there were not differences anthropometrically or demographically as reason for defaulting (Talley 2012). The research resulted in key factors that played a role in the amount of defaulting and re-enforced factors from other studies, even TFPs, using quantitative methods.

In a more recent assessment of defaulting in SFP by Temere et al (2014), International Medical Corps conducted a defaulter study to identify possible reasons for high defaulting rates in an SFP in refugee camps in Chad. It discusses possible barriers influencing defaulting for an SFP, specifically in a refugee setting. The major barriers identified to attending the program include the need to frequently travel outside the camps to visit family members, collect firewood, and for daily waged labor. Other barriers and challenges included: mothers only brought children to the treatment center after trying all possible traditional medicine options; the small ration was not worth enrollment and rarely provided benefit to the child as it was shared among the family; many thought the food ration caused diarrhea; there was overcrowding in the health centers; and the now targeted SFP had previously been a blanket SFP causing some beneficiaries to refuse to participate. After some changes were made to address some of these barriers and challenges, the defaulting rate did decrease from 16.3% in 2011 to 6.1% in 2013 in Mile Camp and from 16.8% in 2011 to 4.7% in 2013 in Kounoungou Camp. (Temere 2014). The decrease in the defaulting rate demonstrates the linkage of some factors to defaulting. However, the multiple changes to the

program make it difficult to know with certainty which changes actually affected or did not affect the defaulting rate. The methods were not well documented and whether the study was quantitative or qualitative was unclear making it difficult to assess the quality of their findings.

In March 2014, ACF did a coverage assessment in Garbatulla Sub-County, Isiolo County, Kenya to understand the coverage of the OTP and SFP looking at barriers and boosters for the Integrated Management of Acute Malnutrition program (IMAM) with a review of previous coverage assessment recommendations (ACF USA 2014). Initially, the researchers reviewed previous recommendations and progress of the IMAM with two additional stages. In stage 1, they analyzed program data and had a discussion with key informants such as community health workers, community leaders, and caregivers of children. In stage 2, they conducted a small survey by randomly selecting two health centers of each program OTP and SFP followed by household screenings of all 6-59 months children using MUACs in the villages under the sampled facility. They found most defaulting occurred between the first and fifth visit to the SFP, which includes the visits where most of the defaults occurred in MSF's 5 TFP (van der Valden 2008) and in the study by Talley et al (2012). The major barriers associated with defaulting in the SFP lack of awareness of MAM, ready-to-use food stocks were out, and the loss of ration cards. The defaulting rates vary by month and site with ranges from less than 0% to greater than 100%. Overall, this study determined a number of factors possibly contributing to defaulting in an SFP.

## Conclusion

The limited amount of literature on SFPs, especially related to defaulting, necessitated the expansion of the literature review scope to include TFPs. TFPs are now mostly community-based and have similar durations and frequencies of visits in similar population making them a feasible comparison to SFPs. These papers, assessments, and articles show the breadth and depth of

possible factors affecting defaulting in TFPs and SFPs. The factors and non-factors associated with defaulter showed overlap for both types of feeding programs. The factors including community mobilizations, seasonal factors (i.e. during harvest or lean season), center specific factors (i.e. lack of supplies), opportunity costs (i.e other priorities), and environmental factors (i.e. distance to SFP or insecurity). One non-factor included some demographic factors (i.e. sex of child). However, some factors associated with defaulting were specific to the type of feeding program. Factors specific to SFPs included an understanding of malnutrition as a sickness, the type of population (mobile vs. non-mobile), social factors (i.e. shame going to SFP), while a non-factor included demographic factors (i.e. age, admission weight or height, or sex). The factors specific to TFPs includes center specific factors (i.e. attrition of staff), while the non-factor includes direct costs (i.e. money). For TFPs, some factors contradicted themselves as non-factors in other studies including anthropometric factors (i.e. weight and height at admission) and demographic factors (i.e. age). Overall, many of the types of factors affecting defaulting in SFPs are similar in TFPs, but there are also certain factors that are specific to the type of program.

Among the studies assessed in this literature review, two distinct types of research were investigated: studies with a discussion of default rates as figures and possible reasons for those figures and studies identifying reasons for high defaulting rates. Most of the studies just discussed the defaulting rates as figures and possible defaulting reasons for those figures and were both quantitative and qualitative. However, most of the studies identifying reasons for defaulting, primarily for SFPs, used qualitative methods making it difficult to generalize to a population other than the one investigated. However, one study did look at different characteristics among children and their resulting outcome (defaulting vs. not defaulting) using



quantitative methods, but it was specific to a TFP and in India. The generalization of this study is limited to this type of program, not SFPs, and probably this location, not in sub-Saharan Africa.

Therefore, there remains a major gap and insufficient literature for quantitative studies identifying factors associated with defaulting in SFPs and in a variety of settings. This study will evaluate factors associated with defaulting as an outcome in a variety of settings and add to the growing amount of literature about SFPs to help inform strategy and policy recommendations for nutrition programming in a variety of contexts.

## Student Contribution

Student analyzed and performed statistical analysis, developed the figures and tables, and wrote the paper

## Thesis Manuscript

Submission intended for the Journal of Nutrition

## Title Page

### **Factors Affecting Defaulting in Children's Supplemental Feeding Programs in Chad, Kenya, and Sudan**

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## ABSTRACT

**Background.** One key measure of supplemental feeding program (SFP) effectiveness is the recovery rate. Defaulting is a main factor undermining the recovery rate and very common in SFPs. However, to date, no studies have quantitatively investigated factors associated with defaulting in SFPs.

**Objective.** This study evaluated baseline factors associated with defaulting in children's SFPs in an urban and semi-urban community in Chad, a rural, semi-nomadic community in Kenya, and an internally displaced persons (IDP) camp in Sudan.

**Methods.** Data were collected from questionnaires (N = 687 (Chad), N = 297 (Kenya), N = 808 (Sudan)) administered to caregivers of children with moderate acute malnutrition (MAM) ages 6-59 months upon their admission into an SFP. The questionnaire collected information on household characteristics, SFP accessibility, opportunity costs to attend the SFP, knowledge of the SFP, and reasons for attending. Country-specific multivariate logistic regression models were built using backward elimination to evaluate factors associated with the outcome of interest, SFP defaulting.

**Results.** Program defaulting was common (48.5% (Chad), 25.6% (Kenya), 42.9% (Sudan)). In multivariable analyses, the primary factors ( $p < 0.05$ ) reducing the risk of defaulting included: children were refused admission to SFPs previously, the precipitating reason for becoming MAM was illness, keeping livestock, food insecurity, a familial support system in the same house, the caregiver's age, an IDP residency status, and trying to register a child for the SFP previously. The primary factors increasing the risk of defaulting included: higher opportunity costs and possible stigma/shame in community.

**Conclusions.** We found factors associated with SFP defaulting were locale-specific. Our data indicate that program implementers should address locale-specific opportunity costs, stigma/shame associated with malnutrition, and caregivers with little/no familial support systems in the same households by identifying and providing additional support to these households and implementing community level stigma reducing programs.

**Keywords:** Supplemental Feeding Programs (SFP); Moderate Acute Malnutrition (MAM); Defaulting; sub-Saharan Africa

## INTRODUCTION

Moderate acute malnutrition (MAM) is defined by a mid-upper arm circumference (MUAC) between 115 mm and 124.9 mm and/or a weight-for-height Z-score (WHZ) between -3 and -2.1 according to the World Health Organization (WHO) 2006 child growth standards, while severe acute malnutrition (SAM) is defined by a WHZ less than -3 and/or a MUAC less than 115 mm and/or bilateral pitting edema (Sphere Handbook 2011). In 2014, MAM affected 34 million children under the age of 5 years worldwide (Levels and Trends 2015). A moderately malnourished child has a risk of death three times higher than a well-nourished, healthy child due to an increased vulnerability to disease and potential progression to SAM (Black 2008).

Though supplemental feeding programs (SFPs) are commonly used to prevent and/or treat MAM vulnerable populations, the effectiveness of SFPs, especially in emergency settings, is debated. Many critics especially question their cost-effectiveness (Navarro-Colorado 2008) and their implementation when the underlying causes of malnutrition are not well understood (Levine 2004).

One key measure of SFP effectiveness is the recovery rate, the percent of individuals discharged as recovered from the SFP to the total number of discharges (Sphere Handbook 2011). The Sphere Handbook (2011) recommends the proportion of discharges from a targeted SFP for children 6 to 59 months who have recovered to be greater than 75%. However, Navarro-Colorado et al (2008) found that only 69% of 376,179 children, pooled from 67 SFPs worldwide implemented between 2002 and 2005, recovered, and the percent recovered among the SFPs analyzed ranged from 22.8% to 96.1%.

Defaulting, which occurs when a program beneficiary is absent two or three consecutive visits, is a principle factor undermining the recovery rate (Navarro-Colorado 2008). The reasons for defaulting are not well understood, though some attribute it to, “seasonal and secular trends,

quality of program management, and/or lack of adaptation of the SFP design to local circumstances” (Navarro-Colorado 2008). Other contextual factors may also affect the recovery rate including the existence of a general ration, the time period since the start of a crisis, the chronic nature of a crisis, whether the population is displaced, and family or SFP center characteristics (Navarro-Colorado 2008).

To date, quantitative studies looking at factors affecting defaulting are limited to a therapeutic feeding program addressing SAM in India and Ghana (Burza et al 2015; Saaka et al 2015) with no quantitative studies investigating the factors affecting defaulting in SFPs in any context. This knowledge gap prevents public health organizations from improving their programs to minimize the factors affecting defaulting. Without further research, high defaulting rates could continue to affect SFP effectiveness and possibly prevent better use of already limited resources.

The purpose of this research is to evaluate predictors of defaulting in SFPs in multiple contexts in sub-Saharan Africa: a semi-urban and urban community (Chad), a rural, semi-nomadic community (Kenya), and an internally displaced persons (IDP) camp (Sudan). Each location was a separate cohort of children with MAM admitted to an SFP.

## METHODS

### Ethics statement

This study was approved by the Director of the CNNTA (Nutrition Department for the Chad Ministry of Health), Nutrition Manager in the Kenyan Division of Nutrition, and the General Secretary in the Sudan Ministry of Public Health, and all participants provided oral informed consent.

### Population and Sample

Children between the age of 6 and 59 months were admitted to SFPs in three countries in 2010 based on a MAM diagnosis using a  $WHZ \geq -3$  and  $WHZ < -2$  according to WHO standards, a  $MUAC \geq 115$  mm and  $MUAC < 125$  mm, or weight-for-height median percent (WHM) of  $\geq 70\%$  and  $< 80\%$  without edema according to National Center for Health Statistics standards. Children were excluded if they had been referred from a therapeutic treatment center for follow-up purposes. Each cohort site used the same methods and tools. The three sites included: Abéché, Chad managed by Action Against Hunger (ACF) with urban and semi-urban residents; Mandera, Kenya managed by Save the Children with a rural, semi-nomadic population; and El Geneina, an IDP Camp in Darfur, Sudan managed by Concern Worldwide. All sites had default rates, the proportion of discharges from the targeted SFP who have defaulted, greater than the targeted rate of  $< 15\%$  set by the Sphere Handbook (2011).

**Chad.** Abéché is located in the Ouaddai region of East Chad, near the border of Sudan. The residents of Abéché and surrounding villages near the border have been affected by insecurity, including displacement of around 170,000 IDPs to neighboring areas. This area also hosts many refugees from Darfur, Sudan. The area is affected by food insecurity and poor infrastructure affecting health and education (UN OCHA 2009).

ACF took over the SFP from Save the Children at the end of 2008. The SFP is integrated with a Community Management of Acute Malnutrition program, which started in 2007 and consists of a stabilization center and six ambulatory treatment units. A mobile team serves the six centers every week. The program targets Chadian children and families from the host population affected by high rates of malnutrition, and primarily serves residents of Abéché and surrounding villages. The defaulting rates for this program were persistently around 30% in 2009.

**Kenya.** The North Eastern Provinces of Kenya are arid provinces with a sparse population density, many of whom are poor pastoralists. These provinces receive little, erratic rainfall. Continued conflict, usually due to disputes over the limited resources, limits mobility affecting the communities' livelihood. Also, these communities have poor infrastructure limiting access to provision of healthcare, education, and water and sanitation (UNDP 2010).

Save the Children implemented a Community-based Therapeutic Care (CTC) program in Mandera Central, Kenya in August, 2007. The CTC program was integrated with the Ministry of Health in 2008, and the nutrition program was expanded to reach children in Wajir East and Wajir South districts in 2009. The SFP in Mandera is run by 2 teams covering 14 sites ranging between 0-62 kilometers away from the program base in Elwak. Each team goes to a different site each week and returns for a bi-weekly follow-up. The low population results in a small case load at each site. Save the Children uses mobile teams to provide more access to services, even in the more remote villages. All sites are easily accessible, except for a few along the Kenya-Somalia border where security advice is required before travel. The defaulting in the SFP programs in Mandera in 2009 ranged between 6% and 37%.

**Sudan.** El Geneina and surrounding camps in Darfur, Sudan are hosts to Sudanese IDPs displaced by violent conflict and food insecurity. The SFP started admitting malnutrition cases in August 2004 with an average admission of 3,631 cases per year. Concern Worldwide runs an SFP and outpatient therapeutic program (OTP). This program operates an SFP every two weeks in four camps around the towns Riyadh, Durti, Abozar, and Ardamatta. A weekly OTP is run from the same distribution points. All sites are easily accessible from town and Concern Worldwide's office where the farthest site is about a 20 minute drive by car. Defaulting is a major issue for El Geneina SFP with an average default rate of 36.9% in 2009.



### Data collection

Each country cohort aimed to recruit 960 children. Participants were recruited in the same order they were admitted, on the same day of admission, and using a constant selection step dependent on the day's expected number of admissions. For example, every third child admitted to any SFP site on that service day was recruited for the study. The questionnaires used in the study were developed from extensive formative research at two emergency SFPs, implemented by ACF, in Mali and Ethiopia.

Upon admittance into the study, an entry questionnaire was administered to the caregiver accompanying the child to the SFP either on the day of admittance (most common) or the second appointment or at home (less common). The entry questionnaire discussed household characteristics, accessibility to the SFP, the opportunity costs of attending the SFP, knowledge of the SFP, the reason for attending, a summary of SFP card information on admission (including date, weight, height, and target weight), and observations from the enumerator. In this analysis, a household asset score was determined separately for each country based on household items using principle component analysis and was divided into quintiles. Household items included in the household asset score were clock/watch, mosquito net, table, chairs, lantern, cart, hoe, axe, electricity, generator, battery, tape recorder, fan, TV, refrigerator, motor bike, radio, bicycle, telephone, and tin roof. Household items were included based on their distribution across households in each country (Vyas 2006), and items possessed by less than 3-5% or more than 95-97% of the population were not included as a rule of thumb. Therefore, the Kenya household asset score did not include a hoe, axe, battery, tape recorder, fan, TV, motor bike, or bicycle, and Sudan's score did not include a clock/watch, axe, battery, fan, TV, motor bike, or bicycle.

Children were followed until they were cured, transferred, defaulted, or did not recover in the program within the maximum time allocated for recovery (3 – 4 months). Exit questionnaires

discussing child's treatment outcome, the caregiver's perceptions of the SFP, and general information about the household were administered at the clinic or home for recovered or transferred children, or staff tried to follow up with the child at home for two consecutive weeks if a child defaulted. However, the exit questionnaire data was not included in this thesis.

### Outcomes

The outcome of treatment (recovered, died, default, non-response, transferred) assigned in the SFP was cross-checked with other information available from patient cards and interviews and corrected when necessary. Defaulting, this study's outcome of interest, occurred when a beneficiary was absent two consecutive visits. Non-defaulters included cured/recovered cases, beneficiaries who met the discharge criteria for three consecutive visits, and non-response cases, those who reached the 3-4 months duration of treatment without achieving the discharge criteria, but continued attending the service. The discharge criteria was based on WHZ, WHM, or MUAC defined by WHO recommendations. Beneficiaries where the caregiver refused to participate, no entry interview existed, no exit interview existed, or the child died or was transferred were excluded from the final analysis.

### Data Analysis

Each country's results were analyzed separately for contextual purposes. The cumulative time to defaulting among defaulters by week since SFP enrollment in each country were calculated. Descriptive statistics were calculated (means and standard deviations for continuous variables and the frequency and percent for categorical variables) for all covariates stratified by the outcome of interest.

Logistic regression was used to estimate the unadjusted odds of defaulting versus not defaulting by each variable in the entry questionnaire. All covariates with p-values < 0.05 were

included in multivariate logistic regression models: a model with all significant predictors from univariate analysis, a model built using backward elimination, and a model built using forward elimination. The goodness-to-fit of each model was determined using the Hosmer and Lemeshow statistic. Each model was assessed for multicollinearity by examining variable condition indexes (cutoff:  $> 30$ ) and variance decomposition proportions (cutoff:  $\geq 0.5$ ); no multicollinearity was observed. Models built using backward elimination had the best goodness-to-fit statistics and are presented. Unadjusted and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) are reported. All p-values are two-tailed. The Statistical Analysis System (SAS) 9.4 English version was used for all data analysis.

## RESULTS

After 262 children were excluded from this study (106 in Chad, 35 in Kenya, 121 in Sudan) based on an exclusion criteria, the final sample sizes were 687 children in Chad admitted between January and October 2010, 297 children in Kenya admitted between February and October 2010, and 808 children in Sudan admitted between March and October 2010 (Table 1). The recovery rates were 35.1% in Chad, 54.7% in Kenya, and 18.9% in Sudan. Among the children included in these analyses, 333 children (48.5%) in Chad, 76 children (25.6%) in Kenya, and 347 children (42.9%) in Sudan defaulted. Among defaulters included in these analysis, the average time to defaulting was 3.8 weeks (standard deviation (SD): 2.7) in Chad, 2.6 weeks (SD: 1.7) in Kenya, and 2.9 weeks (SD: 1.5) in Sudan (Figure 1).

### Significant Factors

Chad (Table 2). There were many significant ( $P < 0.05$ ) factors identified in the bivariate analysis, but only two remained significant in the multivariate analysis using backward elimination (Table 2). Factors statistically associated with a lower risk of defaulting included: children refused admission to SFPs previously as a reason for not attending the SFP earlier

(aOR: 0.55; 95% CI: 0.33, 0.91), and the self-reported precipitating factor for MAM was illness (aOR: 0.51; 95% CI: 0.30, 0.89).

Kenya (Table 3). There were many significant ( $P < 0.05$ ) factors in the bivariate analysis, but only four remained significant in the multivariate analysis using backward elimination (Table 3).

Factors statistically associated with a lower risk of defaulting included: the head of household's main activity is keeping livestock (aOR: 0.038; 95% CI: 0.15, 0.99), the following three months were perceived as being the worst in the year for food security (aOR: 0.29; 95% CI: 0.12, 0.72), and household childcare is provided by older children in the family, compared to nobody, while the caregiver attends the SFP (aOR: 0.15; 95% CI: 0.04, 0.62). The factor statistically associated with a higher risk of defaulting was the number of hours the caregiver was away from home attending the SFP (aOR: 2.01; 95% CI: 1.33, 3.05).

Sudan (Table 4). Six factors remained significant in the multivariate analysis using backward elimination (Table 4). Factors statistically associated with a lower risk of defaulting included: the caregiver's age (aOR: 0.97; 95% CI: 0.94, 0.99), a household residency status of IDP compared to non-displaced persons (aOR: 0.55, 95% CI: 0.39, 0.77), and the number of times the caregiver tried to register her child (aOR: 0.53; 95% CI: 0.35, 0.81), while factors statistically associated with a higher risk of defaulting included: the head of household's main activity is commerce (aOR: 1.73; 95% CI: 1.05, 2.82) and the following three months are perceived as the busiest time in the year for the caregiver's main activity (aOR: 6.52; 95% CI: 1.81, 23.43). Odds of defaulting were also significantly higher if caregivers associated shame with attending the SFP (aOR: 3.01;

95% CI: 1.25, 7.27) or were unsure whether others associated shame with attending the SFP (aOR: 1.79; 95% CI: 1.15, 2.77).

#### Nonsignificant Factors (Data is not shown)

There were no statistically significant differences between defaulters and non-defaulter for child's age, gender, and weight or height at admission across all countries.

## DISCUSSION

This study describes the factors associated with defaulting in SFPs treating MAM in three different contexts: an urban and semi-urban population (Chad), a rural, semi-nomadic population (Kenya), and an IDP camp setting (Sudan). In Chad, both factors were statistically associated with a lower risk of defaulting. In Kenya, three factors were statistically associated with a lower risk of defaulting, while only one was associated with a higher risk of defaulting. In Sudan, three factors were statistically associated with a lower risk of defaulting, while three were associated with a higher risk of defaulting. Our findings suggest factors associated with defaulting are country specific, but some factors were common in two countries. Opportunity costs were associated with higher risks of defaulting in Kenya and Sudan, and children refused admittance to SFPs previously were associated with lower risks of defaulting in Chad and Kenya.

#### Significant Factors

In Chad, children refused admission to SFPs previously were less likely to default once admitted. Highly motivated caregivers may bring their children with an early presentation of MAM. The positive changes caregivers see in their children due to treatment may re-enforce SFP attendance similarly to findings in CTC that treated SAM in Malawi and Ethiopia (Collins 2006). However, the changes seen through treatment in MAM are more subtle than SAM, and more research should be conducted to better understand this association.

However, other popular reasons for not attending the SFP earlier were not significant, but found to be related to defaulting in other literature. Caregivers not knowing about the SFP was not significant, but two studies (Belachew 2007; van der Velden 2008) found lower levels of community mobilization for TFPs had higher default rates. Also, caregivers were busy doing other things was a non-significant reason, but ACF-Uganda (2014) found other priorities was a barrier to seeking care at a TFP, suggesting the opportunity costs of attending the SFP possibly contributed to defaulting. Therefore, these findings may further support the need for additional research to understand this association.

Also, illness as the perceived precipitating factor for being MAM compared to other reasons was statistically associated with a lower risk of defaulting. MAM is largely invisible and shows no outward signs of problems to most observers (UNICEF 1998) making it hard for caregivers to detect. However, a caregiver may be more likely to seek care for a child showing outward signs of sickness compared to just a “skinny child”, similarly to health seeking behaviors found in a study in India (Burtscher 2015). When seeking care, the child may be more likely to receive a MAM diagnosis and/or referral to an SFP for treatment. Once in the program, caregivers may see their child recovering from having symptoms to no symptoms re-enforcing continued SFP attendance similarly to how CTC re-enforce SAM treatment compliance due to rapidly observed changes in the child due to treatment provided by the caregiver and community (Collins 2006). However, a caregiver of a child with MAM only may not see the same observed changes, as MAM is largely invisible, losing that motivation to continue treatment and attending the SFP.

In Kenya, households where the head of household’s main activity is keeping livestock compared to not keeping livestock and the following three months were perceived as being the

worst in the year for food security compared to times when food security is not the worst are less likely to default. However, Concern Worldwide in Ethiopia (2011) found that mobile pastoralist communities resulted in higher defaulting rates. No literature was found to understand how food insecurity relates to defaulting, but Collins (2006) suggested the increase amount of time a caregiver is away from the home with a child with SAM in an in-patient TFP may have undermined the food security of the household encouraging defaulting. This may imply a caregiver attending an SFP may affect the food security of the household and encourage defaulting. Therefore, more research needs to be conducted to understand the relation between both keeping livestock and household food security and defaulting to either confirm or refute these findings.

Also, household childcare provided by older children in the family, compared to nobody, while the caregiver attends the SFP was statistically associated with a lower risk of defaulting in Kenya. This indicates the importance of familial support systems living in the same house to decrease the risk of defaulting. Several studies in Ethiopia found family support was a possible protective factor in adherence to tuberculosis treatment (Tekle 2002; Gebremariam 2010).

The number of hours a caregiver is away from home to attend the SFP was a factor associated with a higher risk of defaulting in Kenya. Other tasks, such as domestic tasks or income generating projects, stopped when the caregiver takes the child to the SFP are opportunity costs. These opportunity costs may prevent caregivers from attending the SFP with their children and encourage defaulting. Similarly, in Uganda, the heavy work load for caregivers to provide food for household survival has been shown to be a barrier to SFP enrollment, and many caregivers engaged in household activities and failed to take children for treatment on time possibly contributing to defaulting (ACF-Uganda, 2011). Likewise, in-patient TFPs require a

caregiver to spend substantial time away from home affecting the household and encouraging defaulting (Collins 2006). Opportunity costs have also been identified as predictors of defaulting. Navarro-Colorado (2008) concluded that opportunity costs were related to defaulting rates in SFPs, and SFPs' current design may force caregivers to choose between attending an SFP with the child and other activities related to the economic or food security of the family.

In Sudan, households where the head of household's main activity is commerce compared to not commerce and the following three months are perceived as the busiest time in the year for the caregiver's main activity compared to not the busiest time have a higher risk of defaulting. Both are more examples of opportunity costs, where time is dedicated to other activities related to the household livelihood. Thus, these opportunity costs may also affect the ability of the caregiver to attend the SFP with the child contributing to the likelihood of defaulting similarly to the opportunity costs identified in Kenya.

Also in Sudan, a caregiver who tried to register their child for the SFP previously was less likely to default once admitted. This explanation may be similar to a significant factor for Chad, where children refused admission to SFPs previously as the main reason caregivers had not attended the SFP earlier. Both factors are associated with bringing their child to an SFP and not necessarily being admitted.

The caregiver's age was associated with a lower risk of defaulting. However, in a child immunization program in southern Ethiopia, maternal age was not associated with defaulting (Tadesse 2009). Similarly, maternal age was an insignificant factor associated with children defaulting from an immunization program in Malaysia (Shamsul 2012). Further studies may need to assess the significance of the association between a mother's age and defaulting.



Households with a residency status as an IDP compared to non-displaced statuses were less likely to default in Sudan. This could occur for several possible reasons: better community mobilization for IDPs in camps, SFPs may be closer and more accessible to IDPs in this location, and these Sudanese IDPs may have more flexible schedules/fewer competing opportunity costs of their time. Better community mobilization is related to smaller default rates (van der Velden 2008; Belachew 2007). Distance is a commonly cited barrier or reason for non-attendance (Navarro-Colorado 2008; Vautier 1998, ACF-USA 2014). Similarly, in Kenya, higher opportunity cost were associated with defaulting, and therefore, less opportunity costs may be associated with less defaulting. However, Navarro-Colorado et al (2008) found displaced populations (refugees, IDPs) from 67 SFPs in Asia, Africa, and Latin America showed higher default rates than residents. Further research is required to understand these associations and/or varied contexts within which IDPs are forming.

A neighbor associating shame with a child attending an SFP increased the likelihood of defaulting in Sudan. If a caregiver knows or even questions the shame associated with attending an SFP, they may feel shameful attending, stop attending, and default. In a study in Kenya, shame was a common barrier for women seeking care for their children with acute malnutrition eliciting feelings of shame, embarrassment, and discomfort while seeking care (Bliss 2015). Similarly in a study in Uganda, stigma associated with malnutrition was a barrier to seeking care because caregivers were ashamed to have a malnourished child (ACF-Uganda 2011).

### Non-significant Factors

In India, Burza et al (2015) found that age and admission WHZ were associated with defaulting from a TFP for SAM children. However, across all the programs included in the current study, the gender, age, and weight or height at admission did not differ between

defaulters and non-defaulters indicating these factors are not important defaulting risk factors in SFP programs addressing MAM in these contexts. These findings are similar to those seen in other preventative programs (van der Velden (2008); Talley (2012)). Therefore, the type of program (TFP vs. SFP) and/or reason for admission (SAM vs. MAM) may affect age and WHZ as factors associated with defaulting, but not gender. More research may be required to assess these possible associations.

### Limitations

There were several limitations to the study and analysis. Thirty-five interviews (16 in Chad, 16 in Kenya, and 3 in Sudan) were excluded because there was no accompanying exit survey, and the proportion of defaulters may be underestimated, especially in Kenya with the smallest number of defaulters. This could potentially affect the factors associated with defaulting if those with and without exit surveys were different by important characteristics. There is potential for misclassification of exposures of interest which could be differential and bias our results in an unknown direction. Also, the limited sample size makes it more difficult to draw conclusions for certain factors.

## CONCLUSIONS

We found that most factors associated with SFP defaulting were locale-specific. Some factors were associated with a lower likelihood of defaulting, while others were associated with a higher likelihood of defaulting. Our data indicate that program implementers should address locale-specific opportunity costs, stigma/shame associated with malnutrition, and caregivers with little/no familial support systems in the same households. Programs, especially in Kenya and

Sudan, should identify and provide additional support to households with higher opportunity costs and little/no familial support in the same household for current programs, and develop/adapt programs sensitive to these specific factors. Also, programs should implement community level MAM stigma reducing programs, especially in Sudan. These recommendations and additional quantitative studies investigating factors associated with defaulting in other locations and contexts with MAM could help organizations and program planners to understand how to better adapt their programs for their specific program context to decrease the amount of defaulting, increase program effectiveness, and better used limited resources.

## Tables

Table 1. SFP Enrollment Characteristics of Children 6 - 59 months and their Households in Chad, Kenya, and Sudan in 2010

	Chad		Kenya		Sudan	
	Defaulters (N = 333)	Non- Defaulters (N = 354)	Defaulters (N = 76)	Non- Defaulters (N = 221)	Defaulters (N = 347)	Non- Defaulters (N = 461)
Mean (SD) Child Age (months)	15.7 (9.7)	16.5 (11.5)	31.3 (13.5)	31.8 (13.5)	19.5 (11.3)	20.5 (12.9)
Male Child (%)	43.8	48.0	42.1	39.5	50.1	52.3
Mean (SD) Weight at Admission (kg)	6.8 (1.7)	7.1 (2.0)	9.8 (2.3)	10.0 (2.4)	7.6 (1.8)	7.8 (2.0)
Mean (SD) Height at Admission (cm)	71.3 (7.0)	71.8 (8.5)	86.2 (12.3)	86.8 (12.3)	74.4 (8.9)	75.3 (10.2)
Female Caregiver (%)	93.9	91.3	97.3	98.1	98.0	98.3
Caregiver's Relationship to Child (%)						
Mother	90.7	91.5	92.0	92.7	93.4	95.2
Other	9.3	8.5	8.0	7.3	6.6	4.8
Caregiver's Highest Education Level (%)						
No Education	52.1	56.1	56.8	49.5	77.2	81.1
Koranic or Madrassa	35.8	34.5	40.5	48.6	3.2	4.3
Primary School or higher	12.1	9.4	2.7	1.9	19.6	14.5
Male HHH (%)	97.2	98.5	95.6	98.1	99.1	99.1
HHH's Highest Education Level (%)						
No Education	34.3	36.5	28.9	24.0	57.9	61.1
Koranic or Madrassa	38.6	38.4	57.8	67.3	20.1	17.0
Primary School or higher	27.1	25.1	12.3	8.0	22.0	21.9

Key: SD, Standard Deviation; HHH, Head of Household; IDP, Internally Displaced Person

**Table 2.** Univariate, Bivariate, and Multivariate Analysis of Significant Factors Associated with Defaulting in Supplementary Feeding Programs for Households of Children 6 - 59 months (N = 687) in Chad in 2010

Factor	Defaulters (N = 333) (%)	Non- Defaulters (N = 354) (%)	Bivariate Analysis				Multivariate Analysis			
			OR	95% Confidence Interval		P-value	aOR	95% Confidence Interval		P-value
				Lower	Upper			Lower	Upper	
Caregiver is HHH										
Yes	13.5	7.9	1.84	1.11	3.05	0.018				
No	86.5	92.2	ref							
Main activity of HHH: Keeping livestock										
Yes	7.7	3.9	2.09	1.02	4.28	0.044				
No	92.3	96.1	ref							
Main Income Generating Activity of HHH: Salaried Work										
Yes	33.1	21.9	1.76	1.19	2.61	0.005				
No	66.9	78.1	ref							
Share of HH Expenditure Covered by Caregiver & Spouse										
None/Almost none	17.1	18.5	ref							
Less than half	31.4	41.9	0.81	0.52	1.26	0.352				
About half	36.9	31.2	1.28	0.82	1.99	0.274				
More than half	14.6	8.4	1.89	1.06	3.39	0.032				
HH Asset Score										
Poorest	17.4	22.0	0.60	0.37	0.97	0.035				
Second	17.7	21.5	0.63	0.39	1.01	0.054				
Middle	23.4	17.8	ref							
Fourth	18.6	21.2	0.67	0.42	1.07	0.094				
Richest	22.8	17.8	0.99	0.62	1.59	0.967				
HH has Camels										
Yes	4.2	1.4	3.06	1.09	8.60	0.034				

No	95.8	98.6	ref								
Paid for Transportation to Attend SFP											
Yes	13.2	6.5	2.19	1.29	3.72	0.004					
No	86.8	93.5	ref								
Did Not Pay Anything to Attend SFP											
Yes	78.7	86.4	0.58	0.39	0.87	0.008					
No	21.3	13.6	ref								
Caregiver Knows No. of Times to Weigh Child in First Month											
Yes	31.0	22.5	1.55	1.10	2.19	0.013					
No	69.0	77.5	ref								
Reason Caregiver did not come to SFP in earlier weeks											
Came, but child not admitted to SFP*	15.1	22.5	0.61	0.41	0.92	0.019	0.55	0.33	0.91	0.021	
All other reasons	84.9	77.5	ref				ref				
Main Reason Child is MAM: Was Born Weak											
Yes	9.6	5.5	1.81	1.00	3.27	0.050					
No	90.4	94.5	ref								
Main Reason Child is MAM: Got sick*											
Yes	79.6	87.2	0.57	0.38	0.87	0.009	0.51	0.30	0.89	0.018	
No	20.4	12.8	ref				ref				
Caregiver had other MAM children											
Yes	13.4	19.0	0.66	0.43	1.00	0.049					
No	86.6	81.0	ref								

Key: OR, Odds Ratio; aOR, Adjusted Odds Ratio; HH, Household; HHH, Head of Household; SFP, Supplementary Feeding Program

\* Significant factors in multivariate analysis using backward elimination

**Table 3.** Univariate, Bivariate, and Multivariate Analysis of Significant Factors Associated with Defaulting in Supplementary Feeding Programs for Households of Children 6 - 59 months (N = 297) in Kenya in 2010

Factor	Defaulters (N = 76) (%)	Non- Defaulters (N = 221) (%)	Bivariate Analysis				Multivariate Analysis			
			OR	95% Confidence Interval		P- value	aOR	95% Confidence Interval		P- value
				Lower	Upper			Lower	Upper	
Caregiver's main activity: Keeping livestock										
Yes	6.8	0.9	7.86	1.49	41.40	0.015				
No	93.2	99.1	ref							
HHH main activity: Keeping livestock*										
Yes	28.8	43.1	0.53	0.29	0.98	0.044	0.39	0.15	0.99	0.048
No	71.2	56.9	ref				ref			
Household food insecurity is the worst in following 3 months*										
Yes	55.6	72.0	0.49	0.26	0.91	0.025	0.29	0.12	0.72	0.008
No	44.4	28.0	ref				ref			
Household Asset Score										
Poorest	15.8	12.2	0.44	0.10	2.08	0.303				
Second	40.8	38.5	0.37	0.09	1.55	0.172				
Middle	5.3	1.8	ref							
Fourth	17.1	27.1	0.22	0.05	0.98	0.047				
Richest	21.1	20.4	0.36	0.08	1.59	0.176				
Time to arrive to SFP										
< 30 mins	41.7	60.1	ref							
30 mins - 1 hr.	44.4	32.4	1.98	1.11	3.53	0.021				
1 - 2 hrs.	11.1	6.6	2.44	0.94	6.34	0.068				
2 - 4 hrs.	2.8	0.9	4.27	0.58	31.52	0.155				
Accompaniment to SFP										
Unaccompanied	82.2	82.2	ref							
Accompanied by family member	4.1	2.3	1.75	0.41	7.54	0.453				

Accompanied by someone else	5.5	0.5	11.65	1.28	106.24	0.029				
Accompanied by someone from SFP	8.2	15.0	0.55	0.22	1.37	0.199				
Hours Caregiver is away from home to attend SFP <sup>1</sup> *	2.8 (1.4)	2.4 (1.0)	1.38	1.10	1.73	0.006	2.01	1.33	3.05	0.001
Person(s) taking care of other children for caregiver attending SFP										
The father, grandparents, a uncle/aunt	18.8	17.8	0.83	0.38	1.82	0.648	1.02	0.30	3.49	0.974
Other children in family *	10.1	23.8	0.34	0.14	0.84	0.020	0.15	0.04	0.62	0.009
Neighbors	33.3	28.7	0.92	0.47	1.78	0.794	1.13	0.41	3.14	0.812
Nobody	37.7	29.7	ref							
Caregiver knows someone else can bring child for ration pick-up										
Yes	73.6	84.1	0.53	0.28	1.00	0.050				
No	26.4	15.9	ref							
Reason Caregiver did not come to SFP in earlier weeks										
No one to look after children at home	5.9	1.1	5.87	1.05	32.83	0.044				
All other reasons	94.1	98.9	ref							

Key: OR, Odds Ratio; aOR, Adjusted Odds Ratio; HHH, Head of Household; SFP, Supplementary Feeding Program

<sup>1</sup> Mean (Standard Deviation)

\* Significant factors in multivariate analysis using backward elimination





Yes	43.6	52.0	0.72	0.54	0.95	0.020				
No	56.4	48.0	ref							
HHH's main activity: Commerce*										
Yes	17.3	9.6	1.98	1.31	3.01	0.001	1.73	1.05	2.82	0.030
No	82.7	90.4	ref				ref			
Next 3 months are main time animals are away										
Yes	7.7	3.8	2.11	1.13	3.96	0.020				
No	92.3	96.2	ref							
Next 3 months are busiest time for Caregiver's main activity										
Yes	97.3	93.3	2.60	1.22	5.58	0.014	6.52	1.81	23.43	0.004
No	2.7	6.7	ref							
Next 3 months are busiest time for Caregiver's main income activity										
Yes	97.6	93.9	2.62	1.17	5.85	0.019				
No	2.4	6.1	ref							
Next 3 months are busiest time for HHH's main activity										
Yes	97.6	93.4	2.81	1.26	6.24	0.011				
No	2.4	6.6	ref							
Household has cows										
Yes	6.9	2.4	3.04	1.47	6.29	0.003				
No	93.1	97.6	ref							
Time to arrive to SFP										
< 30 mins	56.5	69.1	ref							
30 mins - 1 hr	32.3	23.7	1.67	1.21	2.29	0.002				
1 - 2 hrs	10.7	5.9	2.22	1.31	3.77	0.003				
2 - 4 hrs.	0.6	1.3	2.22	1.31	3.77	0.455				
Caregiver's Thoughts on Distance to SFP										
Far	46.9	31.2	1.65	1.24	2.21	0.001				
Not far	57.1	68.8	ref							

Wait time before weighing Child										
< 30 mins	26.3	37.5	ref							
30 mins - 1 hr.	31.5	29.3	1.54	1.07	2.20	0.019				
1 -2 hrs.	41.0	31.2	1.88	1.33	2.64	0.000				
> 2 hrs.	1.2	2.0	0.85	0.25	2.82	0.784				
Wait time between weighing child and food collection										
< 30 mins	53.9	62.1	ref							
30 mins - 1 hr.	5.8	8.1	0.82	0.46	1.46	0.501				
1 -2 hrs.	19.0	11.8	1.86	1.24	2.78	0.003				
> 2 hrs.	21.3	17.9	1.37	0.95	1.97	0.090				
Caregivers reach home from SFP at a reasonable time										
At a reasonable time	65.9	73.6	ref							
Late	34.1	26.4	1.44	1.06	1.95	0.019				
Caregiver's Main Activity if did not come to SFP: Domestic Tasks										
Yes	92.8	87.4	1.85	1.13	3.03	0.014				
No	7.2	12.6	ref							
Caregiver's Main Activity if did not come to SFP: Waged Labor										
Yes	4.9	10.0	0.47	0.26	0.83	0.009				
No	95.1	90.0	ref							
Decided to come to SFP because of sensitization campaign										
Yes	2.9	6.3	0.44	0.21	0.92	0.029				
No	97.1	93.7	ref							
Tried to register child before*										
Yes	14.7	26.0	0.49	0.34	0.71	0.000	0.53	0.35	0.81	0.004
No	85.3	74.0	ref				ref			
Neighbors' child was MAM										
Yes	56.2	49.0	1.35	1.01	1.81	0.046				

No	36.3	42.7	ref							
Don't Know	7.5	7.2	1.07	0.62	1.85	0.809				
Neighbors associate shame with child attending SFP										
Yes	5.2	4.3	1.30	0.68	2.51	0.432	3.01	1.25	7.27	0.014
No	72.3	78.7	ref				ref			
Don't Know	22.5	16.9	1.45	1.02	2.06	0.040	1.79	1.15	2.77	0.010

Key: OR, Odds Ratio; aOR, Adjusted Odds Ratio; IDP, Internally Displaced Person; HHH, Head of Household; SFP, Supplementary Feeding Program

<sup>1</sup> Mean (Standard Deviation)

\* Significant factors in multivariate analysis using backward elimination

Figures

Figure 1

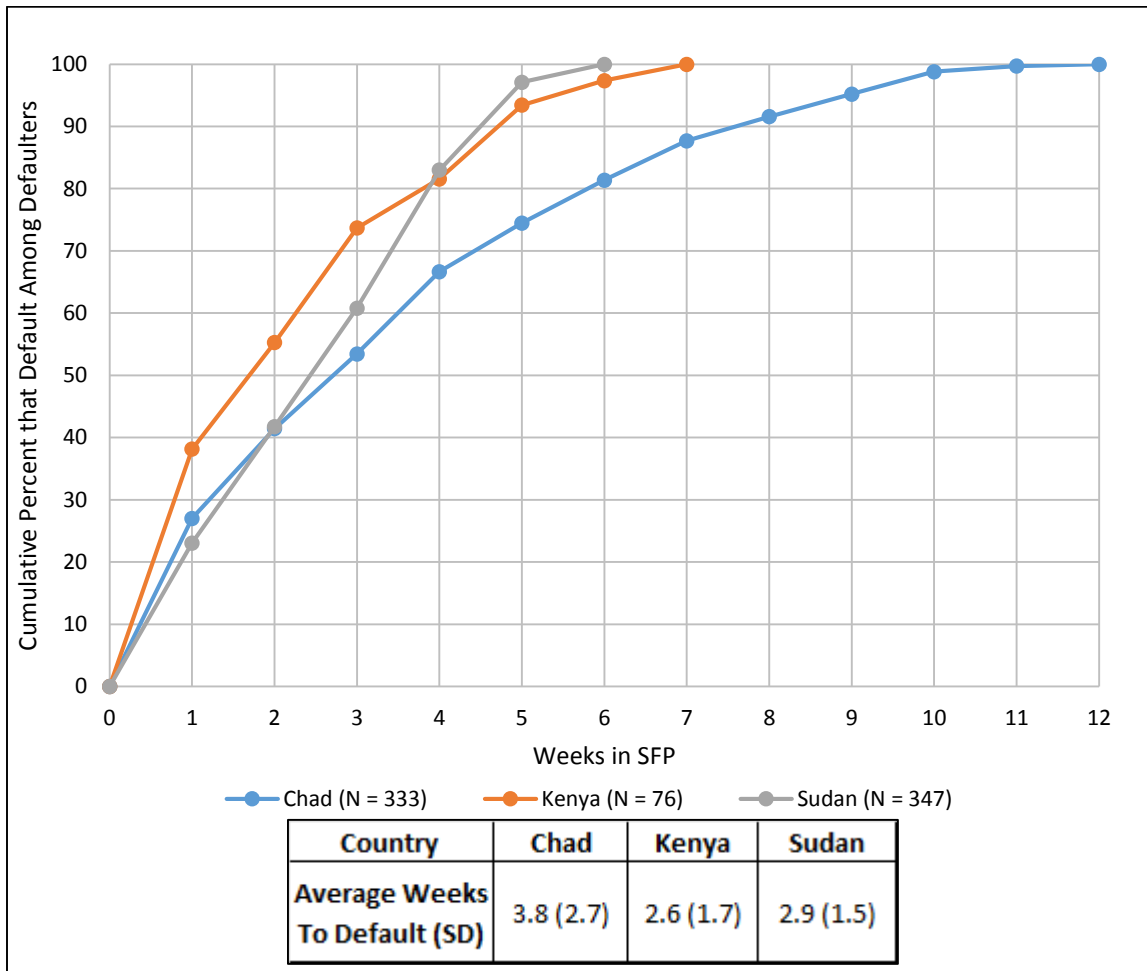


Figure 1. The Cumulative Time to Defaulting of Children 6- 59 Months that Defaulted among All Defaulters by Week since SFP Enrollment in Chad, Kenya, and Sudan

## Conclusions and Recommendations

We found that most factors associated with SFP defaulting were locale-specific. Some factors were associated with a lower likelihood of defaulting, while others were associated with a higher likelihood of defaulting. Our data indicate that program implementers should address locale-specific opportunity costs, stigma/shame associated with malnutrition, and caregivers with little/no familial support systems in the same household. Programs, especially in Kenya and Sudan, should identify and provide additional support to households with opportunity costs (i.e. where the head of household's main activity is commerce and/or the caregiver is busy), and develop a programs sensitive to these opportunity costs (Navarro-Colorado 2008). Forms of support could possibly include a family ration, a common strategy, however its appropriateness is unknown (Navarro-Colorado 2008). Also, programs should try to decrease the opportunity costs of caregivers attending the SFP by limiting the time the caregiver is away from their home, especially in Kenya. Programs, especially in Kenya, should identify and provide additional support to households with little/no familial support to watch children at home while the caregiver attends the SFP. Designing a program sensitive to this factor may also be important to decreasing defaulting in Kenya. Prior to implementing SFP, organization should consider implementing community level stigma reducing programs may help raise awareness in the community and reduce the fear of stigma among affected populations in malnutrition similarly to HIV/AIDS stigma reducing programs (Bliss 2015, Parker and Aggleton 2003).

These recommendations and additional quantitative studies investigating factors associated with defaulting in other locations and contexts with MAM could help organizations and program planners to understand how to better adapt their programs for their specific program context. Addressing these significant factors associated with defaulting in Chad, Kenya, and

Sudan may help decrease the amount of defaulting in SFPs. As the main undermining factor of the recovery rate (Navarro-Colorado 2008), decreasing the defaulting rate may increase the recovery rate and may improve the effectiveness of SFPs in these contexts. A more effective program may lead to better use of limited resources. Overall, these recommendations and research may help lead to less defaulting, more effective programs, and better use of limited resources.

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