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Integrated community-based management of severe acute child malnutrition

Studies from rural Southern Ethiopia

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Abstract

Tadesse, E. 2016. Integrated community-based management of severe acute child malnutrition. *Studies from rural Southern Ethiopia*. *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1232. 62 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-554-9601-2.

Background: The World Health Organization (WHO) recommends the community-based Outpatient Therapeutic Program (OTP) as a standard treatment protocol for the management of uncomplicated Severe Acute Malnutrition (SAM) at the community level. OTP has been scaled up and integrated into the existing grassroots level government health systems in several developing countries. The aim of this thesis was to assess the implementation and outcome of a scaled-up and integrated OTP service provided at community level.

Methods: One qualitative study and three quantitative studies were conducted in southern Ethiopia. Children admitted to 94 integrated OTPs, their caregivers and health extension workers providing primary health care services in the nearby health posts were included in this study. The quantitative studies were based on data generated from observation of a cohort of 1,048 children admitted to the integrated OTPs.

Result: On admission 78.8% of the children had SAM. The majority of these children 60.2% exited the program neither achieving program recovery criteria nor being transferred to inpatient care. Fourteen weeks after admission to OTP, 34.6% were severely malnourished and 34.4% were moderately malnourished, thus 69.0% were still acutely malnourished. Ready-to-use Therapeutic Foods (RUTFs) provided for SAM children were commonly shared with other children in the household and sold as a commodity for the collective benefit of the family thus admitted children received only a portion of the provided amount. Further, the program suffered a severe shortage of RUTFs, where only 46.6% of admitted children were given the recommended amount of RUTFs by providers on admission and only 34.9% of these had uninterrupted provision during the follow-up.

Conclusion: The integrated OTPs we studied provide a constrained service and the use of RUTFs by families is not as intended by the program. The majority of admitted children remained acutely malnourished after participating in the program for the recommended duration. For integrated OTPs to be effective in chronically food-insecure contexts, interventions that also address the economic and food needs of the entire household are essential. This may require a shift to view SAM as a symptom of broader problems affecting a family rather than as a disease of an individual child. In addition, further research is needed to understand the health system context regarding RUTFs and medication supply and service utilization of integrated OTPs.

Keywords: Severe acute malnutrition, integrated outpatient therapeutic programme, programme outcome, recovery, Ethiopia

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List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

I Tadesse E, Berhane Y, Hjern A, Olsson P, Ekström EC (2015) Perceptions of usage and unintended consequences of provision of ready-to-use therapeutic food for management of severe acute child malnutrition. A qualitative study in Southern Ethiopia. Health Policy Plan 2015. doi: 10.1093/heapol/czv003. PubMed PMID: 25749873.

II Forsen E, Tadesse E, Berhane Y, Ekström EC (2013) Predicted implications of using percentage weight gain as single discharge criterion in management of acute malnutrition in rural southern Ethiopia. Maternal Child Nutr 2013. Epub 2013/08/15. doi: 10.1111/mcn.12076. PubMed PMID: 23941395.

III Tadesse E, Berhane Y, Worku A, Ekström EC (2016) Community based outpatient therapeutic program for severe acute malnutrition in rural southern Ethiopia; Recovery, fatality and nutritional status after discharge. (Submitted)

IV Tadesse E, Ekström EC, Berhane Y (2016). Challenges in implementing integrated community-based outpatient therapeutic program for severely malnourished children in rural southern Ethiopia. Nutrients 2016, 8(5), 251; doi:10.3390/nu8050251

To my mom (Belaynesh Bassa) and to the memory of my dad (Tadesse Balla)

Research collaboration

This doctoral thesis was part of a collaboration project between Addis Continental Institute of Public Health (ACIPH) in Addis Ababa, Ethiopia and International Maternal and Child Health (IMCH) at the Department of Women's and Children's Health, Uppsala University, Sweden. Funds for the project were kindly provided by the Swedish International Development Cooperation Agency (SIDA) and IMCH.

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Contents

Abbreviations

CHW	Community Health Worker
CMAM	Community-based Management of Acute Malnutrition
MAM	Moderate Acute Malnutrition
MUAC	Mid-Upper Arm Circumference
PHC	Primary Health Care
OTP	Outpatient Therapeutic Program
RUTF	Ready-to-Use Therapeutic Foods
SAM	Severe Acute Malnutrition
SNNPR	South Nations Nationalities and People's Region
WHO	World Health Organization
WHZ	Weight for Height Z-score

Introduction

Severe Acute Malnutrition

Globally, more than 29 million children under the age of 5 years, an estimated 5 percent, suffer from severe acute malnutrition (SAM) [1, 2]. SAM is associated with a mortality risk nine times higher than that of a non-malnourished child, and among children with moderate acute malnutrition (MAM) the risk of dying is more than two-fold of that of the reference group [3]. Children with SAM have compromised immunity because of complex physiologic and metabolic changes resulting from inadequate nutrients in their body [4, 5]. Their immunity becomes weaker as the insult continues [5-7], thus, children with SAM develop various complications such as sepsis, hypoglycemia, hypothermia, dehydration and anemia and face risk of death [8]. SAM is defined as having a mid-upper arm circumference (MUAC) of <115mm or weight-for-height z-score (WHZ) <-3 of the reference median, or the presence of bilateral pitting edema [9]. WHZ has been used for the diagnosis of SAM since 1999 [8] and, along with the development of community-based management of SAM, the use of MUAC was introduced [10, 11]. Previously, the MUAC cut-off for defining SAM was <110mm, but this has since been raised to <115mm. However, the former definition is still applied in some settings [12, 13].

Community-based Outpatient Therapeutic Program

Prior to the 2007 WHO recommendation [10], the accepted approach for the management of SAM was restricted to health facilities or therapeutic feeding centers mainly because of a lack of appropriate therapeutic food and limited number of health professionals [8]. In areas where SAM is common, this treatment standard was unable to cope with a large number of cases because of its high opportunistic cost to caregivers and resource intensiveness for the health system. Moreover, the milk-based F75 and F100 diet commonly used for the rehabilitation of SAM children are strictly designed for use in health facilities because of their liability for bacterial growth and contamination [10, 11, 14]. Community-based OTPs is an approach that evolved from the need to address large numbers of SAM cases during nutrition and food emergencies [15, 16]. The introduction of Ready-to-Use Therapeutic Foods

(RUTFs) made the shift from facility-based to community-based management of children with SAM possible. RUTFs are less likely to be spoiled by bacteria, have a long shelf life and do not need cooking [10, 17, 18]. RUTFs are conveniently packed and can be used safely at community level [17], however, beneficiaries' perception of RUTFs might influence the way it would be used.

Mostly, OTPs are part of the routine health care services provided at Primary Health Care (PHC) units and treatment for children diagnosed with SAM is provided by Community Health Workers (CHWs) on an outpatient basis. The CHWs screen under-five children at the PHC units as well as in their diverse outreach programs such as vaccination outreach, growth monitoring, and community health promotion days. Children diagnosed with SAM are admitted to OTP and their caregivers are given RUTFs and antibiotics, which they should use to treat their children at home [17, 19]. Caregivers return to PHC units for refills of RUTFs rations and to assess children's health and nutritional status weekly or fortnightly, depending on the PHC unit's schedule [18, 20, 21].

In addition, to enable the involvement of CHWs who have limited medical training, simplified protocols for admission and discharge of SAM were developed [8]. Mid-Upper Arm Circumference (MUAC) has been introduced as an independent and single admission criterion for non-edematous SAM [10]. It has a number of advantages over WHZ, such as ease of measurement [16, 22, 23], less measurement errors [22] and less financial cost [16]. MUAC is also believed to detect malnourished under-five children who are at risk of dying better than the WHZ [16, 23, 24]. The discharge criterion used for children who are admitted based on MUAC is 15% weight gain of their admission weight [22, 25], which needs monitoring of only the child's weight. Researchers argue that monitoring weight does not greatly differ from monitoring WHZ because height changes slowly, and if there is a change in WHZ during treatment, it is mainly from a change in weight [25].

Scale-up and integration of Community-based Outpatient Therapeutic Program to the government-funded public health system

In a humanitarian emergency context, which is characterized by a high, sudden and short-term increase in acute malnutrition [26], small-scale OTPs with high levels of external input of resources have performed well in achieving high coverage levels and recovery rates, low case fatality rates and reduced opportunity costs for families [15, 20, 27]. Based on experiences from these programs, the World Health Organization (WHO) endorsed OTP as a treatment model for SAM, supporting its scale-up and integration with

other initiatives at primary health care (PHC) level to reduce child mortality due to SAM [19]. Currently, OTP is integrated into PHC units in an increasing number of countries, predominantly in Sub-Saharan Africa and South Asia [28]. However, there is increased awareness that the effect of nutritional interventions vary depending on the context in which they are implemented [29, 30], thus, program implementation can be vary in the in the context of integration and scaling up of OTP.

Rationale of this thesis

In 2007, a joint statement by the WHO, WFP and UNICEF recommended community-based management of SAM. The aim was to increase coverage and reduce child morbidity and mortality related to SAM [10]. OTPs, implemented during nutritional emergencies where the implementers are local and have the support of international non-governmental organizations able to access substantial external support and other associated nutritional interventions, achieve high coverage levels and recovery rates, and low case fatality rates [14, 15, 20, 27]. Since the endorsement of community-based management of SAM, the program has been scaled up and integrated with existing government health services in many sub-Saharan African countries, including Ethiopia [19]. The integration and scaling up of OTP entails lower caseloads over longer time periods, with more reliance on the resources of existing health systems and less external input compared to emergency interventions [31]. Thus, documenting the implementation process and outcomes of integrated OTP is of paramount importance in contributing to a reduction in child morbidity and mortality.

Conceptual framework

The conceptual framework for this thesis is entitled ‘program theory’ and is based on the concept designed by Rossi and colleagues [32]. The first part of the theory is known as “program process theory” and describes whether service delivery is consistent with program design and whether service utilization by the target population is in line with the intention of the program’s service provision. The second part of this program theory is known as “outcome/impact theory”, which describes causal links between a program’s services and outcomes (Figure 1). This theory is helpful for understanding linkages between program activities and the intended outcomes and the rationale for why the program does what it does.

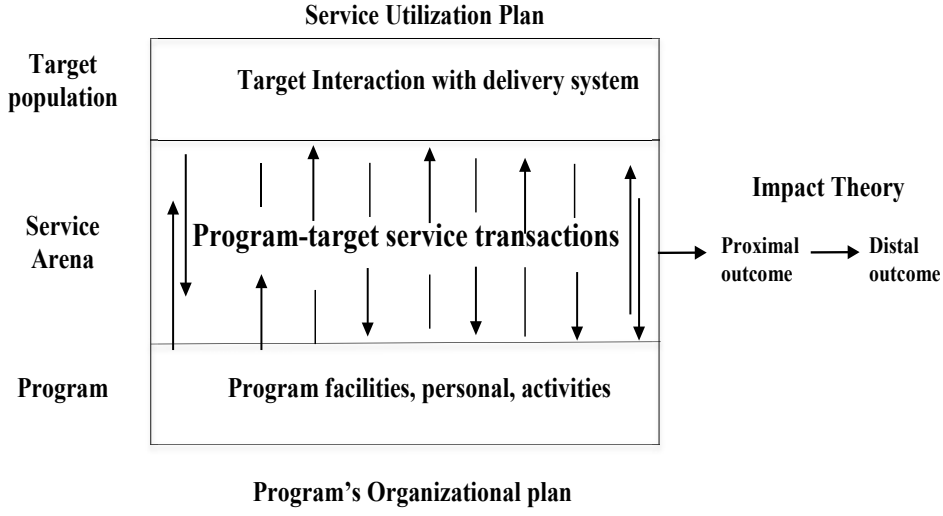

Figure 1. Program theory of process pathways by Rossi et al. [32]

The program theory of process pathways helps to understand integrated OTPs' capability to provide SAM management services which are compatible with national and international guidelines as well as the needs of severely malnourished children in the context we studied. The structure of OTPs includes a number of activities organized into critical stages to be carried out by the service providers and caregivers of severely malnourished children [21]. In integrated OTP service organization, CHWs provide RUTFs, medications and counselling to the caregivers, based on program assumption in which caregivers are expected to utilize program resources and information in a way that leads to the rehabilitation and recovery of SAM children. However, the way caregivers utilize the OTP service might be different from program expectations because of their household context. Further, caregiver's perceptions of the services provision by Health Extension Workers (HEWs), the outcome of the program might be different from what is expected.

Aim of the thesis

The overall aim of this thesis was to analyze the implementation of scaled-up and integrated OTP services provided by HEWs at community level and determine the outcome of SAM management.

Specific objectives

1. Explore perceptions of usage and unintended consequences of provision of RUTF for management of severe acute child malnutrition (Paper I)
2. Analyze predicted implications of using percentage weight gain as single discharge criterion in management of acute malnutrition (Paper II)
3. Determine program outcome of integrated OTPs and acute malnutrition beyond participating in the program (Paper III)
4. Investigate challenges in implementation of critical steps in integrated OTPs and caregiver's perception of service provision and RUTF usage (Paper IV)

Methods

Study setting

Ethiopia has the second largest population in Africa with an estimated population of 99.3 million in 2015, of which 13.5 million were children under the age of five [33]. The country has 11 regions divided in to 68 zones [34] and almost 85% of the Ethiopian population lives in rural areas. The majority of the farmers are smallholders, of which 55% cultivate land less than a hectare in area [35]. Despite the recent average economic growth of 11%, Ethiopia remains one of the poorest countries in the world, with high numbers of its population suffering from various forms of malnutrition [36, 37]. Most of its population receives less than the minimum level of dietary energy requirement compared to other sub-Saharan African countries [38]. According to the World Food Program, the number of people in need of food assistance in Ethiopia was 4.6 million in 2008, a figure that increased to 6.2 million in 2009 [39]. Currently, in 2015/16, the country is experiencing its worst drought in over 30 years [40]. The Government of Ethiopia recently completed the first phase of a national growth and transformation strategy that addressed both the economic and social sectors [41]. Along with significant economic growth, the country achieved the millennium development goal for child mortality and improved in a number of other aspects of health development goals [34, 42]. Although there has been a steady decline in the prevalence of malnutrition among under-five children in the last decade, it still remains unacceptably high; in 2000, 2005 and 2011, incidence of stunting was 58%, 55% and 44% respectively, wasting was found to be 12%, 12% and 10% respectively, and the percentage of under-five children who were underweight was recorded at 41%, 33% and 29% respectively.

Studies included in this thesis were conducted in the Wolaita zone of the Southern Nations Nationalities and Peoples Region (SNNPR). The total population of the zone is estimated to be 1,762,682, where 274,978 residents are children under five years of age. The region is made up of 12 administrative rural districts (woreda) and 3 town administrative districts. The zone has 3 hospitals, 70 health centers and 380 health posts [43]. The area is known for having high population density, rapid population growth, undeveloped farming, shortage of farming land and few income opportunities [44]. Food insecurity, poverty and the number of households depending on seasonal food assistance has been increasing since the mid-1980s [45]. Malnutrition is

widespread in the zone, even when food-related emergencies are absent. Out of twelve rural districts, four adjacent districts that host more than 50% of acutely malnourished children in the zone [46] were included in this study.

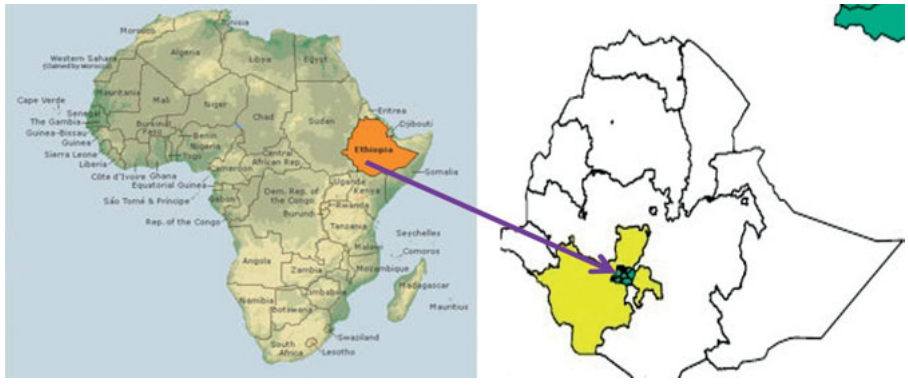

Figure 2. Study areas in Southern Ethiopia

OTPs were implemented in the zone we studied by NGOs until 2004 and then the program was scaled up and integrated into the existing government health care system [47, 48]. Currently, treatment for uncomplicated SAM cases should be available in all health posts (lowest level of primary health care system) in the zone. HEWs manage SAM cases with the help of community volunteers in the identification and follow-up of children with SAM [49]. HEWs are women community health workers who are trained for 10 months through the national Health Extension Program (HEP) and provide basic curative and preventive health services to rural communities for which they are given a salary [50-52].

The studies included in this thesis were part of a bigger research project; "*Effectiveness of community based management of severe acute malnutrition: Importance of maternal care and health system context*" (COMSAM). This project includes a qualitative study which was conducted at the beginning of the project to generate concepts and statements that were used as a basis for developing instruments in subsequent quantitative studies (observational cohort and cross-sectional survey). The main research design of COMSAM was a quantitative design that included a community-based survey and an observational cohort study.

A total of 3,833 randomly selected households were included in the survey, and 1,125 children admitted to OTPs in 94 health posts were followed for 14 weeks from admission in the longitudinal observational study. Enrolment, data collection and follow-up were concurrently carried out from July

to December 2011. This thesis is based on the initial qualitative study and the qualitative observational cohort studies.

Study design, data collection, and analysis

The first study had a qualitative design which was conducted to inform forthcoming quantitative studies and to explore perceptions of RUTFs usage the in community. The remaining three studies were quantitative. In the second study we used data on the nutritional status and weight of children on admission to OTP. The third and fourth studies used data gathered from the follow-up of children from admission to 14 weeks later. The study design, participants, data collection and main analysis are summarized in Table 1.

Table 1. Study design, participants, data collection and main analysis

Study design	Paper	Participants	Data collection	Main analysis
Qualitative Study	I	46 caregivers of admitted children 56 community volunteers 9 HEWs	FGD with caregivers FGD with community volunteers Individual interview with HEWs	Qualitative content analysis
Hypothetical quantitative study	II	631 children	Data on admission was simulated to generate 10%, 15% and 20% gain of admission weight	
Observational cohort study	III	1,048 children	Interview with caregivers and anthropometric measurement of children on admission, 4th, 8th and 14th weeks of admission	Descriptive statistics
	IV	1,048 children 1,021 caregivers of admitted children 175 HEWs	Interview with caregivers and anthropometric measurement of children on admission, 4th, 8th and 14th weeks of admission Interview with HEWs	

Qualitative design

A qualitative study design was used to explore perceptions of caregivers and CHW regarding how RUTFs was used. The concepts and components of Bronfenbrenner's socio-ecological model [53] formed the basis for the development of guidelines for data collection for the COMSAM project.

Data collection and participants

Focus group discussions (FGD) were conducted with caregivers of children admitted to OTPs (n=46), community volunteers (n=57) and semi-structured individual interviews with HEWs (n=9) [54]. Semi-structured guidelines were constructed for collecting data in FGD and interviews. The topic areas in the guidelines were causes of malnutrition, care of SAM children, use of RUTFs and challenges related to OTP. All FGDs and interviews were audio-recorded with the permission of the participants. Data also included field notes from observations that were made by the principal investigator throughout the collection of both qualitative and quantitative data. All recordings of FGD and individual interviews as well as field notes were transcribed into the local language and then translated into English to allow the involvement of other co-researchers in the analysis.

Data analysis

A qualitative content analysis method was used to identify both the manifest and latent content of the text [54]. This was initiated with repeated readings of the transcripts to gain a comprehensive understanding of the content. This was followed by an inductive analysis process, where meaning units were identified and summarized to shorter condensed meaning units. The condensed meaning units were shortened into codes, and sub-categories and categories were developed based on similarities and differences in content. Alternative interpretations of the meaning of the data were discussed among the co-authors until agreement on the most probable interpretation was reached.

Quantitative design

An observational cohort study design was adopted to focus on children admitted to OTPs at 94 health posts in the selected districts, their caregivers and HEWs who provide the OTP service. Children admitted to the program who were ages between 6 and 59 months were eligible for the study. However, those for whom the research team could not collect data within 7 days of admission and those whose households were not found upon three home visits were excluded. The children were followed at their first, fourth, eighth and fourteenth weeks of admission to OTP. Enrolment, data collection and follow-up were simultaneously carried out from July to December 2011.

Data collection and participants

A weekly visit to the health posts was made to identify children admitted to the OTPs from the health post's registration books from July to December 2011. Household visits were then made to collect anthropometric data from admitted children within 7 days of admission and their caregivers were interviewed. Socio-demographic information on the households, caregivers and children, such as age, marital status, education and occupation, were collected.

Anthropometry

The weight of the children was measured to the nearest 0.1 kg using the UNICEF electronic scale. MUAC was taken using the WHO-recommended MUAC tape and procedure [55, 56]. Interviewers were trained in anthropometric measurement techniques and standardization of their measurements was completed. Twenty-three female nurses collected data and were trained in anthropometric measurement techniques, including repeated standardisation sessions to ensure the accuracy and precision of measurements according to established guidelines [57].

The presence of malnutrition was defined by the use of MUAC measurement or the presence of edema, according to the WHO and national recommendations [10, 57]. Children diagnosed with edema on admission were categorised into two groups based on severity: mild/moderate edema and severe edema. Children without edema were categorised into three groups: 1) most severely wasted (MUAC<110mm); 2) less severely wasted (MUAC 110–114mm); and 3) not severely wasted (MUAC≥115mm). Nutritional status at discharge and 14 weeks after admission was categorized into three groups as defined by the WHO [58]. The program definition of recovery from SAM was defined according to the national guidelines: a gain of 15% of weight at admission for non-edematous children, and the resolution of edema for children with edema [57, 59].

Data analysis

Paper II

The final analysis included 631 of 1,048 children. Weight at admission was used to simulate 10%, 15% and 20% weight gain to examine to what extent the application of different percentage weight gain as discharge criterion would lead to nutritional recovery in children admitted to OTP. The Stata statistical software package, version 12.1 (StataCorp 2011), was used in analyzing the dataset. Descriptive statistics were then used to determine the

effects of the different percentages of weight gain on nutritional status in the four respective admission MUAC groups.

Papers III & IV

A total of 1,048 children and their subsets were included in the analysis. Proportions of children with acute malnutrition and the 95% confidence intervals were computed. Program outcome was computed for children with SAM on admission. For the fourth paper, critical key steps of OTP implementation (Diagnosis, RUTFs provision, follow up and exit from OTP) were measured to assess service provision. Data on caregivers' perceptions of service provision, such as attending scheduled health post visits and HEW's interaction, were assessed and data on HEWs' views of resource availability and use of RUTFs by caregivers were collected using four-scale questions which were dichotomized during analysis. Data were entered into Epi-Info (Version 6.0), cleaned and exported to SPSS for Windows (Version 20. 0) for analysis.

Ethical consideration

The research protocol was approved by the ethical review board at Addis Continental Institute of Public Health (ACIPH), Addis Ababa, and by the regional ethical review board in Uppsala, Sweden. Permission to conduct the studies was obtained from the Regional Health Bureau of South Ethiopia (SNNPR) and the district health bureaus of the four study districts. The purpose and procedures of data collection, confidentiality and voluntary participation was explained to caregivers of children admitted to OTP and HEWs. Because most of the caregivers were not able to read and write, their informed consent was tape-recorded for documentation after ensuring their understanding and agreement. All interviews and anthropometric measurements were conducted in privacy during home visits and HEWs were interviewed in their respective health posts.

Results

A total of 1,659 children were registered at the OTPs in the 94 health posts, of which 1,125 were included in the follow-up. Children who were not included in the follow-up were not assessed for eligibility (n=19), assessed but ineligible (n = 160) and data could not be collected within 7 days of admission (n= 355). Further 77 children were excluded because of missing information for key variables (age, sex, MUAC and edema status at admission), thus 1,048 children and their subsets were included in the analysis (Figure 3).

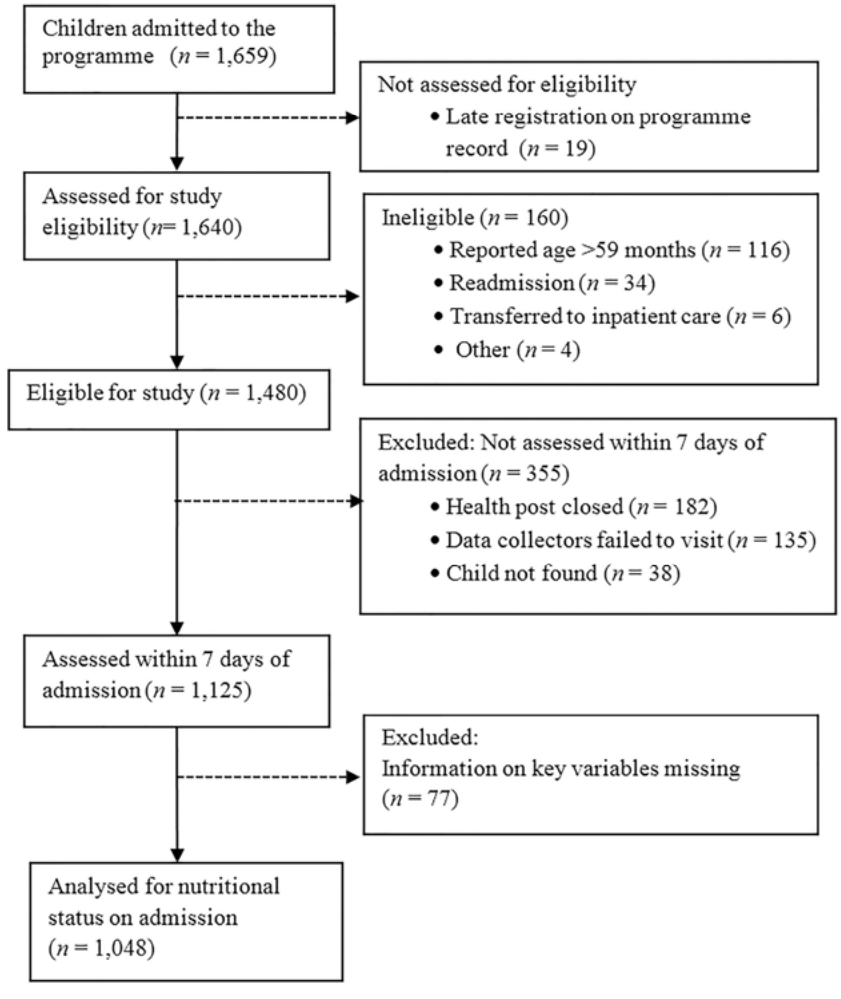

Figure 3. Flow of children admitted to the Outpatient Therapeutic Program

General characteristics of study participants

The majority of children were under 24 months of age 62.3% (653/1,048) and the female-to-male ratio was 1.3. All the caregivers in the studies included in this thesis are women, mostly biological mothers, married, and, on average, they were 30.6 years old. Children admitted to the OTPs and their caregivers mostly lived in houses with thatched roofs and walls of wood and mud or grass 74.7% (761/1,019), had an open-pit latrine 75.5% (769/1,019) and collected water from a public tap or a protected well or spring 77.0% (783/1,017). At the time of the study, 42.4% (433/1,021) of the households

had more than one child under-five years of age (Table 2). Service providers at the OTPs we studied were female HEWs, on average 24.7 years old, and married 69.9 % (122/175). The highest level of education completed for the majority (64.1%) was 12th grade. The majority 73.4% (128/175) was permanent residents of their work area and almost half of the HEWs 51.8% (91/175) lived within a 30-minute walking distance from the health post in which they worked.

Table 2. Characteristics of the children admitted to outpatient therapeutic program and their caregivers

Child characteristics (n = 1048)	**n/n**	**%**
Sex		
Boys	458/1,048	43.7
Girls	590/1,048	56.3
Age (in Months)		
6-11 months	366/1,048	34.9
12-23 months	287/1,048	27.4
24-35 months	126/1,048	12.0
36-47 months	162/1,048	15.5
48-59 months	107/1,048	10.2
Caregiver characteristics (n = 1021)		
Relationship to child		
Biological mother	903/1,019	88.6
Marital status		
Married	893/992	90.0
Age (in years)		
15-19	15/1,006	1.5
20-29	409/1,006	40.7
30-39	480/1,006	47.7
>=40	117/1,006	11.6
Current occupation		
No job	150/1,020	14.7
Farmer	542/1,020	53.1
Petty trade	328/1,020	32.2
Educational status		
Never attended school	34/1,020	3.3
In but did not complete primary school	708/1,020	69.4
Completed primary/secondary school	278/1,020	27.3
Household characteristics (n = 1021)		
Sanitation		
Pit latrine with slab	27/1,019	2.6
Open pit	769/1,019	75.5
Open space (Bush/farm land, other)	223/1,019	21.9
Source of drinking water		
Protected source (public tap/protected well/spring)	783/1,017	77.0
Unprotected source (spring/wall/other)	234/1,017	23.0
House construction		
corrugated iron roof with wood and mud wall	258/1,019	25.3
Thatch roof with wood and mud/grass wall	761/1,019	74.7
Number of under five children		
One	588/1,021	57.6
More than one	433/1,021	42.4

Service delivery at the health posts (Papers II, III & IV)

Diagnosis and classification of severe acute malnutrition (Papers III & IV)

In the OTPs we studied, 78.8% (826/1,048) of admitted children had SAM, thus, 21.2% (222/1,048) were not severely malnourished. On the other hand, 7.3% (77/1,048) of these children had severe edema, thus some children affected by complications associated with SAM were also admitted to the program instead of being referred to inpatient care (Figure 4). All diagnostic criteria for identifying and classifying SAM (measuring MUAC, assessing edema status, co-morbidities and appetite for RUTFs) were assessed for 64.7% (660/1,020) of the admitted children. The proportion of non-SAM children was significantly higher among those who had not been undergone a complete assessment on admission when compared to those who were assessed for all diagnostic criteria (64.9%, (144/222) versus 34.7% (77/222); *p<0.001*).

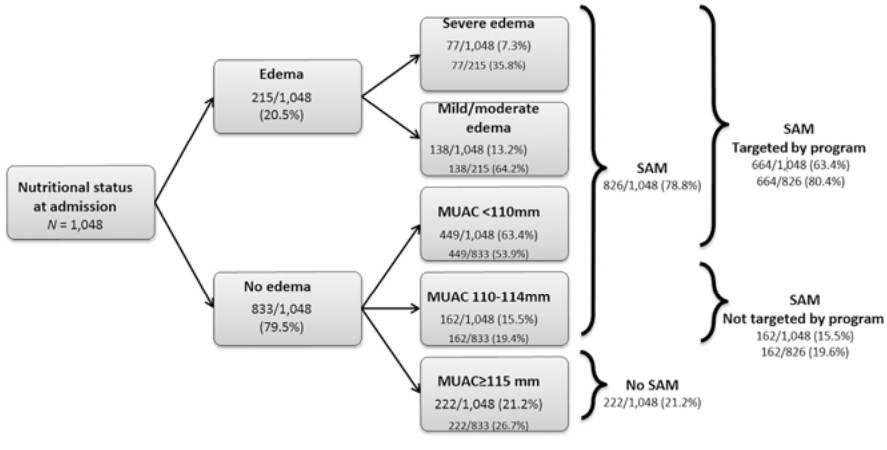

Figure 4. Children's nutritional status on admission to integrated outpatient therapeutic programs (SAM = severe acute malnutrition, MUAC = mid-upper arm circumference).

RUTFs and antibiotics provision (Paper IV)

One-third of the HEWs (32.9%, 55/167) mentioned lack of RUTFs as a major problem in managing children in their OTPs. On admission to the OTPs, only 46.6% (481/1,032) of the children were given the recommended amount of RUTFs. Almost two-thirds (68.5%, 632/922) of the caregivers reported receiving RUTFs in all scheduled health post visits. However, only 49.4% (469/949) were given the recommended amount, thus, 34.9% (316/905) had received the recommended amount of RUTFs on admission and during follow-up. Only 19.3% (196/1,015) of the children were given antibiotics on admission, and 62.9% (100/159) of the HEWs reported that they never had antibiotics at their health posts for children admitted to OTP. During our data collection we observed that almost all the district health offices (*n*=4) we studied suffered a severe shortage of transportation means to deliver the RUTFs and other supplies to the health post. We observed that many health posts lacked RUTFs despite them being available at their respective district health office stores. District health offices were often seen seeking assistance for the transportation of supplies from any possible source, including our research team. We were involved several times in transporting RUTFs and other resources from district health offices to the health posts during our stay in the field.

Follow-up during OTP participation and exit from the program (Paper IV)

Length of stay in OTP, check-up of nutritional status during follow-up visits and home visits by service providers were examined to describe follow-up of children during their stay in the OTPs. For the majority (71.4%, 690/966) of the children, length of admission was within the maximum national recommendation (8 weeks). The mean duration of admission to the OTPs was 7.1 weeks (95% CI: 6.9, 7.3) for children with SAM on admission. Children with SAM on admission who achieved program recovery criteria at discharge had a slightly longer stay in OTP than those who had not achieved the recovery criteria (7.0 weeks vs. 6.7 weeks). However, the difference was not statistically significant. Among children with SAM on admission, those with most severe wasting (MUAC <110mm) had the longest mean stay in OTP (7.4 weeks, SD: 2.7) and their mean stay in OTP significantly varied with severity of SAM on admission. During follow-up visits to the health posts, most of the admitted children had their weight (98.1%, 934/952) and edema status 83.7% (789/942) checked. However, only 33.2% (308/927) of admitted children had home visits by HEWs or a community volunteer.

Of the 826 children with SAM on admission, information on program outcome and nutritional status within seven days of discharge was available for 571 children, of whom 17 were dead. Of the remaining 554 children, only 220/553 (39.8%) left the program either achieving program recovery criteria (*n*=216) or were transferred to inpatient care (*n*=4). The remaining 334 neither achieved program recovery nor were transferred to inpatient care (Figure5).

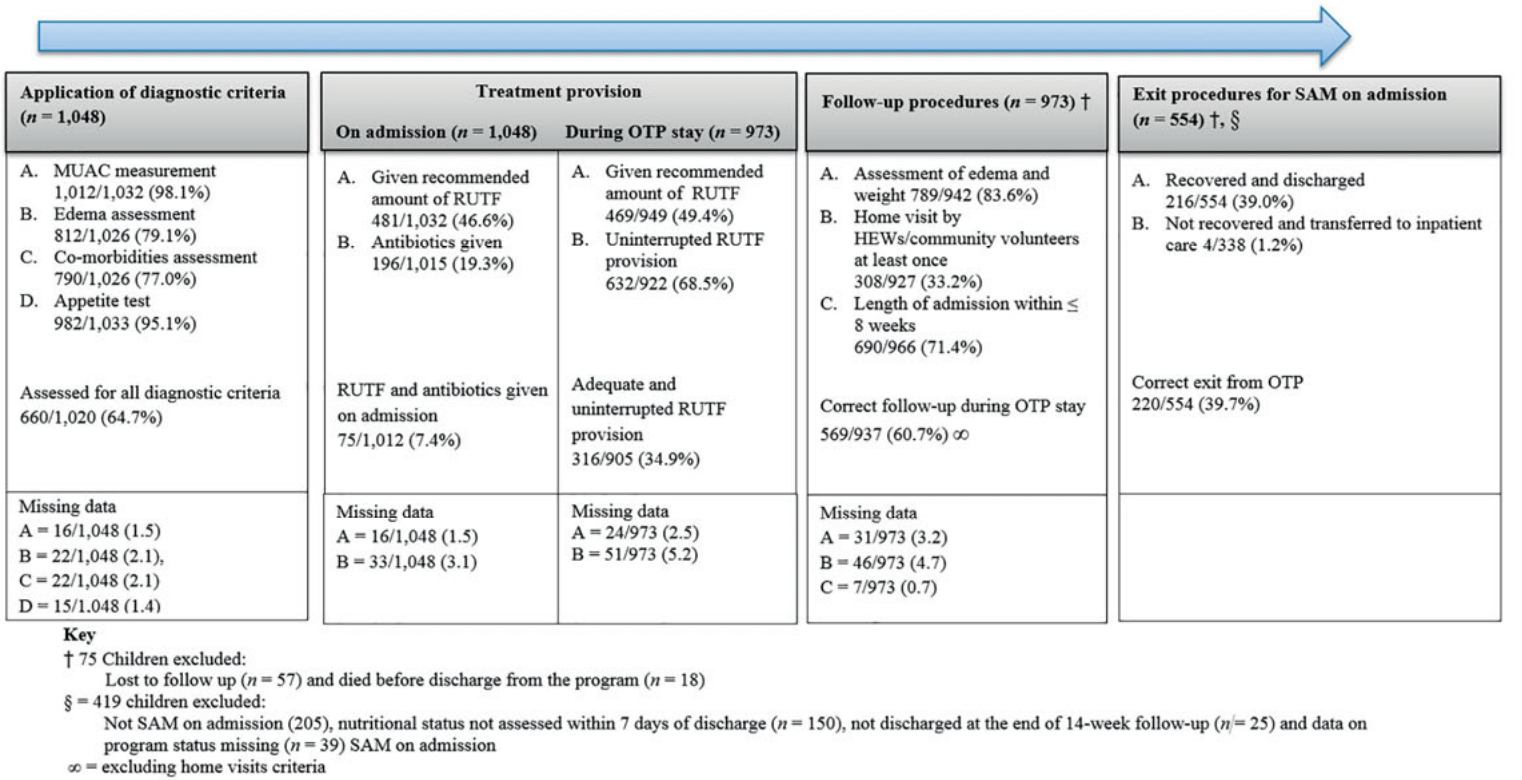

Figure 5. The critical steps in the management of SAM in a scaled-up and integrated outpatient therapeutic program

Implication of use of percentage weight gain as discharge criteria for non-edematous children (Paper II)

Children from 6 to 59 months of age admitted to the OTPs with non-edematous SAM (*n*=631) were included in the analysis of the implication of the use of 15% gain of admission weight as discharge criteria. After simulation of 15% gain of admission weight, wasting would have decreased to 7.8% (38/485) (moderate) and 1.3% (6/485) (severe) in children with MUAC <115mm on admission. Children who remained severely malnourished after simulation of 15% weight gain were those with the lowest WHZ-score (less than -4) on admission and those who remained moderately malnourished after the simulation had a WHZ-score of between -4.4 and -3.6 on admission. When simulated with 20% of weight gain, no more children would have had severe wasting and moderate wasting would have decreased further to 2.7% (13/485) (Table 3).

Table 3. Nutritional status of children at admission and after theoretical percentages of weight gain, grouped according to admission MUAC.

Table 3 Nutritional status of children at admission and after theoretical percentages of weight gain, grouped according to admission MUAC.

Group by MUAC N (%) = 631 (100)	Status on admission	Status after simulated weight gain 10%	15%	20%
MUAC-MAM 115-124mm				
n/N (%) =146/631 (23.1)				
MUAC mean (95% CI)	117.6 (117.2–118.0)			
HAZ mean (95% CI)	-2.9 (-3.1 – -2.6)			
WAZ mean (95% CI)	-3.1 (-3.2 – -2.9)	-2.3 (-2.4 – -2.1)	-1.9 (-2.1 – -1.7)	-1.5 (-1.7 – -1.4)
WHZ mean (95% CI)	-2.0 (-2.2 – -1.9)	-0.9 (-1.0 – -0.7)	-0.4 (-0.5 – -0.2)	0.13 (-0.2 – 0.3)
n/N (%, 95% CI) ≥-2 WHZ	70/146 (47.9, 39.7–56.1)	134/146 (91.8, 87.2–96.3)	139/146 (95.2, 91.7–98.7)	143/146 (97.9, 95.6–100.2)
n/N (%, 95% CI) <-2 WHZ	76/146 (52.1 43.8–60.3)	12/146 (8.2, 3.7–12.7)	7/146 (4.8, 1.3–8.3)	3/146 (2.1, -0.2–4.3)
n/N (%, 95% CI) -3≤WHZ>-2	59/146 (40.4, 32.4–48.5)	9/146 (6.2, 2.2–10.1)	5/146 (3.4, 0.4–6.4)	3/146 (2.1, -0.2–4.3)
n/N (%, 95% CI) <-3 WHZ	17/146 (11.7, 6.4–16.9)	3/146 (2.0, -0.2–4.4)	2/146 (1.4, -0.5–3.3)	0/146 (0.0)
MUAC-SAM <115mm				
n/N (%) =485/631 (76.9)				
MUAC mean (95% CI)	105.4 (104.8–105.9)			
HAZ mean (95% CI)	-3.6 (-3.7 – -3.5)			
WAZ mean (95% CI)	-3.8 (-3.9 – -3.6)	-3.1 (-3.2 – -3.0)	-2.8 (-2.8 – -2.7)	-2.4 (-2.5 – -2.3)
WHZ mean (95% CI)	-2.5 (-2.5 – -2.4)	-1.3 (-1.4 – -1.2)	-0.8 (-0.9 – -0.7)	-0.3 (-0.4 – -0.2)
n/N (%, 95% CI) ≥-2 WHZ	142/485 (29.3, 25.2–33.3)	376/485 (77.5, 73.8–81.3)	441/485 (90.9, 88.4–93.5)	472/485 (97.3, 95.9–98.8)
n/N (%, 95% CI) <-2 WHZ	343/485 (70.7, 66.7–74.8)	109/485 (22.5, 18.7–26.2)	44/485 (9.1, 6.5–11.6)	13/485 (2.7, 1.2–4.1)
n/N (%, 95% CI) -3≤WHZ>-2	189/485 (39.0, 34.6–43.3)	91/485 (18.8, 15.3–22.2)	38/485 (7.8, 5.4–10.2)	13/485 (2.7, 1.2–4.1)
n/N (%, 95% CI) <-3 WHZ	154/485 (31.7, 27.6–35.9)	18/485 (3.7, 2.0–5.4)	6/485 (1.3, 0.2–2.2)	0/485 (0.0)
MUAC-SAM <110mm				
n/N (%) =354/485 (73.0)				
MUAC mean (95% CI)	103.1 (102.5–103.6)			
HAZ mean (95% CI)	-3.7 (-3.9 – -3.6)			
WAZ mean (95% CI)	-4.0 (-4.1 – -3.9)	-3.3 (-3.4 – -3.2)	-2.9 (-3.0 – -2.8)	-2.6 (-2.7 – -2.5)
WHZ mean (95% CI)	-2.5 (-2.6 – -2.4)	-1.4 (-1.5 – -1.3)	-0.9 (-1.0 – -0.8)	-0.4 (-0.5 – -0.3)
n/N (%, 95% CI) ≥-2 WHZ	93/354 (26.3, 21.7–30.9)	269/354 (76.0, 71.5–80.5)	322/354 (91.0, 88.0–94.0)	342/354 (96.6, 94.7–98.5)
n/N (%, 95% CI) <-2 WHZ	261/354 (73.7, 69.1–78.3)	85/354 (24.0, 19.5–28.5)	32/354 (9.0, 6.0–12.0)	12/354 (3.4, 1.5–5.3)
n/N (%, 95% CI) -3≤WHZ>-2	137/354 (38.7, 33.6–43.8)	69/354 (19.5, 15.3–23.6)	27/354 (7.6, 4.8–10.4)	12/354 (3.4, 1.5–5.3)
n/N (%, 95% CI) <-3 WHZ	124/354 (35.0, 30.0–40.0)	16/354 (4.5, 2.3–6.7)	5/354 (1.4, 0.2–2.6)	0/354 (0.0)
MUAC-SAM 110-114mm|				
n/N (%) =131/485 (27.0)				
MUAC mean (95% CI)	111.7 (111.4–111.9)			
HAZ mean (95% CI)	-3.2 (-3.5 – -3.0)			
WAZ mean (95% CI)	-3.4 (-3.6 – -3.3)	-2.7 (-2.8 – -2.5)	-2.3 (-2.5 – -2.1)	-1.9 (-2.1 – -1.8)
WHZ mean (95% CI)	-2.3 (-2.4 – -2.1)	-1.1 (-1.3 – -0.9)	-0.6 (-0.7 – -0.4)	-0.1 (-0.2 – 0.1)
n/N (%, 95% CI) ≥-2 WHZ	49/131 (37.4, 29.0–45.8)	107/131 (81.7, 75.0–88.4)	119/131 (90.8, 85.8–95.8)	130/131 (99.2, 97.7–100.7)
n/N (%, 95% CI) <-2 WHZ	82/131 (62.6, 54.2–71.0)	24/131 (18.3, 11.6–25.0)	12/131 (9.2, 4.2–14.2)	1/131 (0.8, -0.7–2.3)
n/N (%, 95% CI) -3≤WHZ>-2	52/131 (39.7, 31.2–48.2)	22/131 (16.8, 10.3–23.3)	11/131 (8.4, 3.6–13.2)	1/131 (0.8, -0.7–2.3)
n/N (%, 95% CI) <-3 WHZ	30/131 (22.9, 15.6–30.2)	2/131 (1.5, -0.6–3.7)	1/131 (0.8, -0.7–2.3)	0/131 (0.0)

MUAC, mid-upper arm circumference; CI, confidence interval; WAZ, weight-for-age z-score; HAZ, height-for-age z-score WHZ, weight -for-height z-score; SD, standard deviation.

Service utilization by caregivers of admitted children (Papers I & IV)

Perceptions of usage and unintended consequences of provision of RUTFs (Paper I)

RUTFs were perceived by the study participants to be useful and were used for several purposes. Primarily RUTFs were seen as an effective treatment of SAM.

> "I fed this child plumpy nut (RUTFs) for one week and in one week his natural appearance returned. … Even small children make fun of him. They say "He glitters after enjoying plumpy nut." Caregivers FGD

However, RUTFs were also perceived as quality food to be shared with other children in the households and, furthermore, as a commodity to be sold and/or bartered. RUTFs were believed to cure SAM, which was understood as resulting from lack of food and presence of worms in children's intestines. Caregivers of children admitted to OTP explained that RUTFs cured SAM by expelling worms and building the body.

> "It (RUTFs) is like food with butter (way of describing high quality of food) that builds the body and gives strength." Community volunteer FGD

The practice of sharing RUTFs with other children in the household in addition to those admitted to OTP, was spoken of as being common, as was the HEW's recommendation to exclusively use it for the intended children. The children's caregivers face both cultural and emotional challenges when they try to avoid sharing. In addition, caregivers perceive that children will be sick if they crave any food, including RUTFs, and they are not given any.

> "A mother may say 'Why don't I feed all the children? They are all my children!' The other children also want to eat plumpy nut (RUTFs). It is difficult (not to share)." Community volunteer FGD

The selling of RUTFs was spoken of as being common by the study participants. Economic and food needs in poor households and the perception that the weekly ration was excessive for one child were mentioned as reasons for selling RUTFs.

> "They (other caregivers) sell plumpy nut (RUTFs) and then buy (other FGD participants list things caregivers buy such as salt, oil, milk, kerosene…) not to enjoy themselves. … They sell to fill the holes in their home." caregiver FGD

RUTF were available for sale in the communities observed by the research team during field-work. They also heard shopkeepers stating that they sell RUTFs at their shops.

> "Anyone can bring RUTFs… We usually get it from the health post women (HEWs), mothers or anybody. We buy from them and then sell it for little profit." Field-notes after conversation with local shopkeeper

In the subsequent quantitative study (Paper IV) we found that 26.4% (245/941) of the caregivers reported that RUTFs were available in shops in their areas. Both the caregivers (42.9%, 394/918) and HEWs (37.1%, 62/167) reported they heard about RUTFs-selling by other caregivers and sometimes by HEWs within their communities. However, none of the study participants said they themselves sold RUTFs.

Caregivers were perceived to attempt to maintain a prolonged supply of RUTFs, although they were informed that it is contrary to the program's recommendations. Caregivers were spoken of as sometimes opposing HEWs if their children were not admitted to OTP.

> "They say 'Please, take my child into the program. Look at him again. Can't my child go into the program…?' If we decide not to get him in (the program) they sometimes became upset and started to speak bad things against us." Community volunteers FGD

Caregivers were also perceived by the HEWs to seek multiple admissions of their children in different health posts using invented child identities. Caregivers from extremely poor households were even perceived to perpetuate SAM and/or lend their children to other women in order to obtain a share of RUTFs.

> "It is difficult to control them (caregivers) ... they will go to other health posts or send their sick child to someone in search for plumpy nut." HEW

The HEWs and community leaders were said to apply control measures of various degrees in response to the caregivers' attempts to prolong their access to and unintended use of RUTFs. The authoritative measures could include distribution of the product to the caregivers in ways that made it more difficult to sell.

> "We give (RUTFs) to them (caregivers) after opening it…. We also give them daily ration (instead of weekly) except for the weekends." HEW interview

Verbal warning and discontinuation of treatment to the children of caregivers who were involved in unintended use of RUTFs were also mentioned.

> "We warn her (caregiver) several times and if she continues selling we stop treating her child…because she is not feeding him (the admitted child) but sells." HEW interview

Examples of the public exposure of caregivers accused of having sold RUTFs, to punish the individual caregiver and to warn others not to engage in selling RUTFs were described.

> "She (caregiver) stands before the general assembly of the sub-district and we expose what she did (selling plumpy nut). So others learn from the punishment." Community volunteer FGD

Caregivers' experiences of service utilization (Paper IV)

Caregivers' perceptions of service delivery by the HEWs and their experiences of attending scheduled health post visits were examined to describe service utilization for admitted children. The majority; 70.4% (670/952) of the caregivers made weekly visits to the health post, while the remaining 29.6% (282/952) should have visited the health post more than once in a week. Nevertheless, 94.0% (883/939) of the caregivers and all HEWs perceived that attending the scheduled health post visits was not a problem. Almost all caregivers reported that distance was not a problem for accessing services at the health post. During scheduled visits to the health posts, caregivers were counseled and given a RUTFs ration for their children. Most caregivers perceived that HEWs adequately listened (93.9%, 905/964) and understood their situation (94.2%, 909/965) and had sufficient time with them (94.6%, 913/965) during their visits to the health post (Table 4).

Table 4. Caregivers' views of community-based outpatient therapeutic program service provision (n=973)

Item	Missing *n* (%)	*n*/*n* (%)
How difficult is it for you to attend the schedule for collection of RUTF? (*n*=939)	34 (3.5)	
Not difficult		883/939 (94.0)
A little/very difficult		56/939 (6.0)
How often should you visit the health post to collect RUTF if you have a child admitted to OTP (*n*=952)	21 (2.2)	
More than once in a week		282/952 (29.6)
Once in a week		670/952 (70.4)
To what extent do you think distance to the health post is a problem to adhere to follow up visits for SAM children? (*n*=946)	6 (0.6)	
Not at all/small problem		782/967 (80.9)
Big problem		185/967 (19.1)
Do you think HEWs listen to their problems? (*n*=964)	9 (0.9)	
Yes		905/964 (93.9)
No		59/964 (6.1)
Do you think the HEW spent sufficient time with them and their children when visiting the health post for SAM? (*n*=965)	8 (0.8)	
Yes		909/965 (94.2)
No		56/965 (5.8)
Do you think the HEWs were able to understand their problems/challenges related to managing their SAM child management? (*n*=965)	8 (0.8)	
Yes		913/965 (94.6)
No		52/965 (5.4)

Program outcomes, acute malnutrition and fatality (Paper III)

Program outcome was measured for 571 children with SAM on admission and for whom data was collected within one week of discharge. Only 37.8% (216/571) of the children achieved recovery criteria (15% weight gain of admission or resolution of edema at discharge) and 3.2% (18/571) defaulted from the program. The mean weight gain among all non-edematous SAM children was only 2.3 g/kg/day [95% CI 2.0- 2.6]. Nutritional status at discharge was analyzed for all admitted children for whom nutritional assessment was done within seven days of discharge (*n*=673). At discharge, 37.1% (250/673) were severely malnourished (MUAC <115mm or edema) and 37.7% (254/673) were moderately malnourished (MUAC 110-114mm); thus, 74.9% (504/673) were acutely malnourished. Fourteen weeks after admission to OTP, 72.1% (669/928) of the children we studied were acutely malnourished; 34.6% (321/928) were severely and 37.5% (348/928) were moderately malnourished (Figure 6).

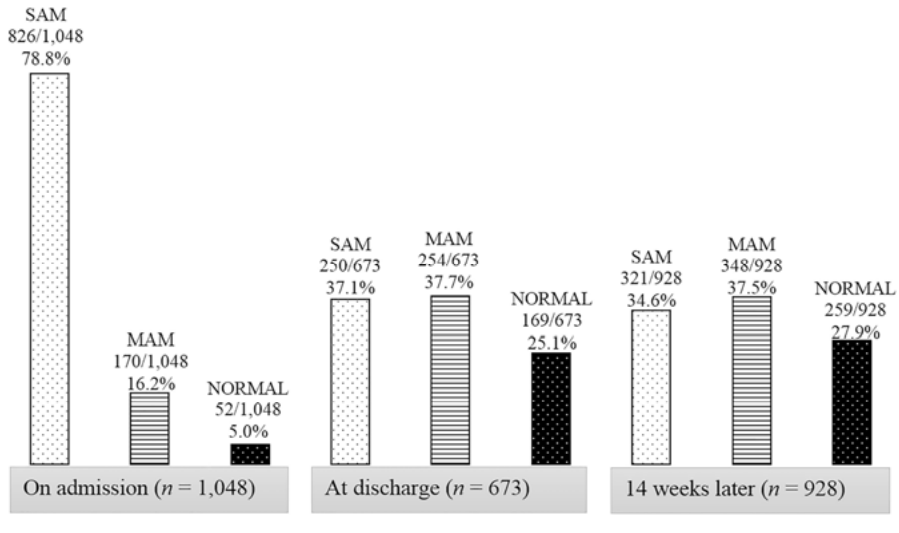

Figure 6. Nutritional status of children on admission, at discharge and 14 weeks after admission

The proportion of children who remained acutely malnourished at discharge as well as at 14 weeks after admission significantly varied with severity of SAM on admission. The proportion of SAM at discharge was significantly higher for those who had the most severe wasting (MUAC <110mm) (54.9%, 95% CI: 49.0, 60.7) on admission when compared to those who

were less severely wasted (MUAC 110-114mm) (32.0%, 95% CI: 22.9, 40.8) and children with edema on admission. At 14 weeks after admission, almost half (51.3%) of the children with the most severe wasting on admission (MUAC <110mm) were still severely malnourished. The proportion of SAM 14 weeks later was significantly higher for the most severely wasted children on admission as compared to children with other levels of and forms of SAM (51.3%, 95% CI: 46.3, 56.2 vs. 31.3%, 95%CI: 20.8, 43.3 for children with severe edema, 25.8%, 95% CI: 18.8, 33.9 for children with mild/moderate edema and 26.0%, 95% CI: 19.5, 33.5 for children with less severe wasting) (MUAC 110-114mm).

A total of 27 children admitted to OTPs died during the 14-week follow-up period, thus, the case fatality rate was 2.7% (27/982). All but one of the 27 deaths had SAM on admission and 10 out of all the deaths had occurred after discharge from the OTP. Children with edema on admission had a significantly higher case fatality rate compared to children without edema; 6.2% (95% CI: 3.5, 19.3) versus 1.8% (95% CI: 1.0, 3.0), respectively. Children with severe edema on admission had the highest case fatality rate, 12.0% (95% CI: 5.9, 20.3) (Table 5).

Table 5. Case Fatality of children at 14-week follow-up, by nutritional status at admission to outpatient therapeutic program

Nutritional status at admission *N*=991	**Missing data *n*/*n* (%)**	**Case Fatality rate *n* (%)**	**95% CI**
All children (*N*=982)	9/991(0.9)	27 (2.7)	1.8, 3.9
All SAM (*n*=781)	6/787 (0.8)	26 (3.3)	2.2, 4.8
Severe edema (n= 75)	0/75 (0.0)	9 (12.0)	6.0, 20.9
Mild/moderate edema (n=135)	1/136 (0.7)	4 (3.0)	1.0, 7.0
MUAC <110 mm (n=415)	5/420 (1.2)	11 (2.6)	1.4, 4.6
MUAC 110-114 mm (n=156)	0/156 (1.2)	2 (1.3)	0.2, 4.2
All non-SAM (*n*=201)	3/204 (1.5)	1 (0.5)	0.0, 2.4

Discussion

Despite adequate duration of admission, the majority of children admitted to the integrated OTPs were acutely malnourished at discharge from the program. Fourteen weeks after admission to OTP, 34.6% were severely malnourished and 34.4% were moderately malnourished, thus 69.0% were acutely malnourished. There was also a difference in perspective in RUTFs usage between HEWs and caregivers of admitted children. RUTFs were shared with other children in the household and sold as a commodity for the communal benefit of the family, thus inadequately consumed by the admitted children. Moreover, the provision of RUTFs in the context we studied resulted in unintended difficulties, both for the caregivers of children and service providers at community level. We also found that more than half of the children admitted to integrated OTPs received inadequate RUTFs during admission and follow-up visits to the health posts. Moreover, 60.3% of SAM children exited the program neither achieving program recovery criteria nor being transferred to inpatient care. The majority of the children who failed to achieve the recovery criteria should have been transferred to inpatient care for intensive management.

The program theory of process pathways [32] which was presented earlier in this thesis was used to summarize findings from the four papers. Key aspects of program delivery and caregivers' utilization of the service provided were linked based on the assumptions of the program theory of pathways. Program outcome and nutritional rehabilitation of children admitted to the program depended on the way service was provided and the extent of utilization of resources from the program according to the program intentions (Figure 7).

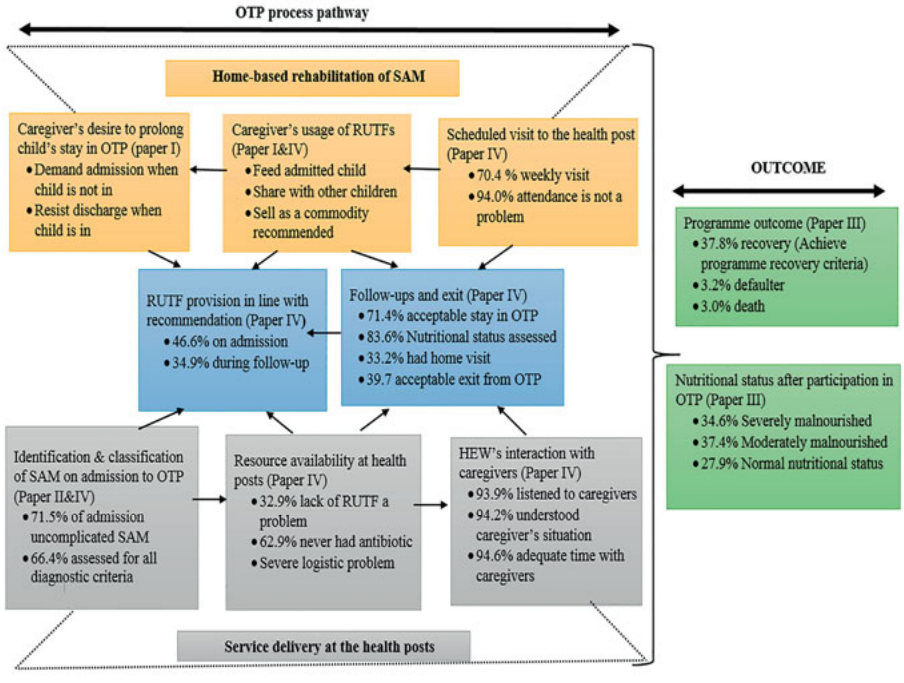

Figure 7. Program theory of process pathways and outcome of implementation of outpatient therapeutic program for management of severe acute malnutrition

Incomplete nutritional rehabilitation

Despite adequate duration of admission to integrated OTPs, the majority (79.5%) of children with SAM on admission failed to achieve complete nutritional rehabilitation (MUAC <125mm or edema). Moreover, the vast majority of SAM children who were declared as "recovered" based on the program recovery criteria were still acutely malnourished. The mean duration of admission was 7.1 weeks for children admitted with SAM into the program. Previous studies showed a linear positive relation between mean duration of admission to OTPs and nutritional rehabilitation of SAM children [60, 61]. However, this was not the case in our study. The difference might be because our data were from integrated OTPs which are part of resource-constrained government health facilities while previous studies were from NGO programs that have access to external technical and resource support [60, 61].

The updated WHO guideline for SAM management recommends the use of MUAC ≥ 125m as a discharge criteria for non-edematous SAM to enhance adequate stay in OTPs, and thus increase the probability of recovery from SAM [58, 61]. Nevertheless, in the context we studied, despite the

mean stay of 7 weeks, only 20.5% of SAM children achieved normal nutritional status, while 35.5% shifted to moderate acute malnutrition and 44.0% remained severely malnourished. It may be argued that in integrated OTP, changing discharge criteria to MUAC without ensuring an adequate supply of the recommended amount of RUTF might not add much to improving recovery from SAM, although it does have a number of other advantages [23, 60, 61]. The fact that 55.3% (316/571) of the children with SAM on admission failed to achieve program recovery criteria despite the mean stay in OTP for 7 weeks shows that there might be a number of other constraints leading to incomplete rehabilitation of SAM children.

The OTPs we studied used percentage weight gain as a single criterion to discharge non-edematous SAM from the program. However, the use of percentage weight gain as discharge criteria paradoxically results in a shorter stay in the program for the most severely malnourished children, while allowing a longer stay for less severely malnourished children [60]. Contrary to our expectation, there was no significant difference in duration of admission among different levels of severity of malnutrition on admission, where the mean stay in OTP was 6.8 weeks for children with edema, 7.1 weeks for most severely wasted (MUAC <110mm) and 7.3 weeks for those with less severe wasting (MUAC 110-114mm) on admission.

Gaps in Service provision of integrated outpatient therapeutic programs

The integrated OTP we studied did not target all needy children on admission, they lacked antibiotics, and children were discharged from the program neither achieving the program recovery criteria nor being transferred to inpatient care. According to the WHO guideline for SAM management, the target population for integrated OTPs are children aged 6 to 59 months with uncomplicated SAM (MUAC <115mm and/or grade I or II edema) [58]. The Ethiopian guideline uses a lower MUAC cut-off <110mm for defining SAM, thus children with MUAC 110-114mm are not targeted although they are severely malnourished [21, 58]. In the OTPs we studied, children with a reported age of >59 months (*n*=116), non-SAM (*n*=222), SAM but not targets of the national program (MUAC 110-114mm) (*n*=162) and grade III edema (*n*=77), that is, 34.8% (577/1659) of the children, were admitted, although they were not the target population of the program. The difference in the MUAC cut-off criteria in Ethiopia is motivated by prudent use of available resources [62, 63], however, it denies treatment to children who could recover from SAM if their condition was properly managed. We have shown that in a hypothetical best-case scenario, 90% of children in the

MUAC 110-114mm group would have recovered from wasting when the 15% weight gain as discharge criteria had been used.

Children with grade III edema are classified as having complicated SAM, thus, they should not have been admitted to OTPs, but rather, referred to inpatient care for appropriate management [58, 64]. Children with severe edema on admission had an increased risk of remaining severely malnourished 14 weeks later and also had a high risk of dying. RUTFs in an OTP is not suitable for children with severe edema as it contains higher protein and energy than the recommended F-75 milk-based diet [65]. While inpatient management would have been appropriate for these children, data on the performance of inpatient care for the management of severe edema and other complicated cases of SAM in the study area are not available. Thus, it is not known whether these complicated SAM cases would have had a different (better) outcome in inpatient care. The admission of non-SAM and older children resulted in distributing the limited resources of the program to children who are not targeted by the program. However, the majority of the non-SAM children (n=170) who were moderately malnourished were at risk of deteriorating to SAM.

Although the national guideline recommends the use of broad spectrum antibiotics for all children admitted to OTP with a diagnosis of uncomplicated SAM, only 19.3% of admitted children were given antibiotics [10, 21]. Previously, researchers were skeptical about the use of antibiotic management of children with uncomplicated SAM and highlighted the risk of causing antibiotic resistance that can result from such blanket use [62, 66]. In contrast, a recent study by Trahan and colleagues that included a large sample size showed significant improvement in recovery and reduction in mortality rate with the use of antibiotics [67]. The 2013 updated WHO guideline for the management of SAM recommends the use of antibiotics for the management of SAM in OTPs [58]. Our finding goes in line with findings from the studies by Trehan and colleagues [67] where the proportion of children achieving program recovery criteria was significantly higher for those who received antibiotics than for those who were treated with RUTFs alone. Amoxicillin is the most commonly used antibiotic in the management of uncomplicated SAM in Ethiopia [21].

The OTPs we studied suffered severe shortage of RUTFs, where more than half of the children admitted to the program never received the recommended amount. Both the caregivers of admitted children and HEWs reported lack of RUTFs as a problem. In Ethiopia, RUTFs are procured by UNICEF through the Regional Health bureaus, then the logistics are managed as any other health service supply through the existing government system up to the level of district health offices. We observed that health offices had a severe shortage of transportation means to deliver RUTFs to the health posts. At times the health posts lack RUTFs, although their respective district health office had it in their stock. In Bangladesh, RUTFs for the

management of SAM at community level are supplied by NGOs and were regularly supplied. But other program supplies that should be provided by the health system are usually out of stock [68]. Moreover, reviews of various research findings from a number of community-based health services, including OTP, showed that shortage of resources was the main reason for CHWs' failure to fulfil their work responsibilities [69, 70].

Almost two-thirds of children who had SAM on admission exited the program neither achieving program recovery criteria nor being transferred to inpatient care, that is, discharged to regular home food. We observed that HEWs were seen discharging children on the basis of a maximum stay (8 weeks) in their OTPs and that discharge from OTPs was perceived as temporary by caregivers and they expect their children to be back on the program in a few weeks. Limited availability of inpatient care and a weak referral network between health posts and higher health institutions are barriers to the transfer of children who failed to achieve program recommended recovery criteria upon exit from the program [10].

Difficulties in usage of RUTFs in integrated OTPs

In OTPs that are integrated to routine health services, differences in the perspective of how RUTFs should be used and the existence of factors favoring unintended uses may jeopardize the effective use of RUTFs. The program intention of RUTFs provision is to treat a disease condition (SAM) in an individual child and it is prescribed in a specific amount for a maximum of 8 weeks [21] . On the other hand, caregivers perceive RUTFs not only as a treatment but also as a food aid and resource that can be used for common benefits within their household. Thus, caregivers expect a longer duration of RUTFs provision. The community we studied has been the recipient of food aid for decades and uses a similar name for OTPs as well as conventional food aid programs that provide food items such as wheat flour and oil. Such a clash in view was explored by Cassidy (1987) who described that programs focusing on saving individual lives have an "activist" view while the local community focus on long-term household continuity have an "adaptor" view [71].

There are number of potential drivers of unintended use of RUTFs in the context we studied, where shortage of food in the household is not uncommon, for example, the cultural norm favors sharing whatever is available among household members. Programs focusing on an individual in the community where the norm is communal are seen to be obviously opposed by the community they intend to serve during implementation [72] . Thus, resources from such a program are usually used in unintended ways that conforms to local norms [73, 74], in line with the community's adaptive view described in previous study [71]. For example, the norm of sharing

RUTFs with other children was so strong in our study that caregivers felt that it would be discriminatory if RUTFs are not shared with all of their children. In our study, HEWs demand that caregivers adhere to their recommended usage of RUTFs which means feeding them only to the admitted children. However, Engle and Nieves (1993) argue that such expectations might not be reasonable [74]. Rather, programs should work with the community in solving the root causes of caregivers' inability to use RUTFs as recommended.

The OTPs we studied function in an area where there were no other nutritional interventions available, such as the targeted supplementary feeding program which is common in small scale OTPs that are attached to emergency relief programs. RUTFs were sold for a substantial amount of money in the local context and improved the purchasing ability of caregivers to buy food for the whole family's consumption. In a food-scarce context of extremely poor households, the weekly ration of RUTFs for a child admitted to OTP was perceived as excessive. Food resource targeting one individual from a food-insecure household is usually shared even if it is intended by nutrition intervention programs to be used only by the targeted individual [65, 75]. In populations with a similar context to our study population's available resources, RUTFs and other nutritional and food interventions are used by the community for preservation of their precarious livelihood [65, 72, 76]. Although the presence of nutritional intervention has not totally eliminated the unintended use of RUTFs [65], it might remarkably reduce the amount of RUTFs that are bartered to address the food and economic needs of the poor households.

The other potential driver for unintended use of RUTFs stems from the high economic value attached to RUTFs. RUTFs were seen to have high economic value not only because of pressing economic need, particularly in poor communities, but also because of the attributes they have that make them more marketable than other food aids. The perceived medicinal and food quality of RUTFs, their long shelf life and convenient packaging make them attractive to other segments of the population, such as students, track drivers and daily laborers. RUTFs might be perceived as a "super food" which might result in them having a higher price and market demand than the conventional food aid inputs, such as wheat flour and oil.

Risk of conflict and dilemma for the service providers and beneficiaries

The caregivers' perspective of how RUTFs should be used is at odds with those of the program intention thus, it might result in dilemma and conflict for both the caregivers and HEWs. Communities in poverty and chronic food

insecurity were seen as striving to maintain their livelihood by using resources from emergency nutrition interventions [75]. A potential source of conflict between HEWs and caregivers is when HEWs have to take authoritative measures to ensure the proper use of RUTFs. HEWs are part of the community they serve and have a lot of social, cultural and religious kinship. Thus, authoritative control measures by HEWs and community leaders might give rise to a number of other conflicts between HEWs and community leaders or/and caregivers. When the HEWs apply the agreed control measure of RUTFs usage on caregivers, this might have negative repercussion on the services HEWs are providing to their community.

Almost all the HEWs are from the community they serve, thus, they relate to the community, not only as CHWs, but also in having strong socio-cultural and economic ties. A potential dilemma for the HEWs might be deciding between embracing the socio-cultural norm and the moral value of 'helping the needy' of the community they belong to and applying authoritative control measures which might be offensive at times. We encountered a service session where a HEW kept providing RUTFs for more than a year because she knew that the caregiver, who was the grandmother of the admitted child, had nothing to feed the child. Such situations might be understood in the following quote from a caregiver: *"It is almost two years. They (HEWs) give (RUTFs) continuously… So I feed her (child with SAM)… That is all I have for her"*.

The application of various control measures in the community that views the program differently from the service provider not only gives rise to conflict but is also time consuming and thus leads to over-burdening HEWs. Researchers suggest a rational limitation of numbers and scopes of tasks of HEWs and catchment areas assigned to each health posts [68, 77]. HEWs have sixteen different 'packages' of health services, of which OTP is one [51]. The majority (88.6%) of HEWs we interviewed often feel overwhelmed because of the many responsibilities they have to fulfil as HEWs and 65.3% complained of not having sufficient time to complete all the activities expected of them. Health service providers at grass-root level providing basic health services might be over-worked by the large number of activities they are unrealistically expected to fulfil [51, 77, 78].

Methodological considerations

This thesis has methodological strength in using a mix of qualitative and quantitative designs. In addition, the studies included in this thesis were based on an independent research team who collected data and assessed the children's nutritional status. The research team was not involved in any aspect of program service delivery or other health and nutrition interventions in the study area.

Qualitative method

Qualitative designs have been used frequently within the field of public health research, not only as a complement to quantitative studies, but to enable a deeper understanding of public health issues beyond numbers. We used qualitative design to generate concepts to be used as basis for developing instruments in a subsequent quantitative component of the research project on which this thesis is based. We used the qualitative data to explore the perceptions of RUTFs usage and the unintended consequences of its provision from the perspective of caregivers of malnourished children, HEWs and community leaders. This triangulation of participants ensured richness of the data and allowed a grasp of the complexities involved. Furthermore, the study was informed by long-term observations in the field during data collection of the subsequent quantitative study. The multidisciplinary research team's composition of insiders and outsiders to the study context contributed to reflexivity throughout the analytic process. A limitation of this study was that some of the sensitive issues that arose during the FGDs may have been more appropriate to explore with individual in-depth interviews.

Quantitative methods

Because the distribution of RUTFs constitutes a strong pulling factor and health posts providing OTP are evenly distributed throughout the community, the overall coverage of SAM cases was probably good and the number of missed SAM cases was low. In the COMSAM research project's cross-sectional survey that included 4,330 randomly selected households with under-five children, 102 children were found to have been affected by SAM

during the survey, of which only two were not admitted to OTP. All data collectors were trained in anthropometric measurement techniques and went through careful training in anthropometric measurements, including standardization sessions prior to fieldwork and throughout the data collection period.

However, the studies had various limitations. The accepted delay of one week after admission and discharge for anthropometric assessment to classify the nutritional status is a limitation. This potential delay may both contribute to an under- and over-estimation of the children's actual nutritional status depending on the utilization of RUTFs and the food security situation of the household. Another limitation was that we did not observe HEWs doing the four assessments for diagnosing SAM, thus, the accuracy of the application of assessment techniques was not evaluated. Hence, the proportion of children with proper diagnosis might not reflect the accuracy of the diagnostic criteria assessed.

Conclusion and implications

The integrated OTPs we studied were deficient in achieving an acceptable recovery rate and other program indicators. Despite having had an adequate length of stay in OTP, children exit the program without reaching the required weight gain and acute malnutrition remained prevalent beyond discharge. On the other hand, MUAC ≥125mm as discharge criteria is recommended to enhance longer participation in the program which is believed to result in complete recovery from SAM. However, in the context we studied, the majority of admitted children stayed in the program for 6 to 8 weeks and the mean stay in OTP was 7.1 weeks, but SAM children remained malnourished at discharge from the program and 14 weeks later. Thus, the shift to the MUAC-based discharge criteria, even if it results in a longer stay in OTP, might not add much of the desired improvements.

The utility of RUTFs, the key innovation in SAM management, has not been as successful in integrated OTPs as it was in small-scale OTPs implemented during emergencies. Differences in views as to how to use RUTFs, a lack of other nutritional interventions for chronically food-insecure communities and limitations in logistics and supply resulted in difficulties in the usage of RUTFs in the context we studied. Interventions that also address the economic and food needs of the entire household are essential to ensure successful treatment of SAM children. In addition, the innovation of therapeutic foods, that have similar nutritive value but that are less appealing for unintended use, need to be explored.

The nutritional rehabilitation of SAM children was further compromised by the lack of antibiotics and an inability to refer complicated SAM cases to inpatient care. However, in this rural part of the region, access to inpatient and referral networks is not well developed, thus, further study is needed in this regard.

Moreover, there were a number of potential sources of conflict, such as caregivers' striving to maintain prolonged access to RUTFs and the unintended use of RUTFs based on local sharing norms, which challenge the efforts by HEWs and community leaders to take measures. As potential clashes between caregivers and HEWs on this issue might affect the effectiveness of other health interventions provided by the HEWs, realistic guidelines must be developed that are in line with professional ethics as well as social norms to protect both the caregivers and the HEWs, and the program itself.

አጭር መግለጫ /Summary in Amharic/

ከባድ አጣዳፊ የምግብ እጥረት በሽታ (severe acute malnutrition) በማደግ ላይ ባሉ ሀገሮች በሚኖሩ ዕድሜያቸው ከአምስት ዓመት በታች የሆኑ ልጆችን በብዛት የሚጎዳ በሽታ ነው::። በአጠቃላይ በዓለም ወደ 19 ሚሊዮን የሚሆኑ ዕድሜያቸው ከአምስት ዓመት በታች ልጆች በዚህ በሽታ ይጎዳሉ:: በዚህ በሽታ የተጎዱ ልጆች ከጤናማ ልጆች ጋር ሲነፃፀሩ ከዘጠኝ እጥፍ በላይ የመታመም እንዲሁም የመሞት አደጋ አለባቸው:። በከባድ አጣዳፊ የምግብ እጥረት በሽታ ከሚሰቃዩ ልጆች መካከል ሁለት ሦስተኛው እጅ ያልተወሳሰበ ከባድ የምግብ እጥረት በሽታ ያለባቸው ሲሆኑ ሌላ ተጨማሪ በሽታ የላቸውም፤ እንዲሁም ለመመገብ ዝግጁ የሆነውን የህክምና ምግብ (Ready-to-use therapeutic-foods) ለመብላት በቂ ፍላጎት አላቸው:። እነዚህ ያልተወሳሰበ ከባድ አጣዳፊ የምግብ እጥረት በሽታ ያለባቸው ልጆች በቀበሌ በሚገኝ የመጀመሪያ ደረጃ የጤና ክብካቤ (primary health care) ተቋም የሥነ-ምግብ ተመመላሽ የህክምና ፕሮግራም (outpatient therapeutic care) እንዲታከሙ የዓለም የጤና ድርጅት በ2007 ዓ.ም ውሳኔ አስተላልፎ ነበር:: ይህ ውሳኔ መሰረት ያደረገው አነስተኛ (small scale) የሥነ-ምግብ ተመመላሽ የህክምና ፕሮግራሞች በሽታውን በተሳካ ሁኔታ በማከማቸው ላይ ነበር:። ሆኖም እነዚያ ፕሮግራሞች በአብዛኛው የተካሄዱት ከፍተኛ የሆነ የወጭ ድጋፍ በሚያገኙ እና በመደበኛ የጤና ባለሙያዎች በሚተገበሩ መንግስታዊ ባልሆኑ ድርጅቶች ባቋቋሙዋቸው ፕሮግራሞች ነበር:።

በኢትዮጵያ የከባድ አጣዳፊ የምግብ እጥረት በሽታ ህክምና ፕሮግራም በስፋት ከመንግሥት የጤና ተቋማት መደበኛ አገልግሎቶች ጋር የተቀናጀ ሲሆን በማህበረሰብ ደረጃ ባሉ የጤና ኬላዎች ጭምር ተቀናጅቶ እየተሠራ ነው:። የሥነ-ምግብ ፕሮግራሞች የሚቀናጁበት ነባራዊ ሁኔታዎች የፕሮግራሙን ወጤታማነት ሊቀይሩ እንደሚችሉ ቢገመትም ከጤና ተቋማት ጋር በተቀናጀ ተመመላሽ የምግብ እጥረት የህክምና ፕሮግራሞች ላይ የተሠሩ ምርምሮች እጅግ ጥቂት ናቸው:። የተሰሩትም ጥናቶች ቢሆኑም ገለልተኝነት ያልነበራቸው ሥራውን በሚያካሄዱ ተቋማት የተደረጉ ምርምሮች ናቸው:። በተጨማሪም ምርምሮቹ ትኩረት ያደረጉት ልጆች ከፕሮግራሙ ሲወጡ ያለውን የጤናና የሥነ-ምግብ ሁኔታ ላይ ሲሆን ከፕሮግራሙ ከወጡ በኋላ ያለው የጤናና የሥነ-ምግብ ሁኔታቸው ላይ ብዙም ትኩረት አላደረገም:። በተጨማሪም አብዘኛዎቹ ከዚህ በፊት የተደረጉ ምርምሮች መሠረት ያደረጉት በፕሮግራሙ መዝገብ እና ማህደር ላይ በሰፈሩ መረጃዎች ላይ ብቻ ነው።

በዚህ ጥናታዊ ጹሑፍ ውስጥ የተካተቱት ምርምሮች በደቡብ ኢትዮጵያ በወላይታ ዞን በመንግሥት የጤና ተቋማት ማለትም በጤና ኬላዎች ከሚካሄዱ የሥነ-ምግብ ተመላላሽ ህክምና ፕሮግራሞች በተመራማሪዎች በተሰበሰበ መረጃ ነው። በዞኑ ወደ 1,762,682 ህዝብ እንደሚኖር የሚገመት ሲሆን ከነዚህም ውስጥ 274,978 የሚሆኑት ዕድሜያቸው ከ5 ዓመት በታች የሆኑ ልጆች ናቸው:። የወላይታ ዞን በ12 የገጠር ወረዳዎችና በሦስት የከተማ ወረዳዎች የተከፋፈለ ነው: : ዞኑ በከፍተኛ የህዝብ ጥግግት፣ ፈጣን የህዝብ ቁጥር ዕድገት፣ ኋላ ቀር የእርሻ አስተራረስ ዘዴ እና የእርሻ መሬት ጥበት እና በውስን የገቢ አማራጮች ይታወቃል:። ዞኑ ለዓመታት የምግብ እህል ዕርዳታ ተቀባይ የነበረ ሲሆን በምግብ እጥረት በሽታ የሚጠቁ ልጆች ቁጥርም ጥቂት አይደለም:። በዞኑ ውስጥ ካሉ 12 የገጠር ወረዳዎች ውስጥ አጎራባች የሆኑ አራት ወረዳዎች በጥናቱ የተካተቱ ሲሆን እነዚህ ወረዳዎች በዞኑ ከሚከሰት የህጻናት የምግብ እጥረት በሽታ ውስጥ ከግማሽ በላይ

ይገኙባቸዋል፡፡ በዚህ ጥናት የተካተቱት አራት ወረዳዎች ቦሎሶ ሶሬ፣ ቦሎሶ ቦምቤ፣ ዳሞት ጋሌና ዳሞት ፑላሳ ናቸው፡፡ በእነዚህ ወረዳዎች በሚገኙ 94 የሥነ-ምግብ ተመላላሽ ህክምና ፕሮግራሞች ህክምና የተሠጣቸው 1048 ልጆች፣ የልጆቹ ወላጆች ወይም ተንከባካቢዎች፣ ህክምናውን የሚሰጡ 175 የጤና እክስቴንሽን ሠራተኞች፣ በጎ ፈቃደኞችና የማህረሰብ መሪዎች በዚህ ጥናት ተሳትፈዋል፡፡

የዚህ ጥናት **ዋና ዓላማ** በማህበረሰብ ደረጃ የሚሰጥ የተቀናጀ የሥነ-ምግብ ተመላላሽ ህክምና ፕሮግራም አሰጣጥ ለማጥናት ነው፡፡ ይህ የምርምር ሥራ አራት ጥናቶችን ያካተተ ሲሆን የመጀመሪያው ጥናት የተመሰረተው ከሚመለከታቸው ባለድርሻ አካላት ጋር በተደረጉ ጥልቅ ውይይቶች እና ቤት ለቤት በመሄድ በተወሰዱ አኃዛዊ መረጃዎች ነው፡፡ በሁለተኛው ጥናት ወደ ሥነ-ምግብ ተመላላሽ ህክምና አገልግሎት የገቡ ልጆች በፕሮግራሙ መሳተፍ ሲጀምሩ የነበራቸውን የሥነ-ምግብ መረጃ እና ክብደት ለክተን መዝግበናል፡፡ ሦስተኛውና አራተኛው ምርምር ላይ ልጆች ወደ ተመላላሽ ህክምና ፕሮግራም ከገቡበት እስከ 14 ሳምንት ያደረግነውን የክትትል መረጃ ተጠቅመናል፡፡

የዚህ ጥናታዊ ጽሁፍ ዋና ዋና ግኝቶች የሚከተሉ ናቸው፡ ለሥነ-ምግብ ተመላላሽ ህክምና ፕሮግራም ውጤተማነት እንቅፋት ሊሆኑ የሚችሉ ጉዳዮችን በመጀመሪያው ጥናት አግኝተናል። ለከባድ አጣዳፊ የምግብ እጥረት በሽታ ተጠቂ ለሆኑ ልጆች የተሰጠ ለመመገብ ዝግጁ የሆነውን የህክምና ምግብ ለተጎዳው ልጅ ብቻ ከመስጠት ይልቅ በቤት ካሉ ሌሎች ልጆች ጋር በጋራ እንዲመገቡት እንዲሁም ለቤት ውስጥ ወጭዎች መሸፈኛ እና ለሌሎች የቤተሰብ አባላት ምግብ ለመግዛት እንደሚሸጥ በመጀመሪያው ጥናት ላይ አይተናል፡፡ በከባድ አጣዳፊ የምግብ እጥረት በሽታ ተጠቂ ልጆች አሳዳጊዎች በፕሮግራሙ የሚሰጠውን የህክምና ምግብ ለረዥም ጊዜ መጠቀም እንደሚገባቸው የሚመስላቸው ሲሆን የፕሮግራሙ መመሪያ ግን ይህ የህክምና ምግብ የሚሰጠው ለአጭር ጊዜ እና በአጭር ጊዜ ውስጥ ለተከሰተ ከባድ አጣዳፊ የምግብ እጥረት በሽታ እንደሚሰጥ ያስገነዝባል፡፡ ይሁን እንጂ ተንከባካቢዎቹ የልጃቸውን ስም በመቀያየር ወይም በተለያዩ የሥነ-ምግብ ተመላላሽ ህክምና ፕሮግራም ልጃቸውን በማስገባት የዝግጁ የህክምና ምግቡን ረዘም ላለ ጊዜ ለመወሰድ ይሞከራሉ፡፡ ይህም አገልግሎቱን የሚሰጡ ተቋማት የተለያየ የቁጥጥር መንገዶችን በተንከባካቢዎች ላይ እንዲጠቀሙ አድርጓቸዋል፡፡ በሌላ በኩል በከባድ አጣዳፊ የምግብ እጥረት በሽታ የተጠቁ ልጆች ከተመላላሽ ህክምና የሚወጡበት መስፈርት ስገቡ በነበራቸው ክብደት ላይ ከ15 በመቶኛ እጅ ሲጨምሩ ሲሆን በሁለተኛው ጥናት ይህ መስፈርት ልጆች በበቂ ሁኔታ ሳያገግሙና ሳይድኑ ከፕሮግራሙ እንዲወጡ የሚያደርግ መሆኑን አግኝተናል፡፡ በተለይም ወደ ህክምና ሲገቡ እጅግ በጣም ከባድ አጣዳፊ የምግብ እጥረት የነበራቸው ልጆች በዚህ መስፈርት ከፕሮግራሙ ሲወጡ በከባድ እና አጣዳፊ የምግብ እጥረት እንደተንዱ ሳይድኑ እንዲወጡ ይደረጋሉ።

ከመጀመሪያዎቹ ሁለት ጥናቶች ውጤት በመነሳት ወደ ሥነ-ምግብ ተመላላሽ ህክምና የገቡ ልጆችን የሥነ-ምግብ ሁኔታ እና ፕሮግራሙ ያስገኝውን ለውጥ ማጤን አስፈላጊ ሆኖ አገኝተናል፡፡ ወደ ፕሮግራሙ የገቡ ልጆች ምንም ያህል በቂ የፕሮግራም ቆይታ ቢኖራቸውም ከፕሮግራሙ ከወጡት ውስጥ 37.8% (216/571) ብቻ የፕሮግራሙን የሥነ-ምግብ ማገገም መስፈርት ያሟሉ (መስፈርቱ፡ ወደ ፕሮግራሙ ሲገቡ ከነበረው ክብደት 15 በመቶኛ እጅ መጨመርና የሰውነት እብጠት አለመኖር) መሆኑን በሦስተኛው ጥናት ላይ አግኝተናል፡፡ በሌላ በኩል የፕሮግራሙን የማገገም መስፈርት ካሟሉት 210 ልጆች ውስጥ 121 (57.6%) ልጆች አጣዳፊ የምግብ እጥረት በሽታ ነበረባቸው፡፡ በአጠቃላይ በሥነ-ምግብ ተመላላሽ ህክምና ሲታከሙ ከቆዩት ልጆች መካከል ወደ ህክምናው ከገቡ ከ14 ሳምንትም በኋላ 34.6% (321/928) በከባድ 34.4% (348/928) በመካከለኛ የምግብ እጥረት በሽታ የተጎዱ ነበሩ፡፡ ወደ ፕሮግራሙ ከገቡት ልጆች ውስጥ 2.7% (27/928) በ14 ሳምንት ውስጥ የሞቱ ሲሆን ከአንዱ በስተቀር ሌሎቹ በከባድ አጣዳፊ የምግብ

እጥረት የተጎዱ ነበሩ፡፡ ወደ ፕሮግራሙ ሲገቡ ከፍተኛ የሰውነት እብጠት የነበራቸው ልጆች ከፍተኛውን የሞት ድርሻ የያዙ ነበሩ፡፡

በፕሮግራሙ በተሳተፉ ልጆች ላይ የታየውን እንደዚህ ያለ አለመዳንና በበቂ ሁኔታ አለማገገም ምክንያት ለመረዳት የፕሮግራሙን አፈጻጸም ሂደት ከተቀመጠው የከባድ አጣዳፊ የምግብ እጥረት በሽታው ህክምና *መመሪያ* አንጻር አጥንተናል፡፡ በዚህም *መሠረት* ወደ ፕሮግራሙ ለህክምና ከገቡት ልጆች መካከል በፕሮግራሙ መግቢያ ላይ 46.6% (481/1፤032) ልጆች ብቻ ተገቢውን መጠን ዝግጁ የህክምና ምግብ የተሰጣቸው ሲሆን 19.3% (196/905) ብቻ ደግሞ ፀረ-ባክቴሪያ መድሃኒት አገኝተዋል፡፡ በፕሮግራሙ በቆዩበት ጊዜ ሳይቆራረጥ በተከታታይ ተገቢውን የዝግጁ ህክምና ምግብ ያገኙት 34.9% (316/905) ልጆች ብቻ ነበሩ፡፡ ወደ ሥነ-ምግብ ተመላላሽ ህክምና ሲገቡ ከባድ አጣዳፊ የምግብ እጥረት በሽታ የነበራቸው በፕሮግራሙ ቆይተው ከወጡ ልጆች መካከል 39.7% (220/554) ልጆች ብቻ በህክምናው *መመሪያ* መስፈርት መሰረት ከፕሮግራሙ ወጥተዋል፡፡

የዚህ ጥናታዊ ጽሁፍ ***መድምደሚያና አንድምታ*** የሚከተለው ነው። በጥናቱ የተካተቱት የሥነ-ምግብ ተመላላሽ ህክምና ፕሮግራሞች ተገቢውን የሥነ-ምግብ ማገገምና የፕሮግራም ውጤት በተሳካ ሁኔታ መፈጸም የማያስችላቸው በርካታ ሁኔታዎች ያለባቸው ናቸው፡፡ በከባድ አጣዳፊ የምግብ እጥረት በሽታ የተጎዱ ልጆች ምንም እንኳን ለበቂ ጊዜ በፕሮግራሙ ቢሳተፉም አብዛኛውን ሳይድኑ ወይም ለተሻለ ህክምና ሳይላኩ በመሀል ከፕሮግራሙ ይወጣሉ፡፡ በክብደት መጨመር ላይ ከተመሠረተ የፕሮግራሙ የማስወጫ መስፈርት ፈንታ የላይኛው ክንድ እኩሌታ (MUAC) ልኬት 125mm እንደ ፕሮግራም ማስወጫ መስፈርት ጥቅም ላይ እንዲውል የዓለም የጤና ድርጅት ያዛል፡፡ ምክንቱም የላይኛው ክንድ እኩሌታ ልኬት ላይ የተመሠረት መስፈርት ልጆች በፕሮግራሙ ረዘም ላለ ጊዜ እንዲቆዩ የሚያደርግ ሲሆን ይህም ረዥም የፕሮግራም ቆይታ በከባድ አጣዳፊ የምግብ እጥረት በሽታ የተጎዱ ልጆች *ሙሉ መዳን* አግኝተው እንዲወጡ ያደርጋል ተብሎ ስለሚታመን ነው፡፡ ነገር ግን እኛ በጠናነው ነባራዊ ሁኔታ ወደ ፕሮግራሙ የገቡ ልጆች በአማካይ 7.1 ሳምንት በፕሮግራሙ የቆዩ ቢሆኑም በሽታው የተጎዱ ልጆች ሳይድኑና ሳያገግሙ ከፕሮግራሙ ወጥተዋል ስለሆነም ከፕሮግራሙ ማስወጫ መስፈርት የላይኛው ክንድ እኩሌታ ልኬት ቢሆን ብዙ ሌሎች ጥቅሞች ቢኖሩትም ምናልባትም የፕሮግራሙ ወጤታማነት እና የልጆችን የመዳን አጋጣሚ የተፈለገውን ያህል ላያሻሽል ይችላል፡፡

በድርቅ እና ሰው ሰራሽ አደጋ ጊዜ በሚካሄዱ የሥነ ምግብ ተመላላሽ ህክምና ፕሮግራም ላይ ለመመገብ ዝግጁ የህክምና ምግብ በቀላሉ ለተገቢው አገልግሎት የዋለ እና ፕሮግራሙን ወጤታማ ያደረገ ቢሆንም በዚህ የተቀናጀ ፕሮግራም ጥናት ላይ ግን ያን ያህል ውጤታማ ሆኖ አላገኘነውም፡ ፡ ይህም ሊሆን የቻለው ለመመገብ ዝግጁ በሆነ የህክምና ምግብ አጠቃቀም ዙሪያ ያለው የአመለካከት ልዩነት፣ በረዥም ጊዜ የምግብ ዋስትና እጦት ለተቸገረ ህብረተሰብ የሚሆን የሥነ-ምግብ ፕሮግራሞች አለመኖር፣ እና የዝግጁ ህክምና ምግብ ከወረዳና ዞን ጤና *መምሪያ* ወደ ጤና ኬላዎች ለማጓጓዝ የነበሩ ችግሮች የህክምና *መድሃኒቱን* በአግባቡ ጥቅም ላይ እንዳይወል አስቸጋሪ ሁኔታ ፈጥረዋል፡፡ የሥነ-ምግብ ተመመላሽ ህክምናው ውጤታማ እንዲሆን ወደ ፕሮግራሙ ለገቡ ልጆች ቤተሰብ ተጨማሪ ኢኮኖሚያዊና የምግብ እገዛ ፕሮግራሞች አስፈላጊነት ጥናቱ አመላክቶአል፡፡ ከዚህ ጋር የተዛመዱ ተጨማሪ ጥናቶችን ማድረግም አስፈላጊ ነው፡፡

ባጠናናቸው የሥነ-ምግብ ተመላላሽ ህክምና አገልግሎቶች ውስጥ በቂ የፀረ-ባክቴሪያ መድሃኒት አለመኖሩ በሽታው የተጎዱ ልጆች በሚያገኙት ህክምና ላይ ከፍተኛ ክፍተት ፈጥሯል፡፡ ሌላው በጣም ከባድ እብጠት የነበራቸው ልጆች በመመሪያው *መሠረት* ወደ ህክምና ማዕከል ለበለጠ ህክምና *መላክ* ሲገባቸው በተመላላሽ ህክምና አገልግሎት *መታከማቸው* ልጆቹን ላሌባቸው የተወሳሰበ ከባድና አጣዳፊ የምግብ እጥረት በሽታ ተገቢ ያልሆነ ህክምና እንዲወሰዱ ስለተደረጉ ልድኑ አልቻሉም፡፡ ይልቁንም እነዚህ ልጆች ከሌሎች የበለጠ የሞት አደጋ ተጋፍጠዋል፡፡ በአንፃሩ እኛ ባጠናነው የገጠር አካባቢ የተወሳሰበ ከባድና አጣዳፊ የምግብ እጥረት በሽታ ያለባቸውን

ልጆች ወደ ተገቢው ህክምና ለመላክ የህክምናው በቅርብ መገኘት እንዲሁም የሎጅስቲክስ እና ሪፈራል ኔትወርክ በበቂ ሁኔታ ላይገኝ ይችላል፡፡ በዚህ ዙሪያ ወደፊት ጥናት ሊደረግ ይገባል፡፡

በተጨማሪም በተቀናጀ የሥነ-ምግብ ተመላላሽ ህክምና አገልግሎት አፈጻጸም ሂደት ውስጥ ብዙ አለመግባባት እና ግጭት ሊፈጠሪባቸው የሚችልባቸው አጋጣሚዎች አሉ፡፡ ለምሳሌ የታመሙ ልጆች ተነከባካቢዎች ለህክምና የምሰጠውን ዝግጁ የህክምና ምግብ ሌላ ጉዳይ ሲጠቀሙና አገልግሎቱ ከሚፈለገው ካቀደው ጊዜ በላይ ምግቡን ለማግኘት የተለያዩ ዘዴዎችን ሲጠቀሙ ከአገልግሎት ሰጪ አካላት ጋር ሊጋጩ ይችላሉ፡፡ የጤና እክስቴንሽን ሠራተኞችም ይህንን ከአገልግሎት ወጪ የሆነ ለመመገብ ዝግጁ የህክምና ምግብ አጠቃቀም ለመከላከልና ለመቆጠር የሚወስዱት የተለያዩ እርምጃዎች ከሚያገለግሏቸው ህብረተሰብ ጋር ያላቸውን ግንኙነት ሊያሻክር ይችላል፡፡ ይህም የጤና እክስቴንሽን ሠራተኞች የምሰጡትን ሌሎች አገልግሎቶች ውጤታማነት ሊጎዳ ይችላል፡፡ ይሄን ጉዳይ መፍተሄ ለመስጠት ግልፅ የሆነ የማህበራዊ እሴቶች እና ሙያዊ ሥነ-ምግባርን እውነታዎች ያገናዘበ የአፈጻጸም መመሪያ አስፈላጊ ነው፡፡ ይህም በአገልግሎቱ ባለድርሻ አካላት የሆኑትን የጤና እክስቴንሽን ሠራተኞች፣ የታመሙ ልጆች ተንከባካቢዎችን፣ እንዲሁም የአገልግሎት መርሃ-ግብሩን ከጉዳት ሊጠብቅ ይችላል፡፡

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"My heart rejoices in the Lord my God… I smile at my enemies, because I rejoice in your salvation (oh Lord)…. God raises the poor from the dust and lifts the beggar from the ash heap to set them among princes…" (1samuel 2:1, 8)" My foremost gratitude goes to God alone.

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References

1. UNICEF, WHO, and World Bank: *Joint Child Malnutrition Estimates Levels and trends.* New York: UNICEF; Geneva: WHO; Washington DC: World Bank; 2012.
2. UNICEF: *Improving child nutrition: The achievable imperative for global progress*. New York: UNICEF: 2013.
3. Black, R.E., et al., *Maternal and child undernutrition: global and regional exposures and health consequences*. Lancet, 2008. **371**(9608): p. 243-60.
4. Fliederbaum, J., et al., *Metabolic changes in hunger disease.* Curr Concepts Nutr, 1979. **7**: p. 69-123.
5. Golden, M., *The effects of malnutrition in the metabolism of children.* Trans R Soc Trop Med Hyg, 1988. **82**(1): p. 3-6.
6. Golden, M.H. et al., *Protein turnover, synthesis and breakdown before and after recovery from protein-energy malnutrition.* Clin Sci Mol Med, 1977. **53**(5): p. 473-7.
7. Reid, M., et al., *Response of splanchnic and whole-body leucine kinetics to treatment of children with edematous protein-energy malnutrition accompanied by infection.* Am J Clin Nutr, 2002. **76**(3): p. 633-40.
8. WHO: *Management of severe acute malnutrition: a manual for physcicians and senior health workers*. Geneva: World Health Organization; 1999.
9. WHO and UNICEF, *Child growth standards and identification of severe acute malnutrition in infants and children. A joint statement by the World Health Organization and the United Nations Children´s Fund*. Geneva: WHO; New York: UNICEF; 2009.
10. WHO, UNICEF and WFP: *Community based management of severe acute malnutrition*. Geneva: WHO; New York: UNICEF; Rome: World Food program: 2007.
11. WHO and UNICEF. *Child growth standards and the identification of severe acute malnutrition in infants and children.* Geneva: WHO; New York: UNICEF: 2009.
12. Chamois, S. *Decentralisation of out-patient management of severe malnutrition in Ethiopia*. 2009. July.
13. Kopplow, R. *Integration of CMAM into routine health services in Nepal*. 2010. 33.
14. Collins, S., *Treating severe acute malnutrition seriously.* Arch Dis Child, 2007. **92**(5): p. 453-61.
15. Collins, S., et al., *Management of severe acute malnutrition in children.* Lancet, 2006. **368**(9551): p. 1992-2000.
16. Collins, S., et al., *Key issues in the success of community-based management of severe malnutrition.* Food Nutr Bull, 2006. **27**(3 Suppl): p. S49-82.
17. Nutriset. *Plumpy'nut® Ready-to-use therapeutic food (RUTFs)*. Available at: http://www.nutriset.fr/en/product-range/produit-par-produit/plumpynut-ready-to-use-therapeutic-food-rutf.html. Accessed: 2nd Jan 2011.

18. Manary, M.J. and H.L. Sandige, *Management of acute moderate and severe childhood malnutrition.* BMJ, 2008. **337**: p. a2180.
19. *Scaling up international food aid: food delivery alone cannot solve the malnutrition crisis.* PLoS Med, 2008. **5**(11): p. e235.
20. Chaiken, M.S., H. Deconinck, and T. Degefie, *The promise of a community-based approach to managing severe malnutrition: A case study from Ethiopia.* Food Nutr Bull, 2006. **27**(2): p. 95-104.
21. FMOH, Ethiopia. *Protocol for the management of severe acute malnutrition*. Federal Ministry of health: Addis Ababa; 2007,
22. Mwangome, M.K., et al., *Reliability and accuracy of anthropometry performed by community health workers among infants under 6 months in rural Kenya.* Trop Med Int Health, 2012. **17**(5): p. 622-9.
23. Briend, A., et al., *Mid-upper arm circumference and weight-for-height to identify high-risk malnourished under-five children.* Matern Child Nutr, 2012. **8**(1): p. 130-3.
24. Briend, A., et al., *Usefulness of nutritional indices and classifications in predicting death of malnourished children.* Br Med J (Clin Res Ed), 1986. **293**(6543): p. 373-5.
25. Myatt, M., T. Khara, and S. Collins, *A review of methods to detect cases of severely malnourished children in the community for their admission into community-based therapeutic care programs.* Food Nutr Bull, 2006. **27**(3 Suppl): p. S7-23.
26. Young H. and Jaspars S., 2009. *Review of Nutrition and Mortality Indicators for the Integrated Food Security Phase Classification (IPC) Reference Levels and Decision-making. Avaialable at: http://www.ochaopt.org/documents/ipc_nutmortalityindicatorsreview.pdf. Accessed: 14th May 2010.*
27. Valid Internation: *Community-based therapeutic care – a new paradigm for selective feeding in nutritional crises. Humanitarian Policy Network paper 48. London: Valid International;* 2004.
28. UNSCN, UNICEF, and Valid International, *Global Mapping Review of community based management of acute malnutrition with a focus on severe acute malnutrition*. 2011: New York: UNICEF.
29. Victora, C.G., et al., *Context matters: interpreting impact findings in child survival evaluations.* Health Policy Plan, 2005. **20 Suppl 1**: p. i18-i31.
30. Garrett, J.L., *Improving results for nutrition: a commentary on an agenda and the need for implementation research.* J Nutr, 2008. **138**(3): p. 646-50.
31. Gatchell, V., V. Forsythe, and P.R. Thomas, *The sustainability of community-based therapeutic care (CTC) in nonemergency contexts.* Food Nutr Bull, 2006. **27**(3 Suppl): p. S90-8.
32. Rossi, P.H., M.W. Lipsey, and H.E. Freeman, *Evaluation: A Systematic Approach*. 2004, SAGA publications: London. p. 133-66.
33. *World Population Prospects: key findings and advance tables* 2015, United Nations, Department of Economic and Social Affairs Population Division, population estimate and projection Section.
34. FMOH, Ethiopia, *Health Sector Development Program IV 2010/11 – 2014/15 FINAL DRAFT*. Addis Ababa: Federal Minsitry of Health; 2010.
35. FMoARD, *Ethiopia's agriculture sector policy and investment frame work, 2010-2020. Draft Final Report*. Federal Ministry of Agriculture Rural Development: Addis Ababa; 2010.

36. *Central Statistical Agency ORC Macro Ethiopia Demographic and Health Survey 2005*, CSA and O. Macro, Editors. 2006: Addis Ababa, Calverton. p. 143-150.
37. MoFED, Ethiopia, *Annual Progress Report for F.Y. 2011/12 Growth and Transformation Plan* 2013 Ministry of Finance and Economic Development: Addis Ababa.
38. FMoARD, Ethiopia, *Productive Safety Net APL III Financing Additional Report No: 63924*. Ministry of Agriculture and Rural Development; 2012.
39. Yeshak G, et al., *Yeshak G, Gezahegn A, Tesfaye L, Dawit A. Livelihood strategies and Food Security of rural households in Wolaita Zone, Southern Ethiopia. Journal of Developing countries studies. 2014;4(14):123-135.* . Journal of Developing countries studies, 2014. **4**(14): p. 123-135.
40. Dorosh P. and Rashid s., *Ethiopia's 2015 drought: No reason for a famine. International Food Policy Research Institute (IFPRI)*. 2015.
41. MoFED, Ethiopia *Growth and Transformation Plan (GTP)2010/11-2014/15 Draft.* Addis Ababa: Minstry of Finance and Economic Development; 2010.
42. Bank, T.W. *Country overview, Ethiopia*. [cited 2015 30 Novemeber]; Available from: http://www.worldbank.org/en/country/ethiopia/ overview.
43. *Zonal Health Department. Annual report 2014.* Wolaita Sodo, South Ethiopia; 2014.
44. *The Socioeconomic Profile of Southern Nations, Nationalities and Peoples Region* 2000, Hawassa: Regional Office of Population:.
45. Teklu, T., *Enviroment stress and increased vulnerablility to improverishment and survival in Ethiopia: A synthesis*. 2003, Western Michigan University.
46. Zonal health department, *Bianual CBN report.* Wolaita sodo, South Ethiopia; 2010.
47. Deconinck H., et al. *Review of Community-based Management of Acute Malnutrition (CMAM) in the Post-emergency Context: Synthesis of Lessons on Integration of CMAM into National Health Systems.* 2008. Washington DC: Food and Nutrition Technical Assistance Project (FANTA).
48. ENN and FANTA: *International Workshop on the Integration of Community – Based Management of Acute Malnutrition*. Washington DC: Emergency Nutrition Network (ENN) and FANTA; 2008.
49. FMOH, Ethiopia, *Managment of severe acute malnutrition at health post level* in *Quick reference for health extension workers*. 2008
50. Wakabi, W., *Extension workers drive Ethiopia's primary health care.* Lancet, 2008. **372**(9642): p. 880.
51. Wilder, J., *Ethiopia's Health Extension Program: Pathfinder International's Support 2003-2007*. 2008: Addis ababa.
52. FMOH Ethiopia, *Health Sector Development Program III (2005/6-2009/10) Planning and program department*. Addis Ababa: FMOH; 2005.
53. Bronfenbrenner J and Ceci JS., *Nature-nurture reconceptualized: A bioecological model.* . Psychological Review, 1994. **101**(4): p. 568-586.
54. Graneheim, U.H. and B. Lundman, *Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness.* Nurse Educ Today, 2004. **24**(2): p. 105-12.
55. ENN, *The Harmonised Training Package. Resource Material for Training on Nutrition in Emergencies, Version 2. Global Nutrition Cluster.* Emergency Nutrition Network (ENN); 2011.
56. WHO, *Physical Status: The Use and Interpretation of Anthropometry - Report of a WHO Expert Committee.Geneva: World Health Organization*;1995.

57. FMOH Ethiopia, *Protocol for the management of severe acute malnutrition*. Addis Ababa: FMOH; 2007.
58. WHO, *Guideline: Updates on the Management of Severe Acute Malnutrition in Infants and Children*. Geneva: World Health Organization; 2013.
59. WHO and UNICEF, *WHO child growth standards and identification of severe acute malnutrition in infants and children. A joint statement by the World Health Organization and the United Nations Children´s Fund*. Geneva: WHO and UNICEF; 2009.
60. Goossens, S., et al., *Mid-Upper Arm Circumference Based Nutrition Programming: Evidence for a New Approach in Regions with High Burden of Acute Malnutrition.* PLoS ONE, 2012. **7**(11): p. e49320.
61. Dale, N.M., et al., *Using mid-upper arm circumference to end treatment of severe acute malnutrition leads to higher weight gains in the most malnourished children.* PLoS One, 2013. **8**(2): p. e55404.
62. Trehan, I., et al., *Evaluation of the routine use of amoxicillin as part of the home-based treatment of severe acute malnutrition.* Trop Med Int Health, 2010. **15**(9): p. 1022-8.
63. *Evaluation of Community Management of Acute Malnutrition in Ethiopia*. 2013, Federal Ministry of Health The Government of Ethiopia/UNICEF country programme 2007-2011 Addis Ababa: Ministry of Health.
64. *Community based management of severe acute malnutrition:a joint statement by WHO, WFP, UNSCN and UNICEF. Geneva: WHO; New York: United Nations Standing committee on Nutrition and UNICEF; Rome: World Food program;* 2007.
65. Collins, S. and K. Sadler, *Outpatient care for severely malnourished children in emergency relief programmes: a retrospective cohort study.* Lancet, 2002. **360**(9348): p. 1824-30.
66. Lazzerini, M. and D. Tickell, *Antibiotics in severely malnourished children: systematic review of efficacy, safety and pharmacokinetics.* Bull World Health Organ, 2011. **89**(8): p. 594-607.
67. Trehan, I., et al., *Antibiotics as part of the management of severe acute malnutrition.* N Engl J Med, 2013. **368**(5): p. 425-35.
68. Puett, C. and S. Guerrero, *Barriers to access for severe acute malnutrition treatment services in Pakistan and Ethiopia: a comparative qualitative analysis.* Public Health Nutr, 2015. **18**(10): p. 1873-82.
69. Puett, C., et al., *'Sometimes they fail to keep their faith in us': community health worker perceptions of structural barriers to quality of care and community utilisation of services in Bangladesh.* Maternal and Child Nutrition 2015. **11**: p. 1011-1022.
70. Bhutta AZ, et al., *Global Experience of Community Health Workers for Delivery of Health Related Millennium Development Goals:A Systematic Review, Country Case Studies, and Recommendations for Integration into National Health Systems. world Health Organization*. 2010: Geneva: World Health Organization.
71. Cassidy, C.M., *World view conflict and toddler malnutrition: change agent dilemma* Child survival (pp. 293-324), 1987.
72. Hampshire, K.R., et al., *Saving lives, preserving livelihoods: Understanding risk, decision-makingand child health in a food crisis* Social Science & Medicine 2009. **68**(2009): p. 758-765.
73. Kerac, M. and A. Seal, *Preventing acute malnutrition in young children: improving the evidence for current and future practice.* PLoS Med, 2014. **11**(9): p. e1001715.

74. Englea, P.L. and I. Nievesb, *Intra-household food distribution among Guatemalan families in a supplementary feeding program: Behavior patterns* Social Science & Medicine 1993. **36**(12): p. 1605-1612.
75. Hampshire, K., et al., *The social context of childcare practices and child malnutrition in Niger's recent food crisis* Disasters, 2009. **33**(1): p. 132-151(20).
76. Ijumba, P., et al., *Free formula milk in the prevention of motherto- child transmission programme: voices of a peri-urban community in South Africa on policy change.* Health Policy and Planning, 2012: p. 1-8.
77. Philips, M., R. Zachariah, and S. Venis, *Task shifting for antiretroviral treatment delivery in sub-Saharan Africa: not a panacea.* Lancet, 2008. **371**(9613): p. 682-4.
78. USAID, *Community Health Worker Incentives and Disincentives: How They Affect Motivation, Retention and Sustainability. BASICS II.* 2001: USAID: Arlington, VA.

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