

**Performance Evaluation of Eleven Severe Acute
Malnutrition Community Based Outpatient
Therapeutic Care (SAMCTC) Centres in Lusaka
District of Zambia**

**By
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the Degree of
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Dedication

This thesis is dedicated with love to my husband and my children (Muyanjlwa, Mwitwa, Chinyama and Ninziye) who gave me practical and emotional support and encouragement throughout my study period. They lifted me up even in times when thesis writing seemed would never come to an end.

It is also dedicated to my late parents Mason Haminda Habulembe and Pauline Chinyama Hatontola for good parental guidance and who taught me that hard work brings fruit and Happiness

Thanks be to the Lord

Declaration

I declare that the dissertation herewith submitted for the degree in Masters in Public Health (MPH) at the University of Zambia has not previously been submitted by me for a degree at any other university or institution of higher education

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I, the undersigned have read this dissertation and have approved it for examination

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Date Signature

Approval – Examiners

This dissertation for Raider Habulembe is approved in partial fulfilment of the requirements for the award of the Degree of Master in Public Health by the University of Zambia

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Abstract

Later in the 1990s, the Community Based Therapeutic Care (CTC) program was introduced first in emergency areas (refugee camps, disaster areas), and later expanded to other locations where severe malnutrition existed. The program has several components including Out-Patient Therapeutic Care Program (OTP). The CTC program aims at treating malnourished children at home while those with complications are referred to inpatient care. The merits of CTC program include timely detection of severely malnourished children in their communities, it uses and builds on existing capacities, and it is an easily accessible service that provides treatment. When it is well implemented, it has the ability to reduce mortality rate among malnourished children to as low as 4.1%.

In Zambia CTC program was introduced in 2005 in Lusaka district. It is currently implemented in 25 health facilities. Since 2005, there has not been any study to comprehensively determine its performance. Scaling up of the program has been carried out without adequate knowledge of program performance with regard to the outlined humanitarian minimum standards in the non emergency response (CTC Standards). For this reason, there was need to evaluate the program. This study was undertaken in order to evaluate the OTP component of the CTC program in eleven health centres in Lusaka district from September 2005 to September 2007

The target population were records of children who were discharged from the program from September 2005 to September 2007 and health care staff working in the OTP. Both quantitative (records and self administered questionnaires) and qualitative methods (in-depth interviews and observations) were used. Using multistage sampling, 82 out of the 2424 records were selected for the study using the Population Proportion to Size Sampling (PPS) method. At health facility level, systematic random selection was used to get the records. Health care staff in a health facility were listed and then randomly selected for interview. Based on health facility and sex as indicators for completeness, a non response rate of 3.5% was incurred. Quantitative data was entered in epi data and analysed using SPSS software while qualitative data was transcribed manually. Analysis of data was further guided by proximate determinant conceptual framework. The associations between performance and predictors were measured using logistic regression models and chi-square methods. Performance of the program was determined by the use of

composite indicator. Data quality control involving pretesting of tools, training of research assistants and ensuring thorough check of completed questionnaires were done. Prior to data collection, ethical approval was given as part of the process of dealing with humans.

The findings established that 86% (n=828) performance rate was achieved by OTP while indicating a contrasting difference of health facility specific performance ranging from 73% to 100% in N'gombe and Matero, respectively. In addition, 60% of children were within the recommended weight gain of above 4 grams per day with mean weight of 5.7 g per day (\pm SD 4.89). Seventy five percent of children cured stayed less than 60 days (\pm SD 22.9%). The defaulter rate was found to be 31% while transfer rate, refusal of transfer and non cure rate percentages were 4.6, 0.1 and 1.9, respectively. The multivariate analysis showed that health facility, source of admission and appetite of the child were found to be significant factors associated with performance, while breastfeeding was also an important factor in univariate analysis. The analysis further showed that the goodness of fit Hosmer and Lemeshow Test (χ^2 , 7 df, p=0.97) on the determinants of performance was used. The cox and Snell R Square and Nagelkerke R Squared indicated that between 39.9% and 61% of variability was explained by the variables in the model. Regarding availability and adequacy of food and logistics it was found that 9.1%, 8.9% 3.0 % and 2.1% of children in the age ranges 5.5-6.9 kg, 7.0-8.4 kg, 8.5-9.4 kg and 9.5-10.4 kg, respectively, received correct amounts of RUTF. About 77% of health care staff observed during the study gave the correct amount of RUTF to children. Other supplies such as height boards were inadequate and transport was poor. Staffing levels seemed adequate although the majority of staff working for the OTP centres were volunteers. The knowledge of staff was rated good (over 60%) after assessing key admission criterion (oedema, MUAC, visible severe wasting), appetite test elements, and outreach up. However, knowledge in some component seemed to be inadequate particularly in MUAC and height measurements, child referral, weight gain, appetite test and health education.

In conclusion, high level of good performance of OTP associated with several factors which suggests the need for OTP scaling up to other remaining provinces and districts. The factors include source of admission, appetite of the child at admission and the health facility providing the OTP services. These findings are also consistent with the Proximate determinant conceptual framework which depicts that severe malnutrition is caused by poor food utilisation in the body,

diseases and other factors such as poor appetite which are also influenced by proximate determinant factors such as feeding practices, food preparation and health seeking behaviour. The status of the proximate determinants and biological factors at admission will influence how good the recovery process of the child will be while in the OPT. Therefore, directing efforts on one factor does not yield much success in addressing mortality in the OPT and malnutrition in general. The knowledge of staff was fairly good but requires to be intensified especially in the area of infant feeding practices, health information and education, and health care practices. However, this research had a limitation in that almost all data was obtained from the records of children already discharged thus there was no data collected on the socioeconomic factors that may have affected performance of children such as education of the mother, income level, perception of mother on the diseases and others. Although the focus of the study was on management of severely malnourished children, the critical question still remained as, “is it feasible, sustainable and cost effective?”. It is consequently vital to consider carrying out a cost effectiveness study of the program and other factors associated with poor feeding practices among OPT children with particular attention to breastfeeding. In addition there is need to investigate the causes of high defaulter rates in health facilities

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List of Abbreviations

CSO	Central Statistics Office.
CTC	Community Based Therapeutic Care
CHWk	Child Health Week
DHS	Demographic and Health Survey
IDI	In-Depth Interview
IDR	In-Depth interview Respondents
IMCI	Integrated Management of Childhood Illnesses
IYCF	Infant and Young Child Feeding
LDHMT	Lusaka District Health Management Team
MDGs	Millennium Development Goals
MOH	Ministry of Health
MUAC	Mid Upper Arm Circumference
OR	Odds Ratio
OTP	Outpatient Therapeutic Care Program
PCR	Polymerase Chain Reaction
PPS	Population Proportion to Size Sampling
RUTF	Ready to Use Therapeutic Food
SA	Self Administered
SAM	Severe Acute Malnutrition
SAR	Self Administered questionnaire Respondents
SC	Stabilisation Centre(s)
SCN	Standing Committee on Nutrition
SFP	Supplementary Feeding Program
TFCs	Therapeutic Feeding Centres
UNICEF	United Nations Children's Emergency Funds
UTH	University Teaching Hospital
VCT	Voluntary Counselling and Test
WFP	World Food Program
WHO	World Health Organisation

Definitions of Operational terms

Community based Therapeutic Care: is defined as an innovative concept that mobilises communities and supports local health services to rapidly and effectively treat those with acute malnutrition with the majority being treated at home rather than at TFCs or nutrition rehabilitation centres.

Defaulters from program: individuals who have not attended the feeding programme for more than 2 weeks

Exits from the programme: are children no longer registered. It is made up of those who have defaulted, recovered (those who are referred) and died.

Humanitarian Charter and Minimum Standards in Disaster Response. These are standards which were developed by Sphere Project, a programme of the Steering Committee for Humanitarian Response (SCHR) and InterAction with VOICE and ICVA.

Oedema (nutrition): bilateral symmetrical pitting oedema which cannot be accounted for by heart failure, gross proteinuria, renal or cardiac failure, liver disease or pre-eclampsia (sphere guidelines).

Performance Evaluation: is a systematic process of observing, assessing, and interpreting a program's actual performance. Program performance also should influence children's performance. If the performance of a program helps to alleviate or reduce child malnutrition, it can be concluded that the program was successful.

Poverty Trap: situation without a surplus that can be used for investment in the health and education of children therefore, poverty is passed on to the next generation.

Severe Acute Malnutrition: Presence of severe wasting i.e. weight for height <70% or <-3 Standard deviations of the median National Centre for Health Statistics/World Health Organisation reference or oedema or a mid upper arm circumference (MUAC) <110 cm (WHO, 2; Gatchell: 2006:S90; CS0:183) (currently it has been changed to 11.5cm)

Ready to Use Therapeutic Food (RUTF): an energy dense mineral/Vitamin-enriched food designed to treat severe acute malnutrition (Sphere).

Recovered: are those individuals who have become free from medical complications and have achieved and maintained sufficient weight gain (Sphere)

Therapeutic Feeding Centres: are large inpatient centres where patients are admitted for 21 days or longer. The centres are resource intense and are often very far from those affected with acute malnutrition. (Gatchell: 2006:S90).

Chapter 1: Introduction

Community-based Therapeutic Care (CTC) program provides support to severely acutely malnourished (SAM) children through the process of early case identification, admission and care. The main emphasis of the program is to treat the majority of children at home rather than at Therapeutic Feeding Centres (TFCs) (Collins, 2004). CTC program has many benefits to communities and the nation as will be highlighted later in the chapter.

This thesis presents findings of the performance of Outpatient Therapeutic Program (OTP) component of the CTC program in eleven health facilities in Lusaka District. Chapter 1 discusses findings of other studies on OTP, chapter 2 provides the justification for the study, chapter 3 outlines the research question and objectives, chapter 4 highlights the research design and methods used, chapter 5 presents the results, chapter 6 provides a discussion of the findings and finally chapter 7 presents the conclusions and recommendations.

1.1 Severe Malnutrition

CTC program aims at reducing mortality in SAM and levels of under-nutrition in areas where it has persisted as a public health problem, mostly in developing countries. Globally, it is estimated that there are nearly 60 million children with moderate acute malnutrition and 20 million who are severely acutely malnourished. The majority of those affected are found in South Asia and Sub Sahara Africa (WHO, 2007). According to Collins (2006:2) 9% of Sub Saharan Africa and 15% of South Asian children have moderate acute malnutrition. approximately one million children die every year from severe acute malnutrition (WHO, 2007:2).

It is reported that SAM is the commonest reason for paediatric hospital admission in many poor countries (Collins, 2006; Khanum, 2005). Twenty five to 30% of children with severe malnutrition die during hospital admissions (Khanum, 2005). Similarly in Zambia the situation is alarming. In 1996, one thousand one hundred and ten malnourished under-five children were admitted for inpatient care in 16 hospitals. During the same year, the case fatality rate was estimated at 31% while there was no hospital with case fatality rate below the acceptable value of five percent (MOH, 2006). In the general population wasting has remained steady over the years (Table 1).

Table 1: Malnutrition Levels

	1992	1996	2003	2007
Type		Percent		
Stunting	40	42	47	45
Underweight	25	24	29	14
Wasting	5	4	5	5

Extracted from CSO: 2001/2:183

Acute malnutrition contributes to mortality rates. According to CSO (2003), moderate wasting is associated with a mortality rate of 30-148 per 1000 children per year and severe wasting is associated with a mortality rate of 73-187 per 1000 children per year. As defined by MUAC <110 mm (currently changed to 115 mm) several population based studies (Table 2) have shown high proportion of deaths attributed to severe malnutrition.

Table 2: Proportion of deaths (%) attributed to severe Malnutrition

Place	Proportion of deaths (%)
Bangladesh	24.9
Bangladesh	19.1
Bangladesh	33.1
N Malawi	6.70
SW Uganda	16.7
Senegal	10.2

Source: Briend Andre' (2005) **Community-based Management of Severe Malnutrition**: Technical Background in WHO, UNICEF, and SCN Informal Consultation on Community-Based Management of Severe Malnutrition in Children, Geneva, 21-23 November 2005, Meeting Report.

In Zambia, the under-five mortality rate is high. However, the rate reduced slightly to 168 per 1000 in 2002 from 191 per 1000 in 1992 and 197 per 1000 in 1996 (CSO, 200:119).

The current high levels of malnutrition pose a challenge in attaining millennium development goals (MDGs- Annex 1) linked to nutrition for countries like Zambia especially MDG number 4 which is aimed at reducing child mortality levels by two thirds by 2015 (WHO, 2010). Nishida (2009:4) indicated that malnutrition is directly or indirectly associated with more than 50% of all child mortality and is the main contributor to the burden of disease in the developing world. Attainment of the MDGs therefore, would require the participation of well nourished people, both children and adults.

There are several causes of SAM which at times act together to cause severe harm to the child. Child malnutrition is linked to poverty, low levels of education (Obaid, 2004; Collins, 2006) and poor access to health services, including reproductive health and family planning (Obaid, 2004). WHO (2007) reported that limited access to nutritious food and unhygienic living conditions increase the risk of repeated infections.

Poor childhood growth has serious consequences later in life. Shrimpton (2006) explains that those who survive have short term consequences such as compromised brain development, reduced growth and body mass with changes in body composition and metabolic programming which have an impact on body function throughout the course of life. Poorly nourished children may grow up as poorly nourished adults with compromised potential to economically produce to full capacity, and participate adequately in child care. This creates a vicious cycle leading to a poverty trap with enormous repercussions on the development of the country. Obaid (2004:7) noted that “undernutrition (which includes severe malnutrition) contributes to dysfunctional societies with individuals too weak, too vulnerable to disease, and lacking in physical energy to carry out the extraordinarily laborious tasks of escaping the poverty trap”.

Several interventions have been implemented to mitigate severe malnutrition. Until the 1990s most interventions to reduce severe malnutrition were facility based through therapeutic feeding centres (TFCs) and supplementary feeding (SF) for those discharged from TFCs. It was noted that TFCs interventions had some draw backs such as limited coverage and impact (WHO, 2007), high expenditure, centralisation, increased risk of cross infection and longer stay of caregivers in health facilities (Collins, 2004). SAM patients were identified through Integrated Management of Childhood Illness (IMCI) approach and referred those that required special attention to hospital or to inpatient within the same hospital.

Later in the 1990s community based therapeutic care (CTC) was initiated. It offers treatment in communities without caregivers and their children being admitted to the health facility or TFC. To ascertain the usefulness of therapeutic treatment offered at community level, CTC was one of the interventional researches carried out in some countries including Zambia aimed at reducing mortality resulting from severe malnutrition through provision of therapeutic feeds. In this study,

the analysis of data was guided by the Proximate-Determinant Framework shown in Figure 1. In addition to above interventions, in May 2002, the 55th World Health Assembly (WHA) endorsed the Global Strategy for Infant and Young Child Feeding (IYCF), which provides guidelines on optimal IYCF to prevent child malnutrition (WHO, 2007). This was adapted in Zambia in 2006 with the view to scale up its implementation. In 2005 the CTC program was introduced in Zambia in Lusaka district.

1.2 The Importance of CTC Program

The CTC program has four components which collectively make the programme effective in treating SAM children. These are community mobilisation, supplementary feeding program, outpatient therapeutic programs and stabilisation centres. Community mobilisation brings about program sensitisation, increased service demand and community participation in the program which may lead to increased coverage. Depending on the condition of the client, they may either be admitted into the SFP or OTP or may be referred to SC if they have complications.

The CTC program has far reaching benefits to communities and the nation. According to Collins (2004), the program places emphasis on utilising and building on existing capacities, thus equipping communities to deal with similar situations. It has advantages of timely detection of severe malnutrition in the community (WHO, 2007; Collin, 2004), provision of treatment for those without medical complications with ready to use foods (RUTF) or other easily accessible nutrient dense foods at home (Collins, 2004) and has easily accessible services. CTC can be integrated in other sectoral programs such as health, hygiene and food security interventions without difficulty (ibid).

CTC is a life saving program that needs to be supported. Recent literature reveals that home management of severe malnutrition can achieve high coverage in affected population and can be very effective in treating SAM. Collins (2004) reported that the South Wollo CTC program in Ethiopia was able to reach 77.9% of the severely malnourished children living in two townships within three months into the program. In Zambia, CTC was started in 2005 and has been fully implemented in 25 health facilities in Lusaka. Plans are under way to scale up to other

provinces starting with Eastern and Luapula Provinces. By September 2007, 2424, children were admitted to the program (Valid International Zambia, 2007).

CTC can have a major public health impact in the treatment of SAM. According to WHO (2007:3), with modern treatment regimens and improved access to treatment, the case fatality rate can be as low as 5% both in the community and in health care facilities. CTC approach is necessary to compliment efforts of health care facilities in treatment of SAM. In order to arrest the situation of infants and young children dying, there is need to scale up simplified management of severe malnutrition interventions in all areas to save the SAM children. Scaling up would be beneficial if the already implementing health facilities are evaluated and lessons learnt are applied to new sites.

1.3 Minimum Standards used in Performance Evaluation of CTC program

In measuring the performance of CTC program certain standards are observed. The first standards from which the CTC program indicators were derived were the Sphere Standards. These guidelines were used in emergency situation to improve the quality of assistance provided to people affected by disasters, and to enhance accountability to the humanitarian system in disaster response. The development of the community based therapeutic feeding program over the years led to the need to revise the indicators to suit such programs. Valid International and Concern Worldwide (2006) have refined the indicators that are used to measure the study variables (Appendix 5).

Programs implemented in some rural areas in Ethiopia, and Malawi reported on some of the key indicators. Coverage and death rates compared favourably to the CTC standards of 70% (for urban environments) and 10 % respectively. Weight gain was slightly above 4 % for CTC standards (Table 3)

Table 3: CTC Outcome Indicators in the Early Programs in Africa

	South Wollo, Ethiopia Feb 2003 - Jan2004	North Dufar, North Sudan, 2002-2003	Dowa, Malawi
Average weight gain(kg/day)	4.40		
Average length of stay (days)	81.0		
Coverage (%)	77.5	60	70
Death rates%	7.50	7.90	9

Source, Collins Steve (2004) **Community Based Therapeutic care: A New Paradigm for selective feeding in nutritional crises**. HPN Network Paper, Number 48, Nov 2004.

1.4 Food and logistic supplies to CTC programs

In order to adequately support SAM children, the CTC program requires a number of logistic supplies and equipment (Annex 6). Therapeutic feeds need to be easily accessible and affordable to both patients and the country for program sustainability and performance. Currently, the RUTF in use is being produced by a limited number of countries. However, local production is being tried in Ethiopia, Malawi, and Bangladesh (Gatchell, 2006). Although studies show that TFC interventions require large amounts of logistics compared to CTC interventions, Collins's view (2004) is that OTP/SFP points have high logistic demand as points are highly decentralised. This is truer in terms of transport and where the CTC areas are very remote.

1.5 Knowledge and Practices of health personnel on CTC

Training and orientation of staff is key to sustainability and management of CTC programs. Currently, there seems to be no studies available on the knowledge level of health care staff working in CTC program. Several countries have included CTC training in tertiary health programs. For instance, CONCERN is working in South Sudan with UNICEF and others to include training in CTC protocols in the one year nursing course (Gatchell, 2006). Health care staff are expected to put into practice certain practices which are key to the success of treating SAM children. Admitting patients to the CTC programs, conducting appetite tests, giving correct nutrition education and counselling, following up patients and discharging them correctly are important consideration to CTC program success.

1.6 Proximate-Determinant Analytical Framework for Performance

Analytical frameworks are models that guide the collection, analysis and interpretation of data for research in health, nutrition and other programs (Boerma, 2005). They explain the cause and effect (UNICEF, 1998) that needs to be investigated. Furthermore, Mosley (1984) and Laviolette (2008) identified the use of conceptual models to identify the most cost effective uses for health sector resources. The proximate determinant framework was therefore used to guide data analysis in this study. Boerma (2000) and Hill (2003) reported that proximate determinants models were developed by Davis and Blake in 1956 to study fertility. In the framework, the proximate determinants were regarded as biological and behavioural factors through which social, economic and environmental factors (sometimes referred to as distal factors-Victoria, 1997) affect fertility and thus in this case performance. According to Mosley (1984:27), over 97% of newborn infants are expected to survive through the first five years of life therefore, reduction in this survival probability in any society due to the operation of social, economic, and environmental forces. The social economic factors also operate through proximate determinants that in turn influence the risk of disease. The framework therefore, provides conceptual model for researchers of health programs to carry out a variety of statistical modelling strategies (Hill, 2003) and to make decisions on which factors to include in the model depending on the hierarchical relationships among risk factors (Victoria, 1997).

In this study, analysis of data was guided by the Proximate-Determinant Framework shown in Figure 1. The diagram shows that there are many factors that may cause severe malnutrition. Disease, utilisation of food in the body and other factors such as appetite may be the direct cause but they are also influenced by intermediate factors (proximate determinants) such as feeding practices, food preparation and health seeking behaviour. These behavioural factors are in turn influenced by underlying factors (most of which were not part of this study) such as the quality of services being offered by facilities, age, distance, empowerment of women in terms of income and health, knowledge, availability of food, cultural practices and existence of policies and resources and how they are being controlled. Underlying factors would not contribute to severe malnutrition directly unless through intermediate factors such as the care practices, feeding practices and disease. If there are no interventions to ensure that underlying causes are addressed it is likely to result into behavioural and biological consequences that will result in severe

malnutrition which may also result into death of a child. It is also true that malnutrition can lead to additional health problems and deprivation which may create and perpetuate poverty hindering social economic development while contributing to unsustainable resource use and environmental degradation (WEHAB, 2002; Blossner, 2005). Figure 1 shows the link between factors in determining performance of SAM children. In order to know the factors influencing level of performance, the model examined some of the intermediate factors that may influence occurrence, and severity of and recovery from severe malnutrition.

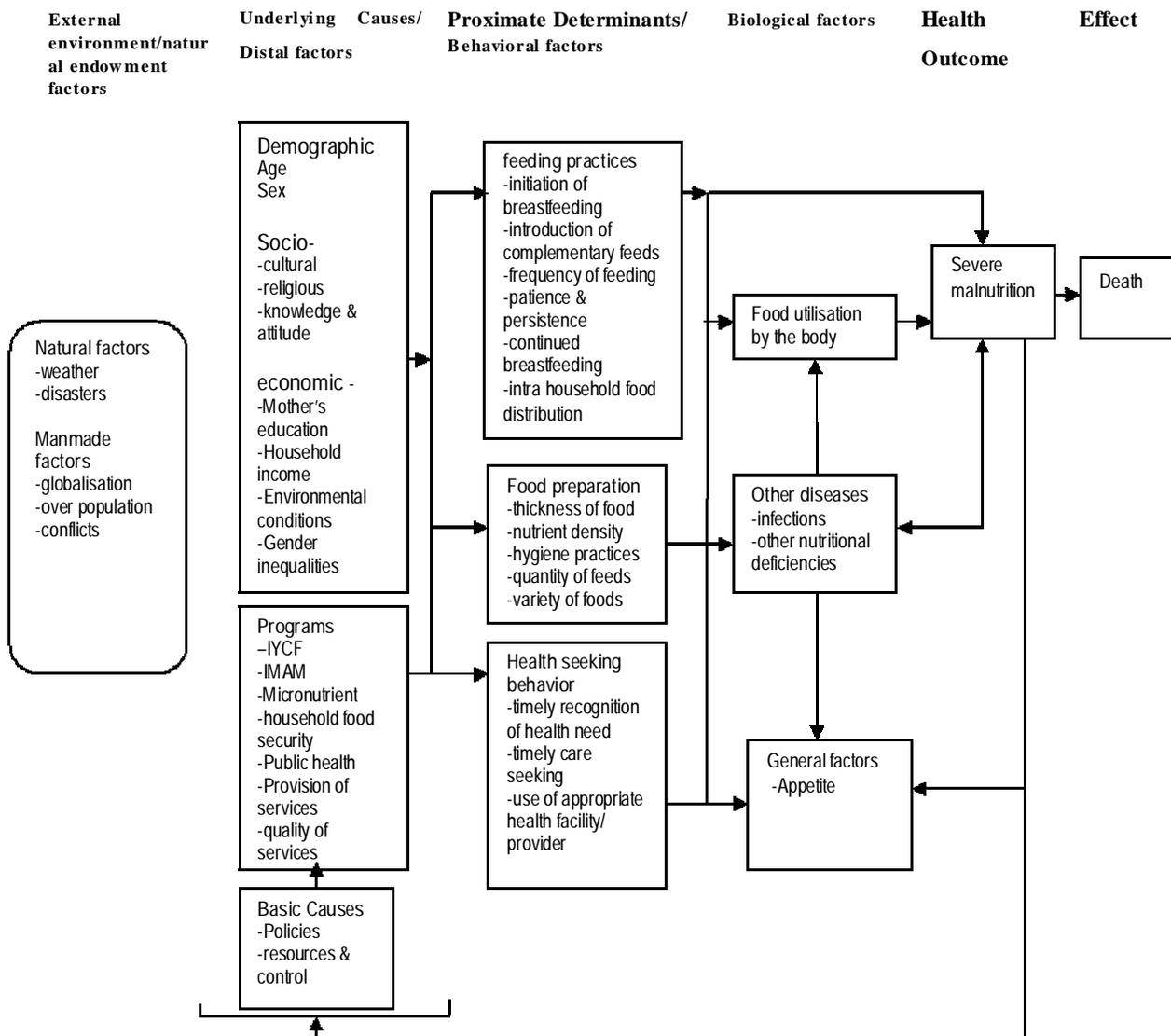


Figure 1: Proximate-Determinant Conceptual Framework-Factors of Performance

Adapted from Mosley et al (1984), Victoria (1997) and Boerma et al (2000) Analytical Frameworks: Variables on the left side of the figure influence those on the right side. (IYCF-Infant and Young Child Feeding program, IMAM-Integrated Management of Acute Malnutrition),

Proximate determinants are key to child survival. For exclusive breastfeeding is estimated to be able to save approximately 1.3 million additional children's life every year if the rates were raised above 90% levels (Veneman, 2007). Breastfeeding has been known to reduce incidence of malnutrition, and diseases (Chantry, 2009; Lenore, 1989; Popkin et al, 1990; Howie et al, 1990; WHO, 2000) and mortality (Edmond, 2006; Black, 2008) if it is conducted in the right way. It is the only best source of nutrition in first 6 months of life while it continues to provide a good portion of the child's nutrients from 6-24 months (WHO/UNICEF, 2006). Regarding appropriate care seeking it has been found that seeking prompt and appropriate care could reduce child deaths due to ARI by 20% (WHO, n.d In; Chandrashekar et al, 2006).

Chapter 2: Justification

Since the introduction of the CTC program in Zambia, there has not been any comprehensive study to determine the effectiveness of the program in treating severely malnourished children. By implication, scaling up is being done without adequate knowledge of the program's performance with regard to the outlined humanitarian minimum standards in non emergency response ("CTC standards"), hence the need to evaluate the program. The lessons learnt will be critical in scaling up of the program to other districts and provinces. This will in turn reduce mortality and morbidity among under-five children

The study carried out a performance evaluation of the program that has been implemented in the first eleven health centres in Lusaka. The rationale for the study is that the performance of CTC program has been understood and necessary adjustment will be made to improve effectiveness in the program. It has generated further critical knowledge to fill up knowledge gap of the health care staff on the subject. The generated knowledge will be used to improve management of SAM thereby reducing the associated burden of disease. The Information that was derived from the study will also be used for policy implementation and in program planning during the scaling up of the CTC program to various health facilities, districts and provinces by program officers.

In order to attempt to solve the problem of severe malnutrition it is important to have a conceptual framework. In this study, the proximate determinant framework was used to evaluate the OTP of the CTC program and analysis was based on it.

Chapter 3: Research Question and Objectives

3.1 Research Question

In this regard, the key question that needed to be addressed was:

“To what extent had the OTP Program performed against the set CTC indicators?”

3.2 Hypotheses

Null hypothesis: OTP program was not performing according to set indicators and has had no influence on health outcome of severely malnourished children.

Alternative hypothesis: OTP program was performing according to set indicators and was influencing health outcome in severely malnourished children

3.3 Aims and objectives

The overall aim of the study was to evaluate the performance of the OTP in eleven health centres in Lusaka district for the years 2006 and 2007 (that is, September 2005 to September 2007). In addressing the research question, the objectives of the study were segmented into four key components (1) Outcome indicators, (2) Logistics and supplies, (3) Knowledge of health care staff, and (4) practices of health care staff.

Specifically, the objectives of study were:

- i.* Compare the performance of the OTP against the CTC set criteria (indicators listed in appendix 1)
- ii.* Determine the availability and adequacy of food and logistic supplies to OTP implementing health centres during the evaluation years (September 2005 to September 2007);
- iii.* Determine the level of knowledge of health personnel on management of severe malnutrition using the CTC model;
- iv.* Assess if health personnel are meeting expected health practices in managing severe malnutrition.

Chapter 4: Research Design and Methods

4.1 Study Location (site) and population

The study was carried out in 11 health centres (Table 4) located in high and medium density populated areas of Lusaka district. These health centres have been implementing the OTP program since 2005. The table lists the health centres and the proportions of children admitted by September 2006

Table 4: Health Centres Studied

High Density Servicing Facilities	Proportion (%) admitted (Sept. 06)	Medium density Servicing Facilities	Proportion (%) admitted (Sept. 06)
Bauleni	7	Chelstone	1
Chawama	21	Kamwala	13
Chipata	11	Chilenje	4
George	17		
Kanyama	9		
Mutendere	4		
Matero Ref.	6		
Ngombe	5		

Source: Valid Zambia, 2006-unpublished. These were admission to OTP as at September 2006

The target groups were records of children (Annex 4) who were discharged from the OTP program from September 2005 to September 2007 as well as health care staff involved in the management of severe malnutrition and work in the OTP Program. The health care staff interviewed were those who have worked in the OTP program for 3 months or more. These were nutritionist, nurses, clinical officers, environment officers and others such as community health workers.

The exclusion criteria allowed for records of children over five years admitted to the OTP between September 2005 and September 2007. Health care staff who have worked in the OTP for less than 3 months were excluded from the study.

4.2 Study design

The study was a cross sectional study. A retrospective approach was used as it used records of children who were discharged from OTP between September 2005 and September 2007.

Research Variables

The OTP key variables considered in the research are described in the Table 5;

Table 5: Description of Variables used in the Research

Variable type	Conceptional Definition	Operational Definition	Scale of measurement
1.	2.	3. Performance variables	
Dependent variable	Weight	Average Weight gain of = 4g per kg per child per day (Valid International 2006)	Continuous, in kg
	Recovery	Recovery rates is the proportion of children admitted to program who recover which should be >75% (Sphere 2004)	Discrete
	Defaulters	Defaulter rate is the proportion of exits who fail to complete the feeding program to end which should be <15% (Valid International 2006; Sphere 2004)	Discrete
	Length of stay	Average length of stay in CTC program is the maximum number of days admitted to the program <60 days (Valid International 2006).	Ordinal in groups of weeks (1, 2, 3, 4, 5, 6)
	Death	Death rates of registered clients are the number of exits from the program who die before completing the treatment which should be 10% (Valid International 2006; SPHERE 2004).	Discrete
	Transfer rate	Transfer rate (Referral) is the proportion of children transferred to another level for treatment.	Discrete
4.	5.	6. Logistic and staffing variables	
Independent	Training	Staff training (number of staff trained in SAM) and the length of training	Discrete
	Staffing	Patient staff ratio is the numbers of patients a staff attends to per day which is 1:10 recommended (SPHERE 2004).	Discrete
	Supplies	The materials required by the various components of a CTC programme	discrete
7.	8.	9. Knowledge variables	
Independent	Importance of CTC	Proportion of staff citing correctly at least 3 of the 4 SAMCTC principles	Nominal
	Admission and discharge criteria	Proportion of staff citing correctly at least 3 of the 4 SAMCTC admission criteria	Nominal
	Conducting appetite test	Proportion of staff citing correctly the complete appetite test steps	Nominal
	Medical management of SAM in OTP	Proportion of staff citing correctly at least 8 of the 11 medical management elements	Nominal

	Knowledge on types and quantities of feeds to give	Proportion of staff citing correctly types and quantities of feeds to give	Nominal
	Criteria of failure	Staff citing correctly criteria for failure to gain weight	Nominal
	Key messages for mothers or caregivers	Proportion of staff citing correctly all key messages mothers or caregivers	Nominal
10.	11.	12. Practice of health care staff variables	
Independent	Screening and admission	Proportion of staff practicing correctly the screening and admission criteria	Nominal
	Conducting appetite test	Proportion of staff conducting correct appetite test	Nominal
	Distribution of feeds	Proportion of staff distributing RUTF correctly	Nominal
	Nutrition education	Frequency of nutrition education	nominal
Generic Variables			
Independent	Age	Age in years of the staff interviewed	Discrete
		Age in months at the time of admission for under-five children whose records were reviewed	Discrete
	Sex	- Staff's gender - Child's gender.	Nominal
	Educational level	Education attained at the time of study by staff	Ordinal,
	Training	Management of SAM training undergone by the health care staff interviewed	Nominal

Table 6: Composite Variable for Performance

Type of indicator	Cut offs
Weight: Average weight gain of = 4g per kg body weight per child per day (Valid International 2006)	= 4g = 1 < 4g = 0
Recovery: Recovery rates is the proportion of children admitted program who recover which should be >75% (SPHERE 2004)	recovered = 1 not recovered = 0
Defaulters: Defaulter rates is the proportion of exits from the program who fail to complete to end which should be <15% (Valid International 2006; SPHERE 2004)	Defaulted = 0 Non Default = 1
Length of stay: Average length of Stay in CTC program is the maximum number of days admitted to the program <60 days (Valid International 2006).	<60 days = 1 >60 days = 0
Death: Death rates of registered clients are the number of exits from the program who die before completing the treatment which should be 10% (Valid International 2006; SPHERE 2004).	Alive = 1 Died = 0

Note: composite variable was developed using 5 indicators (weight gain, recovery rate, default rates, length of stay and death rates) by assigning values to cut-off points as shown in the table.

4.3 Sampling and Sample size

Selection of the children's records:

Selection of children's record was done using a multi – stage sampling. All the 11 health centres were listed and data was collected from all (at this stage it was 100% sampling).

Record Sampling involved simple random sampling assuming single population. The formula below was used and gave a sample of 64 records

$$n_1 = \frac{z^2 p (1-p)}{d^2} = \frac{1.96^2 \times 0.015(1-0.015)}{0.03^2} = \frac{3.85 \times 0.015 \times 0.99}{0.0009} = \frac{0.0571725}{0.0009}$$
$$= 63.525 \quad \underline{\underline{= 64}}$$

n_1 = is the sample size required

z = is the z – score/value

d = is the required precision (margin of error) ± 3 % points

p = is the prevalence of severe malnutrition (1.5%)

The **third stage** involved **cluster sampling** where each site was treated as a cluster. The sample size was adjusted for non –availability of records using rho. The formula was as indicated below;

$$n = n_1 (b - 1) 0.6$$

$$n = 64(12 - 1) 0.6$$

$$n = 704 \times 0.6$$

$$n = 422.4$$

$$\underline{\underline{n=423}}$$

Four hundred and twenty three records were to be collected but the research could afford up to eight hundred twenty eight (828) records

n =sample size required,

b =number of clusters,

ρ = variability coefficient or intra-cluster correlation coefficient (rho)

The **4th stage** involved **Population Proportion to Size Sampling (PPS)**

Sample size of clusters was calculated using PPS Method. The number of records that were selected are shown in table 7.

Table 7: List of health centres with number of records that were collected

High Density facilities	Number of records collected	Medium Density facilities	Number of records collected
Bauleni	67	Chelstone*	11
Chawama*	209	Kamwala	130
Chipata*	86	Nchilenge	29
George*	54		
Kanyama*	93		
Mutendere*	39		
Matero Ref.	59		
Ngombe	51		
		Total	828

Note: n=828*Health centres where knowledge and practices questionnaire was administered

Selecting records in a health facility

Systematic selection was used which included the following steps:

1. Organising all the records and numbered them from 1 to the total number of eligible records. This provided the total number of records (N)
2. Determining the number of sample records (n)
3. Calculating the sampling interval (k) by N/n
4. Selecting a random number from 1 to k. Included every k^{th} child record.

Selection of health care staff for Self Administered Questionnaire

Stage 1

Since there was no list of health care staff per institution in the 11 health facilities, the health facilities were clustered according to the type of area they cater for that is, either medium or high density as shown in Table 7. Five health facilities were selected randomly from high density facilities and one from medium density health facilities. These are designated with a star (*) in Table 7.

Stage 2

Health care staff were first listed in a health facility and then randomly selected. Where less than 4 staff were found, all were interviewed using self administered Questionnaire. Key staff (in-charge, CTC coordinator, and nutritionist) were interviewed using in-depth questionnaire. The rest of the staff (nurses, environmental officers etc) were given self administered questionnaires. The two questionnaires were meant to triangulate the information given by health care staff.

Selection of health care staff for Observations

A minimum of 3 health care staff were observed during a CTC session. The preferred mixing was 1 senior health care staff, 1 enrolled nurse and 2 community health workers but this was difficult to achieve due to non availability of adequate tertially trained staff. Therefore, more volunteers were observed.

4.4 Data Collection, Entry and Plan for Analysis

4.4.1 Data Collection

Conducting the research involved several steps in which quantitative and qualitative techniques were used to collect data.

Quantitative Data

A. Record Review

Quantitative methods were important to allow for the analysis of data such as rate of weight gain, death rates, default rates and length of stay. Data for under-five children discharged from program from September 2005 to September 2007 was retrieved. Using a checklist (Annex 2), social demographic information was collected as well as information related to;

- Source of admission
- Admission anthropometry
- Admission criteria
- History on admission
- Routine medication
- Routine follow up in OTP

B. Self Administered Questionnaire

Using a structured self administered questionnaire (Annex 2), information on knowledge and practices on management of SAM, logistics and staffing within health care institutions was collected from members of staff.

Qualitative Data

A. In-depth interviews

In order to corroborate information, in-depth interviews were conducted on similar issues from the following staff in each health facility.

- In-charge
- nurse in each category (registered and enrolled)
- community health workers

B. Observations

Observations were conducted during OTP clinics, at a time when health care staff were assisting caregivers using observation checklist (Annex 2). This was meant to observe practices and knowledge being imparted to clients by health care staff.

Record Review response rate

Health facility and sex were used as indicators for completeness of data. A total of 832 records were collected from 11 health facilities. Of these, 828 had complete data on health facility while 803 had complete data on sex. The non response rate was 3.5% when sex is considered.

Health Care staff response rate

A total of 21 self administered questionnaires were collected and used for analysis.

4.4.2 Data Entry

Data from the field was entered upon generation. Quantitative data was entered as epi data, while qualitative data was transcribed manually. This was due to non availability of appropriate software such as N-VIVO.

4.4.3 Data Analysis

A. Quantitative Data

Quantitative Data was organised, processed and analysed using SPSS software. A coding key was developed and standard codes used for uniform answers such as yes, no, don't know and not

applicable to make data entry more organised. Data was processed using descriptive (frequencies) and cross tabulation. In addition, Logistic regression was used to find the factors associated with performance of children

Analysis also involved determining OTP performance which was arrived at by computing five key indicators (weight gain, recovery rate, default rates, length of stay and death) into one composite indicator of performance using the recode and compute command. This also used the principle of most sensitive indicator by first computing weight and lengths of stay followed by cure indicator, default indicator and finally death. In this case there was need to assign values to cut-off points (Table 6). To gauge performance the figures were summed up at a linear scale. Those with five out of five means the performance was excellent, four out of five it was good, and three out of five was fair. Any number below three meant that there was a problem.

B. Qualitative Data

Qualitative data was put in themes, coded (indexed or categorized), and then analysed manually. The data in the themes were organised according to questions across respondents and their answers. This allowed for identifying consistencies and differences (Taylor, 2003). Table 8 shows simplified matrix adapted from Taylor.

Table 8: Analysis of Qualitative Data

Question	Categories
Why do you think it is important to have a CTC program in your health facility?	Responses to the question were sorted into: Access, increased coverage, timeliness etc

Adapted from Taylor, 2003

4.4.4. Data quality control

Quality control was achieved in several stages. Firstly, the tools were pre-tested to ensure that they were best understood by the interviewers and interviewees. The r assistants were also trained before data collection and pre-testing in order to impart communication and other skills that were relevant to the research.

In addition, while in the field the questionnaires were checked thoroughly by the principle investigator (student) and ensured that the team was not overworked. Furthermore, qualitative data was entered into matrices as soon as it was generated to ensure the correct response was recorded. Repeated reading through the scripts provided the basis for further probing to obtain corroborative data.

4.5 Ethical Considerations

Consent: Informed consent (Annex 3) was obtained before interviewing staff. This was preceded by a clear explanation of the purpose of the research to the interviewee.

Confidentiality and privacy: The records which were collected from the health centre were kept confidential and were not given to any partner or project for further analysis. The records were allocated numbers that were used to enter as identity in the computer in place of names. The computer was protected with password to avoid unpermitted accessing of the file.

Permission: Approval for conducting the study was obtained from the Research Ethics Committee of the University of Zambia (Annex 7.3) and permission to conduct the research was obtained in writing from the Director of LDHMT (Annex 7.1).

4.6 Pre-testing of Tools

Pre-testing of the tools was done to non members of study population to determine validity. These health centres had similar characteristics to the study population. The pre-test was done at Civic centre health facility. The self administered questionnaire, in-depth tool and observation tools were further pretested at Ngombe clinic. A few records were retrieved because the centre started CTC program much later. Since there were only three members of staff working in the OTP program they were all given self administered questionnaire and only one in-depth interview was done. No observations were done because there were no mothers/caretakers who attended the clinic on that day. The data was entered using the epi data program. The activity was important to ensure uniformity in the understanding research tool and checking of the data spread sheet.

Chapter 5: Presentation of Findings

This section comprises overall descriptions, factors associated with overall performance, food and logistics availability and adequacy, knowledge and practices of health personnel.

5.1 General Descriptions

Demographic data

Table 9 shows demographic data for children's records. The table shows that data was collected from 11 health facilities. Chawama had the highest number of children's records collected (25.2%) while the lowest number was collected from Chelstone (1.3%).

Table 9: Description of Factors of Performance (Demographic data)

Variable	Frequency	%
Health Centre		
Bauleni	67	8.10
Chawama	209	25.2
Chelstone	11	1.30
Chilenje	29	3.50
Chipata	86	10.4
George	54	6.50
Kamwala	130	15.7
Kanyama	93	11.2
Matero ref	59	7.10
Mtendere	39	4.70
N'gombe	51	6.20
Sex of children		
Female	410	51.1
Male	393	48.9
Age at admission		
0-5 mths	3	0.40
6-11 months	137	17.5
12-23 months	470	59.6
4-59 months	178	22.6
People in HH		
<6 People	339	59.3
6-12 People	220	38.4
>12 People	13	2.30
Distance to health Facility		
<10 minutes	118	18.4
11-30 minutes	351	54.8
31-60 minutes	149	23.3
61-120 minutes	19	3.00
>120 minutes	3	0.50

n-828, based on the response rate

It further shows that there were proportionally an almost equal number of female and male children in the OTP. Out of 803 records with sex 410 (51.1%) were for females and 393 (48.9%) were for males. Seventeen and half percent were aged between 6-11 months, 59.9 % between 12-23 months while 22.6% were 24 -59 months.

Table 9 further shows that 59.3% of the children admitted to the OTP were living in a family size of less than six household members. Thirty eight percent (38.4%) lived in family sizes of between six to eleven household members while 2.3% were from larger families of more than twelve members. In addition, majority (54.8%) of mothers/caretakers whose children have been admitted to the OTP walk for 11-30 minutes to get to health facility to access services while 0.5% walked more than 2 hours.

Table 10 shows the distribution of demographic factors of health worker interviewed. It indicates that 21 health care staff were interviewed. Fourteen (66.7%) were females and 7 (33.3%) were males. Of these staff, 27.8% , 27.8%, 22.2% ,and 22.2% were in the age range of less than 30 years, 31-45 years, 46-48 years and above 49 years respectively. There was equal proportion of staff who attended secondary and tertiary education (40%) while 20% attained primary education.

Table 10: Description of Factors For Health Care Staff (Demographic data)

Variables	Frequency	Percent
Sex		
Female	14	66.7
Male	7	33.3
Age		
<30 yrs	5	27.8
31-45 yrs	5	27.8
46-48 yrs	4	22.2
>48 yrs	4	22.2
Education level		
Primary	4	20.0
Secondary	8	40.0
Tertiary	8	40.0

Table 11 shows the distribution of other factors of health workers interviewed. It shows that 44.4% of the staff had worked in the OTP program for more than 24 months while 33.3% and 22.2% worked for 13-24 months and 3-12 months respectively. Sixteen (84.2%) out of 19

respondents indicated having been trained in CTC and 15.8% did not receive any training. The majority (53.8%) of the staff attended one day training while 23.1% were trained for hours, 7.7% for 2 days and 15.4% for 3 days.

Table 11: Description of Factors For Health Care Staff (Other data)

Variable	Frequency	Percent
Years of Experience		
3 - 6 Months	4	22.2
13 - 24 months	6	33.3
>24 months	8	44.4
Training Attended		
Yes	16	84.2
No	3	15.8
Length of Training		
<1 day	3	23.1
1 day	7	53.8
2 days	1	7.70
3 days	2	15.4

Other factors important for Care of Severely Malnourished Children

Table 12: Description of other factors important for Care of Severely Malnourished Children

Variable	Frequency	%	Variable	Frequency	%
Mother status			Anaemia		
- Alive	672	94.4	Yes	74	9.40
- Dead	40	5.60	No	712	90.6
Source of Admission			Breastfeeding		
Community	206	30.9	Yes	199	26.9
Health centre	377	56.60	No	542	73.1
Inpatient	83	12.5	Appetite		
Readmission			Good	382	47.1
Yes	41	8.70	Poor	412	50.8
No	429	91.3	None	17	2.10
Adm. Anthropometry:			Routine edication:		
MUAC <11cm	348	43.2	Amoxycillin Yes	620	90.9
MUAC =11cm	457	56.8	Amoxycillin No	62	9.10
Oedema:			Vitamin A		
Plus +	179	38.0	Yes	270	82.3
Plus ++	268	56.9	No	58	17.7
Plus +++	24	5.10	Measles immunisation		
Weight for height			Yes	409	74.0
Yes	9	1.10	No	144	26.0
No	776	98.9	Anti-malarial		
Visible severe wasting			Yes	536	88.6
Yes	70	8.90	No	69	11.4
No	716	91.1	Fully Immunisation		
History on Admission			Yes	349	68.4
Diarrhoea Yes	330	40.3	No	161	31.6
Diarrhoea No	489	59.7	Mebendazole		
Vomiting			Yes	353	93.1
Yes	136	16.7	No	26	6.90
No	677	83.3	Folic acid		
Coughing			Yes	361	94.0
Yes	470	58.0	No	23	6.0
No	341	42.0			

n-828, based on the response rate

Maternal support was possible for the majority of children. Most children (94.4 %) admitted to OTP had their mothers still living at the time of admission while 5.6% were orphans (Table 12). However, it was not possible to know from the records whether the children were single or double orphans.

Table 12 further shows that children admitted in the OTP came from three sources; 30.9% from the community, 56.6% were referred from health facility while 12.5% came from the inpatient areas or stabilisation centres. Disaggregating data among the health facilities showed that Ng'ombe health facility had the highest number (66%) of children from the community, Bauleni had the highest number (92.1%) of children referred from health facility and Chilenje from inpatient (stabilisation centre). Of all the admissions, 8.7% of these children were readmitted to OTP while the rest (91.3%) were new admissions. Figure 2 indicates that most of the children admitted to OTP do not stay more than 5 weeks (the number reduced from 764 on admission to 343 children at the end of week 5) and very few children (18) reached week 16.

Figure 2: Flow of Children in OTP

N=828. The calculation was based on the number of children living RUTF from the time of admission through discharge. the longest expected stay is 16 weeks

Admission Anthropometry: MUAC and oedema were the most commonly used criteria. of 809 records that reported on MUAC, 43.2% records show that children were admitted with

MUAC less than 11 cm while 56.7% were admitted with MUAC above 11 cm (analysis with current changes of cut off point, 61% of children would have been admitted as MUAC below 11.5 cm and 39% with MUAC equal to and above 11.5 cm) . 472 records showed that children were admitted with oedema. Of these 38.1% had oedema plus 1, 56.8% had oedema plus 2 and 5.1% were admitted with oedema plus 3. Only 1.1% of the children were admitted using weight for height (Table 12).

Figure 3 shows the average weight of children at admission according to age. It indicates that 47.4% and 38.3% of children aged 6-11 months were in the weight ranges of 4.0-5.4 kg and 5.5-6.9 kgs at admission respectively while 37% and 39.2% of children aged 12-23 months were in the weight ranges of 5.5-6.9 kgs and 7.0-8.4 kgs respectively. The majority of older children (24-59 months) were spread in three weight ranges of 7.0-8.4 kg (37.4%), 8.5-9.4 kg (19.9%) and 9.5-10.4 kgs (12.3%). All the weights are below the WHO Child Growth Standards (Annex 1b) for normal child. Weights are also used to calculate the therapeutic feeds for SAM children.

Figure 3: Weights per Age at Admission

Note: n=828, proportions of children in various weight ranges at admission according to age ranges of 6-11 months, 12-23 months and 24-59 months

History on Admission: Table 12 highlights the status of children at admission with respect to common diseases (diarrhoea, coughing, and anaemia). It shows that diarrhoea (40.3%) and coughing (58%) were highly prevalent at admission. Breastfeeding was uncommon among

mothers whose children were admitted to OTP as only 26.9% of the mothers were breastfeeding and 73.1% were not. The records further showed that 53.6% of infants between 6 to 11 months were not breastfeeding at time of admission and increased to 70.4% in the age range of 12-23. Most of the children (94.4%) aged between 24 to 59 months were not breastfeeding.

Assessment of children's appetite on admission from children's histories showed that 382 (47.1%) had good appetite, 412 (50.8%) had poor appetite and 17 (2.1%) had no appetite. Close examination of routine medication shows that amoxicillin, and anti-malarial are the most reported drugs given to children. Over 600 children's card out of 828 reported on amoxicillin and anti-malaria drugs while vitamin A, Mebendazole and folic acid are the least reported. Of the 686 records that reported on amoxicillin, 624 (90.9%) reported children having received amoxicillin and 62 (9.1%) did not. A further 553 records reported on measles status of the child at admission. Of these, 409 (74%) had received measles immunisation. Full immunisation was reported among 349 (68.4%) out of 510 children's records. The table further shows that the majority of children (88.6%) received anti-malaria drugs.

Micronutrient administration reflects that 328 record cards out of 828 reported on Vitamin A supplementation. Two hundred seventy (82.3%) out of 328 records indicated children having received vitamin A (Table 12). With regard to folic acid and mebendazole, children were given these drugs during the second visit or later. Mebendazole is given to control worm infestations thus improve recovery of the child. A total of 380 records reported on mebendazole. Of these 353 (93.1%) reported children having received mebendazole while 27 (6.9%) did not receive. Out of a total of 386 records that reported on folic acid administration, 362 (94%) showed children having received the tablet and 24 (6%) did not receive.

Follow up: Figure 4 highlights the trends of diseases over the follow up period of children. The trend for diarrhoea showed a sharp decline of cases by week three of children's admission. The decline was from 40.3% on admission to 16.8% at week three. By week 16 only 5% of children still suffered from diarrhoea. A similar trend was observed by week 2 on children admitted with vomiting. The number decreased from 16.8% on admission to 3.3% in week two thereafter the cases remained below 6% and reached zero by 16th week. The reduction in the coughing cases

was much slower showing a decline from 57.8% at admission to 27.9% at week four with the reduction becoming almost static at week 12. The trend for anaemia was unusual. Even though it showed 9.5 % prevalence at admission, it declined to zero by week ten.

Figure 4: Trends in Diseases among the OTP Children

N=828, line graphs represents proportion of children who reported being illnesses from diarrhoea, vomiting, fever, coughing and anaemia during the follow up period.

Appetite: Among children admitted to OTP, appetite improved within a few weeks of children being admitted. Figure 5 shows that appetite improved from 75.7% to 94.8%, 95.4%, and 96.1% by second, third and fourth week respectively. Beyond week 7, very few children suffered poor appetite.

Figure 5: Trends in Appetite Improvements among Children Admitted to OTP observed During Appetite Test

Note: n=828, Proportions calculated per week of follow up for children observed with good appetite.

5.2 Performance

Overall

Table 13 highlights the summary results of performance. The Table indicates that the program performed to a level of 85.8% an indication that the children in the OTP did very well.

Table 13: Summary of Outcomes

	Factor	Performance	Description
Key Outcome Variable	1.Weight gain	60.3% (n=453/460) (5.7g/kg/day)	Weight gain >4g per kg per day is recommended (CTC Manual, 2006)
	2.Length of stay	74.7% (n=459/780)	<60 days
	3.Cure	59% (n=460/780)	>75%
	4.Default	31.1% (n=242/780)	15% exits is recommended CTC Manual 2006, and Sphere, 2006.these are children who were absent for 3 consecutive weeks
	5.Dead	3.20% (n=26/780)	10% of deaths is the highest recommended by CTC criteria, 2006 and Sphere standards, 2004
	Average of Factors	71.9%	This is the average of the five key factors above
Composite Variable	Desirable	85.8% (n=388)	children who performed well when processing the composite indicator
	Undesirable	14.2% (n=64)	Children who did not meet the composite criteria of having performed well.
Other variables	transfer rate	4.60% (36),	Children whose condition deteriorated and required inpatient therapeutic or hospital care
	refusal of transfer non cure rate	1% (1) (1.90%).	Children who had not reached discharge criteria within 4 months
		Good	Bad
Health Facility	Bauleni	(33) 89.2%	(4) 10.8%
	Chawama	(99) 88.4%	(13) 11.63%
	Chelstone	(6) 75.0%	(2) 25.1%
	Chilenje	(17) 94.4%	(1) 5.60%
	Chipata	(40) 87.0%	(6) 13.0%
	George	(31) 76.9%	(9)23.1%
	Kamwala	(63) 92.6%	(5) 7.40%
	Kanyama	(33) 80.5%	(8)19.5%
	Matero ref	(20) 100.0%	(0.0) 0%
	Mtendere	(18) 75.0%	(6)25.0%
N'gombe	(28) 73.0%	(10) 27.0%	

*NB: Composite indicator was made of 5 different indicators-weight gain, length of stay, cure, default rate and death rate. Sample size for performance was 460/828 as performance was based on children who were discharged as cured. Default, death, transfer refusal and non cure rates were based on sample size of 780. Definitions are from CTC Field Manual, 2006

The Table further highlights the outcomes of the OTP during the period under study. Out of the total of 780 exits, 460 (59%, 95% CI 55.5-62.4) of exits were cured, 242 (31%, 95% CI 27.8-34.3) defaulted and 3.3% (95% CI 2.07-4.59) died during the period they were admitted to the program. Out of total of 460 record cards showing discharge as cured, 60.3% (95% CI 55.74-64.69) had attained recommended weight gain of above 4 grams per day while 39.7% (95% CI 35.3-44.25)

had a weight gain below 4 grams a day. The mean weight gain was 5.7 g per day (SD 4.89, (95%CI 5.3-6.2). It further showed that 74.7% of children cured stayed less than the 60 days recommended in the OTP. Only 25.3% stayed more than 60 days. The mean length of stay was 48.04 (SD 22.9, (95%CI 45.9-50.15). The transfer rate was 4.6% (36), where as refusal of transfer was 0.1% (1) and non cure rate 1.9% were recorded.

5.3. Evaluation of Factors Associated with Performance

This section presents findings on factors associated with performance (Table 14). These include health facilities, sex, age, distance, source of admission, support status of child, appetite status of child, illness and treatments provided.

Table 14 shows association of demographic variables with overall performance of children. It indicates that good performance ranged from 73.0 % in Ng'ombe to 100 % in Matero reference health facilities. The univariate analysis (Table 15) showed no significant difference in the performance of children in the health facilities (OR 0.93; 95%CI 0.85-1.01). However, the multivariate analysis model showed that there was significance difference among health facilities in performance of children (OR 0.58; 95%CI 0.37-0.89). There was also a variation among health facilities with Chelstone and Kanyama being more likely to have children who are performing well compared to others (OR, 2.82; 95%CI 1.12-7.13) and (OR 4.67; 95%CI 1.46-14.95) respectively.

Performance also differed between the 2 project years. Table 14 indicates that 91.7 % of children admitted between September 2005 and September 2006 and 83.4 % admitted between October 2006 to September 2007 performed well.

Performance was also compared between the health facilities catering for the high and medium density areas showing 84.3% of children from high density areas and 91.5 % from medium density performed well. There was no significant difference between the children admitted to either high or medium density areas health facilities and their performance ($P>0.05$)

Table 14: Association of Demographic Variables and Other Factors with Overall Performance (Aggregated)

Variable	Performance		Pv	Variable	Performance		Pv	
	Good	Bad			Good	Bad		
	Total (%)	Total (%)			Total (%)	Total (%)		
1.0 Social Demographic Data				2.0 Anthropometry/ History on Admission/ Routine Medication				
Health Centre:	Bauleni	(33) 89.2	(4) 10.8	0.04	2.1 Anthropometry			
	Chawama	(99) 88.4	(13) 11.63		MUAC = 11cm	(243) 87.4	(35) 12.6	
	Chelstone	(6) 75.0	(2) 25.1		<11cm	(132) 83.0	(27) 17.0	
	Chilenje	(17) 94.4	(1) 5.60		Oedema:	Oedema +	(96) 86.5	(15) 13.5
	Chipata	(40) 87.0	(6) 13.0			Oedema ++	(140) 89.2	(17) 10.8
	George	(31) 76.9	(9) 23.1			Oedema +++	(8) 100.0	(0) .0
	Kamwala	(63) 92.6	(5) 7.40		Visible Sev. Wasting	Yes	(29) 77.8	(8) 22.2
	Kanyama	(33) 80.5	(8) 19.5			No	(338) 86.8	(54) 13.8
	Matero ref	(20) 100.0	(0) 0		Weight for height:	Yes	(3) 100.0	(0) 0
	Mtendere	(18) 75.0	(6) 25.0			No	(362) 85.3	(62)
	N'gombe	(28) 73.3%	(10) 27.0		2.2 History on Admission			
Sex of children:	Female	(179) 83.6	(35) 16.4	0.10	Diarrhoea	Yes	(148) 84.0	(28) 16.0
	Male	(195) 89.0	(24) 11.0			No	(235) 86.7	(36) 86.3
Location:	High density	300) 84.3	(56) 15.7	0.08	Vomiting	Yes	(58) 82.6	(12) 17.4
	Medium	(86) 91.5	(8) 8.50			No	(373) 86.0	(52) 14.0
Period:	Sept 05-Sept 06	(121) 91.7	(11) 8.3		Coughing	Yes	(215) 86.6	(33) 13.4
	Oct 06 – Sept 07	(252) 83.4	(50) 16.6			No	(165) 84.1	(31) 15.9
Age at admission:	6-11	(47) 77.0	(14) 23.0	0.08	Anaemia:	Yes	(34) 86.4	(6) 10.0
	12-23	(237) 88.1	(32) 11.9			No	(343) 91.0	(54) 90.0
	24-59	(83) 85.6	(14) 14.4		Diseases (composite):		(357) 86.0	(58) 14.0
People in hh:	<6 People	(158) 84.9	(28) 15.1	0.87	Sick	No sickness	(7) 77.8	(2) 22.2
	6-12 People	(100) 83.2	(20) 16.8		2.3 Routine Medication			
	>12 People	(8) 88.9	(1) 11.1		Amoxycillin	yes	(304) 86.8	(46) 13.2
Other Factors Important to Performance						No	(29) 87.9	(4) 12.1
Distance to health Facility	<10 minutes	(57) 85.1	(10) 14.9	0.74	Vitamin A Suppl.:	Yes	(124) 87.3	(18) 12.7
	11-30 minutes	(168) 86.6	(26) 13.4			No	(30) 78.4	(8) 21.6
	31-60 minutes	(71) 84.5	(13) 15.5		Measles Immunisation:	Yes	(194) 86.2	(31) 13.8
	61-120 minutes	(6) 100.0	(0) 0			No	(61) 84.5	(11) 15.5
	>120 minutes	(0) %	(0) %		Anti-malaria:	Yes	(265) 85.9	(43) 14.1
Support status:	Alive	(309) 85.1	(54) 14.9	0.24		No	(32) 82.1	(7) 17.9
	Dead	(18) 94.7	(1) 5.30		Fully Immunised:	Yes	(167) 86.5	(26) 65.0
Adm Source:	Community	(100) 80.0	(25) 20.0	0.08		No	(71) 83.3	(14) 16.7
	Health centre	(177) 86.7	(27) 13.3		Mebendazole:	Yes	(192) 83.8	(37) 16.2
	Inpatient	(39) 92.9	(3) 7.10			No	(16) 100.0	(0) .0
Readmission:	Yes	(22) 91.7	(2) 8.30	0.36	Folic Acid:	Yes	(190) 83.3	(38) 16.7
	No	(189) 86.6	(34) 15			No	(15) 87.5	(2) 12.5
Appetite:	Good	(191) 86.4	(30) 13.6	0.43	Treatment (composite) :		(5) 17.2	(24) 82.8
	Poor	(179) 84.0	(34) 16.0		Not received all treats		(33) 78.6	(9) 21.4
	None	(7) 100.0	(0) 0					
Breastfeeding:	Yes	(76) 76.8	(23) 23.2	0.01				
	No	(268) 87.3	(39) 12.7					

Note: n=454 as the outcome variable performance was analysed based on the cured population

Comparison of performance between female and male children showed that males performed better than females by a margin of 4.4% (47.8% female and 52.2% male). There was no significant association between performance and whether the child is female and male both in univariate (OR 1.59; 95%CI 0.91 -2.78) and in multivariate analysis (OR 0.28; 95%CI 0.03-2.44) (Table 15). Performance was compared among the age groups with the highest proportions of good performance (88.1%) found in the age group 12-23. However, there was no significant

association between the age of children and performance in univariate (OR 1.04; 95%CI 0.995-1.08) and multivariate analysis (OR 1.24; 95%CI 0.96-1.61).

Table 15 shows that 85.1% of children whose mothers were alive and 94.7% whose mothers were dead had good performance (OR 3.15; 95%CI 0.41-24.04). Table 15 further shows that 84.9%, 83.2% and 88.9% of children living in households with less than 6 members, 6-12 members and more than 12 members respectively had good performance. However, the univariate analysis showed that there was no significant difference in the performance of children and the number of people in the household (OR 0.99, 95%CI 0.87-1.13). This persisted even in multivariate analysis (OR 1.66; 95%CI 0.79-3.50).

Table 15 indicates that 85.1%, 86.6%, 84.5% and 100% of the children whose mothers or caregivers walked for less than 10, 10-30, 31-60 and 61-120 minutes respectively performed well. There was no significance difference in both uni and multivariate analysis on the distance the caregivers cover to the health facility and the performance of their children (OR 1.01; 95%CI 0.99-1.03)

Table 15 shows that 80%, 86.7% and 92.9% of children referred from the community, health facility and inpatient respectively, performed well. In univariate analysis, there was a significant difference in the way children are referred to the health facility and whether they performed well or not (OR 1.71; 95%CI 1.06-2.75). It persisted in multivariate analysis (OR 0.11; 95%CI 0.01-0.31). the source of referral of children was an important factor as to whether the child will perform well or not.

Table 15 shows that 86.4%, 84.0% and 100% of children who reported good, poor and no appetite had good performance. There was no significant association observed in univariate analysis between children's appetite and performance. in multivariate analysis those who had good appetite were less likely to report poor performance (OR.01; 95%CI 0.01-0.67)

Table 15 shows that 76.8% of children who were breastfeeding and 87.3% of those who were not breastfeeding performed well. There was a significant between performance of

children and whether children were breastfeeding or not (OR 2.08; CI 1.17-3.70). Based on the odds ratio, the odds of children performing well were 2 times higher if they were breastfed. However, the association did not persist in multivariate analysis.

All illnesses and treatments that were put into composite to find out how many children admitted with at least an illness and how many had no illness. Table 15 shows that 86% of children who were admitted with illness performed well while 77.8% who had no illness performed well (OR 0.57; 95%CI 0.12-2.81). It also shows that 78.6% of children who did not receive all treatments and only 17.2% of those who received all treatments performed well (OR 1.31; 95%CI 0.383-4.404).

5.4 Determinants of Performance

This section gives a highlight of factors that were found to be associated with performance and the test statistics that were used.

Table 15 highlights some of the determinants of performance using univariate and multivariate logistic regression. The analysis showed the goodness of fit Hosmer and Lemeshow Test (χ^2 , 7 df, $p=0.97$) on the determinants of performance. The Cox and Snell R Square and the Nagelkerke R Squared indicated that between 39.9% (0.399) and 61% (0.61) of the variability is explained by the variables. Health facility, source of admission of the child and appetite of the child were found to be the significant factors that were associated with the performance of children admitted to the OTP. Children who were brought to the OTP through the healthy facility were likely to perform better compared to those referred from the community. Children who reported to have good appetite were less likely (OR 0.01) to report poor performance compared to those children with poor appetite.

In multivariate analysis the health facility was a good predictor of performance of children in the OTP but the model could not fit well when categorising the variable. However, in univariate analysis, children receiving OTP services from Kanyama and Chelstone health facilities were more likely to perform better (OR 4.67; 95%CI 1.46-14.95 and OR 2.821, 95%CI 1.12-7.13 Respectively)

Table 15: Description of Determinants of Performance

Variable/outcome	Prevalence	Univariate	Multivariate
	Total(%)	OR (95% CI)	OR (95% CI)
Health centre: All	(86)85.8	0.93 (0.85-1.00)	0.58 (0.37-0.89)
Bauleni	(33)89.2	1	
Chawama	(99)88.4	3.06 (0.861- 10.83)	
Chelstone	(6)75.0	2.82 (1.12- 7.13)	
Chilenje	(17)94.4	1.11 (0.192- 6.44)	
Chipata	(40)87.0	6.29 (0.738- 53.69)	
George	(31)76.9	2.47 (0.803- 7.59)	
Kamwala	(63)92.6	1.23 (0.44- 3.49)	
Kanyama	(33)80.5	4.67 (1.46- 14.95)	
Matero ref	(20)100.0	1.53 (0.53- 4.41)	
Mutendere	(18)75.0		
N' gombe	(28)73.0	1.11(0.343- 3.59)	
Age: All	(367)85.9	1.04 (0.995-1.08)	1.24 (0.96-1.61)
6-11 months	(47)77.0	1	1
12-23 months	(237)88.1	0.57 (0.25-1.29)	0.00 (0.00-1.58)
24-59 months	(83)85.6	1.25 (0.63-2.46)	0.45 (0.00-81.7)
Breastfeeding: All	(77)76.8	2.08 (1.17-3.69)	1.869(0.184-18.9)
Yes	(76)76.8	1	
No	(268)87.3	0.48 (0.27-0.85)	
Sex :- All	(372)86.3	1.59 (0.91-2.77)	0.28 (0.03-2.43)
Female	(179)83.6		1
Male	(195)89.0	0.63 (.360-1.10)	4.11 (0.17-99.3)
Support status-mother: All	(326)85.6	3.156 (0.41- 24.13)	
Alive	(308)85.1	1	
Dead	(18)94.7	0.32 (0.04-2.42)	
Distance to healthy facility	(302)86.0	1.01 (0.99- 1.03)	1.01 (0.96-1.06)
<10 minutes	(57)85.1	1	1
11-30 minutes	(168)86.6	1.13 (0.51-2.49)	1.86 (0.03-115.6)
31-60 minutes	(71)84.5	0.96 (0.39- 2.34)	24.5 (0.06-10519.1)
61-120 minutes	(6)100.0		
>120 minutes	0%		
Total people in hh:- all	(265)84.4	0.99 (0.87-1.13)	1.66 (0.78- 3.50)
<6 people	(158)84.9	1	1
6-12 people	(100)83.2	0.88 (0.47- 1.64)	0.31 (0.01-12.6)
>12 people	(8)88.9	1.42 (0.17- 11.7)	
Source of admission:- all	(315)85.1	1.71 (1.063-2.754)	0.01 (0.00-0.30)
Community	(100)80.0	1	1
Health facility	(176)86.7	0.31 (0.09- 1.08)	
Inpatient	(39)92.9	0.50 (0.14- 1.74)	
Readmission: yes	(22)10.4	0.50 (0.11-2.23)	
No	(189)86.6		
Appetite	(377)85.5	0.93 (.57- 1.54)	.01 (.00-.67)
Diseases	(364)85.8	0.57 (0.12- 2.81)	
Treatments	(57)80.3	1.31(0.39-4.40)	4.04 (0.02-714.5)

5.5 Further Descriptions of Factors of Performance

This section gives results of the relationship between key variables with performance. Key variables analysed with social demographic variables were weight gain, length of stay, cure, defaulting and death rate. These are the main variables that are used to measure performance of

the CTC program and thus used to measure the overall performance (composite). Different factors may be responsible for each outcome.

Table 16 (a) and (b) shows the performance of children disaggregated by key outcome variables and are reported according to demographic variable.

Health facility: Table 16a shows that the highest proportion of children who gained weight above 4 g per kg body weight per day were from Matero ref (80%) followed by Kamwala (70.6%). The least weight gain above 4 g was observed from Chelstone (50%) ($P_v > 0.05$). However, there was no statistical significance between health facility and weight gain. Furthermore, table 16a shows that matero ref had the highest proportions (95%) of children who stayed the recommended less than 60 days in the OTP followed by Bauleni (89.2%). The least proportion was from Kamwala (16.7%). There was a significance association between health facility the child was admitted to and the period the child stayed in the facility ($P_v < 0.01$). Ngo'mbe health facility had the highest proportion of children cured (84.1%) while Matero ref (35.1%) had the least cured ($P_v < 0.01$). In addition, Table 16b shows that Kanyama had the highest defaulting rate (45.5%) followed by matero ref (38.6%) and chilenje (37.9%). The least defaulting rate (6.8%) was from Ngo'mbe ($P_v < 0.01$). Death rates were high in Matero ref which reported 14.0%. Deaths were also recorded in Kamwala (3.4%), Chipata (3.8%) and Ng'ombe (2.3%) ($P_v < 0.01$).

Table 16a: Performance of Children Disaggregated by Key Outcome Variables

Social demographic and Key variables												
Variable	Weight Gain		Pv	OR(95%CI)	Length of Stay		Pv	OR(95%CI)	Children Cured		Pv	OR(95%CI)
	>4g	=4g			<60 days	=60 days			Cured	Not cured		
	Total(%)	Total(%)			Total(%)	Total(%)			Total(%)	Total(%)		
Health Centre												
Bauleni	(18) 48.6	(19) 51.4	0.24		33) 89.2	(4) 10.7	0.01		(37) 55.2	(30) 44.8	0.00	
Chawama	(69) 61.6	(43) 38.4			(87) 76.3	(27) 23.7			(114) 57.9	(83) 42.1		
Chelstone	(4) 50.0	(4) 50.0			(4) 50.0	(4) 50.0			(8) 72.7	(3) 27.3		
Chilenje	(10) 55.6	(8) 44.4			(15) 83.3	(3) 16.7			(18) 62.1	(11) 37.9		
Chipata	(25) 54.3	(21) 45.7			(33) 71.7	(13) 28.3			(46) 57.5	(34) 42.5		
George	(20) 51.3	(19) 48.7			(28) 71.8	(11) 28.2			(40) 83.3	(8) 16.7		
Kamwala	(48) 70.6	(20) 29.4			(58) 16.9	(12) 17.1			(70) 60.3	(46) 39.7		
Kanyama	(27) 65.9	(14) 34.1			(27) 62.8	(16) 57.2			(43) 49.4	(44) 50.69		
Matero ref	(16) 80.0	(4) 20.0			(19) 95.0	(1) 5.0			(20) 35.1	(37) 64.9		
Mtendere	(15) 60.0	(10) 40.0			(17) 68.0	(8) 32.0			(25) 64.1	(14) 35.9		
N'gombe	(19) 51.4	(18) 48.6	(22) 59.5	(15) 40.5	(37) 84.1	(7) 15.9						
Support status:												
Alive	(211) 58.1	(152) 41.9	0.18	0.50(0.17-1.41)	(271) 73.6	(97) 26.4	0.89	0.93(0.33-2.63)	(369) 59.0	(256) 41.0	261	1.44(0.76-2.73)
Dead	(14) 73.7	(5) 26.3			(15) 75.0	(5) 25.0			(20) 50.0	(20) 50.0		
People in the HH:												
<6 People	(102) 54.5	(85) 45.5	0.42		(140) 74.5	(48) 25.5	0.23		(187) 57.9%	(136) 42.1%	0.59	
6-12 People	(73) 61.3	(46) 38.7			(82) 67.8	(39) 32.2			(122) 61.0%	(78) 39.0%		
>12 People	(6) 66.7	(3) 33.3			(8) 88.9	(1) 11.1			(9) 69.2%	(4) 30.8%		
Age												
: 6-11 mths	(33) 54.1	(28) 45.9	0.33		(38) 62.3	(23) 37.7	0.02		(61) 49.2	(63) 50.8	0.04	
12-23mth	(169) 62.6	(101) 37.4			(215) 78.8	(58) 21.2			(272) 61.8	(168) 38.2		
24-59mth	(55) 56.7	(42) 43.3			(73) 73.0	(27) 27.0			(102) 59.6	(69) 40.4		
Sex :												
Female	(127) 59.6	(86) 40.40	0.81	0.95(0.65-1.40)	(162) 74.7	(55) 25.3	0.66	0.91(0.59-1.402)	(217) 58.2	(156) 41.8	0.65	0.93 (0.70-1.25)
Male	(133) 60.7	(86) 39.3			(169) 76.5	(52) 23.5			(222) 59.8	(149) 40.2		
Source of admission												
Community	(69) 54.8	(57) 45.2	.082		(86) 67.7	(41) 32.3	0.06		(127) 66.5	(64) 33.5	0.12	
Health cent	(115) 56.7	(88) 43.3			(159) 76.8	(48) 23.2			(207) 58.0	(150) 42.0		
Inpatient	(31) 73.8	(11) 7.1			(36) 83.7	(7) 16.3			(44) 57.1	(33) 42.9		
Readmission												
Yes	(15) 62.5	(9) 37.5	0.68	1.20(0.50-2.86)	(21) 87.5	(3) 12.5	0.12	2.59(0.75-8.99)	(25) 64.1	(14) 35.9	0.32	1.41(0.71-2.80)
No	(129) 58.1	(93) 41.9			(165) 73.0	(61) 27.0			(226) 55.8	(179) 44.2		
Distance to HF												
=10 minutes	(39) 58.2	(28) 41.8	0.61		(47) 70.1	(20) 29.9	0.74		(67) 60.9	(43) 39.1	0.02	
11-30 minutes	(111) 57.2	(83) 42.8			(152) 76.4	(47) 23.6			(201) 61.1	(128) 38.9		
31-60 minutes	(55) 65.5	(29) 34.5			(64) 75.3	(21) 24.7			(85) 61.6	(53) 38.4		
61-120 minutes	(4) 59.5	(2) 40.5			(5) 83.3	(1) 16.7			(6) 31.6	(13) 68.4		
>120 minutes									(0) 0.0	(3) 100.0		

Table 16b: Performance of Children Disaggregated by Key Outcome Variables Cont'd

Variable	Defaulting				Died			
	Defaulters Total(%)	Other outcomes Total(%)	Pv	OR(95% CI)	Died Total(%)	Other Outcomes Total(%)	Pv	OR(95% CI)
Health Centre			0.00				0.00	
Bauleni	(25) 37.3	(42) 62.7			(0) 0.0	(67) 100		
Chawama	(58) 29.4	(139) 70.6			(9) 4.6	(188) 95.4		
Chelstone	(2) 18.2	(9) 81.8			(0) 0.0	(11) 100.0		
Chilenje	(11) 37.9	(18) 62.9			(0) 0.0	(29) 100.0		
Chipata	(26) 32.5	(54) 67.5			(3) 3.8	(77) 96.3		
George	(7) 14.6	(41) 85.4			(0) 0.0	(48) 100.0		
Kamwala	(39) 33.6	(77) 66.4			(4) 3.4	(112) 96.6		
Kanyama	(40) 45.5	(48) 54.5			(0) 0.0	(88) 100.0		
Matero ref	(22) 38.6	(35) 61.4			(8) 14.0	(49) 86.0		
Mtendere	(8) 20.5	(31) 79.5			(0) 0.0	(39) 100.0		
N'gombe	(3) 6.8	(41) 93.2			(1) 2.3	(43) 97.7		
Support status								
Alive	(204) 32.6	(422) 67.4	0.52	.816(0.42-1.56)	(16) 2.6	(610) 97.4	0.98	1.02(0.13-7.92)
Dead	(15) 37.5	(25) 62.5			(1) 2.5	(39) 97.5		
People in the HH								
<6 People	(113) 35.0	(210) 65.0	0.19		(8) 2.50	(315) 97.5	1.85	
6-12 People	(55) 27.4	(146) 72.6			(5) 2.50	(196) 97.5		
>12 People	(4) 30.80	(9) 69.2			(0) 0.00	(13) 100.0		
Age								
6-11 mths	(46) 36.8	(79) 63.2	0.06		(6) 4.8	(119) 95.2	0.16	
12-23mth	(121) 27.5	(319) 72.5			(17) 3.9	(423) 96.1		
24-59mth	(59) 34.5	(112) 65.5			(2) 1.2	(169) 98.8		
Sex								
Female	(117) 31.3	(257) 68.7	0.81	1.04(0.76-1.42)	(14) 3.7	(360) 96.3	0.42	1.40(0.62-3.20)
Male	(113) 30.5	(258) 69.5			(10) 2.7	(361) 97.3		
Source of admission								
Community	(47) 24.6	(144) 75.4	0.12		(8) 4.2	(183) 95.8	0.36	
Health cent	(114) 31.9	(243) 68.1			(9) 2.5	(348) 97.5		
Inpatient	(27) 35.1	(50) 64.9			(1) 1.3	(76) 98.7		
Readmission								
Yes	(13) 33.3	(26) 66.7	0.86	0.94 (0.47-1.89)	(0) 0.0	(39) 100.0	0.32	1.03(1.01-1.04)
No	(141) 34.7	(265) 65.3			(10) 2.5	(396) 97.5		
Distance to Health facility								
=10 minutes	(34) 30.9	(76) 69.1	0.14		(1) 0.9	(109) 99.1	0.01	
11-30 minutes	(94) 28.6	(235) 71.4			(11) 3.3	(318) 96.7		
31-60 minutes	(44) 31.7	(95) 68.3			(3) 2.2	(136) 97.8		
61-120 minutes	(10) 52.6	(9) 47.4			(0) 0.0	(19) 100.0		
	(2) 66.7	(1) 33.3			(1) 33.3	(2) 66.7		

Support status: Table 16 further shows that 58.1% of children whose mothers were still alive at the time of admission and 73.7% who were orphaned gained the recommended weight of above 4 g. There was no statistical significance between the type of support a child had and whether the child gained recommended weight or not (OR 0.50; 95% CI 0.18-1.41). Concerning length of stay, 73.6% of children who still had mothers alive and 75.0% whose mothers were dead stayed the recommended <60 days. There was not significance difference between the support status and length of period a child stayed in the OTP program (OR 0.893, 95% CI 0.33-2.63).

Regarding the cure rate, 59% of children whose mothers were alive at the time of admission and 50% whose mothers died were cured. There was no significant association between support the child had and whether the child was cured or not (OR 1.44; 95% CI 0.76-2.73). It was further found out that there was a high default rate (37.5%) among children whose mothers were dead at admission than among those whose mothers were alive (32.6%-Table 16b). However, there was no significant association between support status and defaulting (OR 0.81; 95% CI 0.42-1.56). Death rate was almost the same whether the child's mother was dead (2.5%) or alive (2.6%) at the time admission. (OR 1.02; 95% CI 0.13-7.92)

Household members: Table 16a shows that 54.5%, 61.3% and 66.7% children who lived in household with member of less than 6 people, 6-12 people and above 12 people respectively gained recommended weight ($P_v > 0.05$). The number of children who stayed up to the recommended period (less than 60 days) was high in all the three categories of household members. Seventy five percent who lived in household of less than 6 people, 67.8% in households of 6-12 people and 88.9%, in households of more than 12 people stayed less than 60 days ($P_v > 0.05$). The highest (69.2%) rate of cure was found in children who lived in households with more than 12 household members ($P_v > 0.05$) while default rate was highest (35%) in children coming from household with less than 6 people ($P_v > 0.05$). The prevalence of death rate was the same (2.5%) in all the three categories of household membership ($P_v > 0.05$ -Table 16b).

Age : Table 16a shows that adequate weight gain attained by children in the three age categories of 6-11 (54.1%), 12-23 (62.6%) and 24-59 (56.7%) varied considerably ($P_v > 0.05$). It further shows that children in the age range of 12-23 months had the highest number (78.8%) of

children who stayed within the recommended period of 60 days ($P_v=0.02$) and highest cure rate of 61.8% ($P_v= 0.04$). Table 16b indicates that default rate was highest (36.8%) among children in the age range 6-11months ($P_v >0.05$) while death was prevalent in 4.8% 3.9% and 1.2% of children in the age range of 6-11 months, 12-23 months and 24-59 ($P_v > 0.05$).

Sex: Table 16a indicates that 59.6 % of females and 60.7% males children gained recommended weight ($P_v>0.05$, OR .955, 95% CI .650-1.404). Concerning length of stay, 74.7% females and 76.7% males stayed less than 60 days (OR 0.91, 95%CI 0.59-1.40). Of those discharged as cured, 58.2% were females and 59.8% were males (OR 0.934, 95%CI 0.697-1.25). Of those who defaulted 31.3% were females and 30.5% males (OR 1.04, 95%CI 0.762-1.42). Death occurred among 3.7% females and 2.7% males (OR 1.40, 95%CI 0.62-3.20).

Distance: Table 16a shows that the highest proportions (65.5%) of children who gained adequate weight walked between 31-60 minutes ($P_v >0.05$) to get to health facility to receive services while the highest proportion (83.3%) of those who stayed the recommended period of less than 60 days walked between 61-120 minutes to the health facility ($P_v>0.05$). The majority (60.9%) of the children cured were those whose mothers walked ten minutes or less ($P_v= 0.02$). More children defaulted (66.7%, $P_v=0.14$) and died (33.3%, $P_v<0.01$) among mothers/caregivers who walked for more 120 minutes (Table 16b).

5.6 Food and Logistics availability and adequacy

This section gives results on food and logistics situation in health facilities implementing the OTP. Most of the figures used in this section were derived from table 17.

Table 17 shows the distribution of supplies found in health facilities. It shows that 1 (Chelstone) out of 6 health facilities had 4 weighing scales, 3 (George, Mtendere, Chawama) had 2 weighing scales and 2 (Chipata and Kanyama) had 1 weighing scale each. Height measuring boards were only found in 2 health facilities (Chipata and Kanyama) which had 1 height board each. An electronic calculator was found only in one health facility (Chipata) while none of the health facilities had a clock. All the other items (pens, scissors, soap etc) were hardly found in health facilities. OTP and ration cards were available in most health facilities

Table 17: Distribution of Supplies found in Health Facilities

Item	Number Supplied						Recommended
	Chelstone	George	Mtendere	Chipata	Kanyama	Chawama	
Scales	4	2	2	1	1	2	1
Height boards	0	0	0	1	1	0	1
Elec. Calculator	0	0	0	1	0	0	1
WHM Table	0	0	0	0	1	0	1
Pens	0	0	0	0	0	0	3
Scissors	0	0	0	0	0	0	1
Clock	0	0	0	0	0	0	1
Bucket with lid	4	0	1	1	1	2	2
Soap Wash hands	0	2		0	0	0	1
Small bowl	0	0	2	0	0	4	1
Hand/paper towel	0	0		0	0	4	2
Water jug & lid	0	0	0	1	0	0	2
Plastic Cups	4	10	2	4	0	6	10
Metal spoons	0	6	0	0	0	10	2
Teaspoons/medicine cup	0	0	0	0	0	0	6
Thermometer	2	2	1	1	1	2	3
OTP Card- new admissions	enough		enough	Enough	50		100
OTP ration cards	enough		enough	Enough	50		100
Clear plastic envelops	enough		0	Enough	50	13	100

Food Supplies (RUTF): Respondents were asked to indicate where they get the food supplies from. The responses showed that VALID and the DHMT provide the supplies. The supplies were taken to the main storage health facility (Chilenje). This was where most health facilities went to restock. Three health care staff (from 3 health facilities) reported that food supplies lasted for one month, 1 respondent said two weeks, and 1 said more than a month. The other did not know how long the food stock last.

Figure 6 (a) and (b) shows proportions of children provided with correct amounts of RUTF during their follow up periods. It indicates that no children in the weight range of 3.5-3.9 kg received correct amount of RUTF. The majority of the children who received the correct amount were in the age range of 5.5-6.9 kg and 7.0-8.4 kg. The proportions of children receiving correct amounts varied from 0.2% in the weight ranges of 9.5-10.4 kg to 16.7% in the weight ranges of 7.0-8.4 kg. Figure 7 (a) and (b), further shows that none of the weight categories of children got the correct average amount of RUTF.

Figure 6a: Proportions of Children Provided with Correct Amounts of RUTF

Figure 7b: Proportions of Children Provided with Correct Amounts of RUTF

Figure 8a: Average Amounts of RUTF given per Child per Weight Range

Figure 9b: Average Amounts of RUTF given per Child per Weight Range

Health care staff were observed on how they give RUTF. A total of 13 health care staff were observed and of these 76.9% gave the correct amount of RUTF to children while 23.1 % did not give the correct amount according to the distributing table used in health facilities.

Several challenges on food supplies were listed by health care staff. It was predominantly mentioned that there are shortages of sachets when accounting for them. They also stated that stocks run out quickly especially for health facilities in high density areas. A health worker was quoted saying

“....due to wider coverage of the population in the catchment area, stocks run out....”

They further indicated that supplies are sometimes not delivered on time. They had this to say;

“..... it takes time for the supplies to be brought to the centre”

Some health workers complained that there was inadequate storage space in some health facilities. For instance, one said that;

”..... Storage space for RUTF is not enough to stock required amounts”

Logistics: A question was asked to know the furthest distance the health care staff cover to get to their screening site or to carry out follow ups. The furthest distance mentioned was about 2-3 km while the shortest distance was operations within the facility. All of them indicated that they walk to sites. One staff indicated that they book a vehicle.

Health care staff cited the following challenges; lack of transport, incentives for volunteers and delay in delivering of supplies. When asked as to how they thought the problem could be solved the staff suggested that the district needed to find a way of addressing the problems especially transport.

Staffing: When asked how many people work in the OTP, the health care staff gave different numbers. One said that they usually have 2 staff and 2 community volunteers every week and another said 2 nurses and 5 volunteers but they were joined by a new nutritionist. The other two said that they usually work 3 and 6 respectively. The health care staff also gave varying average numbers of SAM patients that are admitted and seen per day (Table 18).

Table 18: Average Number and Admission per OTP Day

Health Facility	Admissions Per OTP Day	Average Number seen per OTP Day	No. Of staff	Ratio
Chelstone	0-1	6-10	4	2:1
George		15	4	4:1
Mtendere	3 – 5	28	3	7:1
Chipata		25-30	4	7:1
Chawama	7*	20-30	3	8:1
Kanyama		30	6	5:1

*During peak period 10 and other time 5

Several challenges were raised regarding staffing. The most commonly mentioned were that non availability of trained staff during some OTP session as a health care staff said;

“..... sometimes the trained staff is out for a workshop or off duty”

Others felt there was inadequate trained staff in the program and inadequate staffing as was indicated in the following statement;

“..... inadequate staff sometimes I am just alone”

5.7 Knowledge of Health personnel

This section gives results on the knowledge of health care staff in managing the severely malnourished children. Table 19 shows the frequencies of the knowledge and practices variables

Knowledge on Importance of CTC Program: Responses from all the 21 health care staff who completed the self administered questionnaire perceived that the CTC program was important. Table 19 shows their responses confirming their perception with regard to empowers the community (81%), increases program ownership (33.3%), increases program coverage (38.1%), and strengthening case finding, referral, follow up and monitoring of activities respectively (85.7%).

Table 19a: Frequency Table for Knowledge and Practices

Variable	Freq	%	Variable	Freq	%		
1. Importance of CTC Program							
a. Empowers the community	Yes	17	81.0	b. increases program ownership	Yes	7	33.3
	No	4	19.0		No	14	66.7
c. Increases program coverage	Yes	8	38.1	d. Strengthens case finding, referral, follow up and monitoring of activities	Yes	18	85.7
	No	13	61.9		No	3	14.3
2. Core Operating Principals							
Easy access	Yes	12	57.1	Increased coverage	Yes	13	61.9
	No	9	42.9		No	8	38.1
Timeliness	Yes	8	38.1	Sectorial integration	Yes	9	42.9
	No	13	61.9		No	12	57.1
Capacity Building	Yes	16	76.2				
	No	5	23.8				
3. CTC Components							
community mobilisation	Yes	18	85.7	Outpatient Therapeutic Program	Yes	19	90.5
	No	3	14.3		No	2	9.50
Inpatient Facility (Stabilisation centres)	Yes	7	33.3	Supplementary Feeding Program	Yes	18	85.7
	No	14	66.7		No	3	14.3
Local food production	Yes	6	28.6				
	No	15	71.4				
4. Child Referral							
Self referral	Yes	3	14.3	Mother to mother referral	Yes	6	28.6
	No	18	85.7		No	15	71.4
Referral by community based providers or volunteers	Yes	20	95.2	Referral by health facility or other nutritional programs	Yes	20	95.2
	No	1	4.8		No	1	4.80
5. Admission Criteria							
a) OTP Criteria							
Bilateral oedema (+ or ++) without complications	Yes	19	90.5	MUAC <11cm	Yes	18	85.7
	No	2	9.50		No	3	14.3
Weight for height,3SD	Yes	8	38.1	Visible severe wasting	Yes	13	61.9
	No	13	61.9		No	8	38.1
b) Inpatient Program							
Oedema+++	Yes	17	81.0	MUAC <11cm with complications	Yes	16	76.2
	No	4	19.0		No	5	23.8
W/H Z-score<3SD with complications	Yes	9	42.9	Visible severe wasting with complication	Yes	10	47.6
	No	12	57.1		No	11	52.4
Children<6 months are unable to breastfeed or W/H<3	Yes	5	23.8				
	No	16	76.2				
6. Conducting Appetite test							
to be conducted in a quiet place	Yes	6	28.6	Health worker should first explain to caregivers the purpose of the test and how it will be conducted	Yes	20	95.2
	No	15	71.4		No	1	4.8
the caregiver should first wash hands	Yes	20	95.2	caregiver sits comfortably with baby on laps and offers the RUTF	Yes	16	76.2
	No	1	4.80		No	5	23.8
Caregiver offers RUTF while encouraging the child to eat	Yes	15	71.4	Child should be offered plenty of water	Yes	18	85.7
	No	6	28.6		No	3	14.3
Amount take should be measured when the child is through with eating	Yes	13	61.9				
	No	8	38.1				
7. Importance of Appetite test							
it is an important criteria for admission	Yes	10	47.6	It indicates the child's condition	Yes	12	57.1
	No	11	52.4		No	9	42.9
to see if the child can be admitted to OTP	Yes	7	33.3	It helps to know if the child's condition is improving since it is done weekly	Yes	15	71.4
	No	14	66.7		No	6	28.6

n=21, W/H=Weight for height

The knowledge on importance of CTC program was further measured using a scale of 4 which was developed from the four listed responses. The total score was the sum total of all yes responses. Out of 21 respondents, 6 (28.9%) scored 4, (14.3%) scored 3, 5 (23.8%) scored 2 and 7 (33.3%) scored only 1. Importance of CTC was also analysed with 3 key social demographic variables of age, sex, education and years of experience. Table 20 show that there was a significant association between the level of education and the knowledge on CTC.

Similarly all the respondents interviewed from using the in-depth questionnaire perceived the CTC program as important. They cited several reasons their perception which were different but indirectly linked to the self administered respondents. The program was viewed as important due to its role in reducing child mortality among the severely malnourished children, curing malnutrition, restoring health of children and providing additional feeds to children of families who are food insecure.

Health care staff understood that a CTC program was one of the child survival program which aims at reducing mortality especially among the severely malnourished children. Some of them had this to say,

*“.....If many children are not monitored you can lose them (die).
You have to see to it that their life is back to normal....”*

Other health care staff perceived the benefits of the program in its role of reducing malnutrition which according to some of them it is achieved through health education.

Some of them consider the OTP as a program that helps children to quickly gain weight (catch up growth) in line with case monitoring in self administered respondents (SAR). Quick weight recovery among the HIV positive children further mentioned by several staff. For instance one said this;

“....it has helped a lot of babies to pick up as you have seen that mother with 3 babies which were all malnourished has received help and this time all the babies are fine and children recovered), it helps children on ART to pick up and some mothers do not have time to cook for their children...”

Reduction in case referrals was too cited by 4 staff. me further indicated that it decongest the stabilization centres (in this case UTH) if children are treated in the OTP. Empowering the community was cited in form of capacity building. Some felt that the OTP helps to increase knowledge of staff on the CTC program through various and orientations conducted and work experience. One was quoted saying,

“...help in children's survival, increases knowledge to the care takers of every kind, helps people to prevent malnutrition by health education provided...”

Health care staff felt that the OTP program provides additional foods to children from families that were food insecure and this helps to maintain the weights of children, for instance one said;

“...It supports families with children who are undernourished by providing food...”

Other reasons cited were that the program helps to make volunteers popular as they are seen like nurses in the community (program ownership), it reduces workload on mothers due to readymade food and there is sectoral integration in the program.

Core Operating Principles: Knowledge of health care staff on the core operating principles of CTC program varied according to the principle. Table 19a shows their responses with easy access being known by 57.1%, increased coverage (61.9%), timeliness (38.1%), sectoral integration (42.9%), and capacity building (76.2%). To further measure knowledge on the operating principles of the CTC program a scale of 5 was developed based on the core principals. Of the 21 respondents, 23.8% scored 5, 9.5% scored 4, 23.8% scored 3, and 9.5% scored 2, 28.6% scored 1 and 4.8% scored 0.

CTC Components: Participants were able to identify the components of the CTC program. Of the five components of the CTC program, the OTP (90.5%) was the most recognised among the health care staff followed by community mobilisation (85.7%) and supplementary feeding (85.7%). Inpatient care was recognised by 33.3% while Local food production was least

recognised (28.6%). Table 20 shows that 9.5% were able to list all the CTC components. Although there seemed to be good knowledge on the CTC components among the SAR, this was different with the in-depth respondents (IDR). None of the respondents mentioned the correct number of CTC program components. However, two of them mentioned that there were 4 components while the remaining had different numbers. Of the eight in-depth respondents one cited at least 3 correct components while another respondent cited 2 and one gave 1 correct one. Some respondents mentioned some components indirectly such as activities that are carried out in each component such as the cooking demonstrations and referring patients to UTH. The rest of the respondents had wrong understanding of the CTC components. 2 respondents mentioned that they did not know the components and as a result did not cite anything.

Child Referral: Most of the SAR were able to list referral by community based providers or volunteers (95.2%) and by health facility or other nutritional programs (95.2%) as ways they refer children to OTP. Twenty eight percent and 14.3% identified mother to mother and self referral respectively. Table 20 shows that 23.8% of staff were able to identify all the components. Similarly referral by facility was the commonly known by the IDR (6). Only 1 indicated children being referred by the community based providers. Another mentioned mother to mother referral. None of the participants mentioned staff referral or other nutritional programs.

Admission Criteria: All the health care staff who responded were at least aware that there was a criterion to use to admit children to the program. Table 19a shows that 19 (90.5%) SAR respondents identified bilateral oedema plus one and two without complications, 18 (85.7%) identified MUAC of less than 11cm, 8 (38.1%) weight for height $-3SD$ and 13 (61.9%) visible severe wasting for OTP. As for inpatient criteria, 17 (81%) identified bilateral oedema plus three, 16 (76.2%) MUAC less than 11cm with complications, 10 (47.6%) visible severe wasting with complications, 9 (42.9%) weight for height $<3SD$ with complications and 5 (23.8%) unable to breastfeed or $W/H <3 SD$ for children below 6 months. Table 20 further highlights that 23.8% and 14.3% of staff were able to list all criteria for OTP and inpatient respectively. Regarding IDR almost all of them mentioned MUAC less than 11cm and oedema plus 1 and 2 as criteria. Some cited severe wasting and another 2 cited appetite in addition to above. A few mentioned that both MUAC less than 11cm and oedema plus 1 and 2 could not be accompanied by

complications. One of them also indicated that they admit children discharged from inpatient. One was very specific to say that children 6-11 months admitted to OTP should have a height of greater than 65 cm. Another respondent said that they admit children whose arm circumference will be green or yellow. Concerning referring children to inpatient, the majority of respondents indicated that they refer children to inpatient when they have oedema plus 3, Oedema plus 1 and 2 with complications and MUAC less than 11cm with complications. Severe complications were explained using conditions such as children with dehydration, swollen body and those not responding to treatment with food. Some respondents mentioned no appetite as an indicator for inpatient. One of them cited MUAC which is red. Both the SAR and IDR had good information on admission criteria.

Medical Management: as routine medical management of children at admission health care staff are expected to provide some drugs. The majority of respondents indicated that they give antibiotics and anti-malaria, folic acid, and mebendazole. Three of them further specified what is given on the first visit and second visit. However, there were some mixed statements with a few staff who indicated that antibiotic is given to children who are sick. Vitamin A supplementation was cited by five respondents but only one of them further explained that it is only given to children who have no oedema. Two of them also said they give multivitamins. In addition, four staff indicated they check for the immunisation status. No respondent cited that they check for measles. Giving anti-malaria drugs was cited by seven respondents although others indicated that it's being given to children with fever. Some of the staff indicated that they probe further for T.B and ART treatments and caretakers are referred for VCT.

Appetite test: Twenty (95.2%) out of 21 health care staff who responded to the SA indicated that the appetite test is conducted on all the children admitted to the OPT. Table 19a highlights the responses that were given. Of the 21 respondents, 95.2% knew that health workers needed to explain to mothers/caregivers the purpose of the test and that mothers/caregivers need to first wash hands before giving the RUTF to the child, 85.7% indicated that the child should be offered plenty of water while taking the RUTF, 76.2% indicated that caregiver need to sit comfortably with baby on laps and offers the RUTF, 71.4% indicated that caregiver offers RUTF while encouraging the child to eat and 61.9% indicated that the amount taken should be measured

when the child is through with eating. The least known step was that an appetite test needs to be conducted in a quiet place. Knowledge on appetite test was further measured using a scale of 7 which are the key steps in doing an appetite test. Of the 21 health care staff that responded, 14.3% cited all seven messages, 33.3% scored 6, 28.6% scored 5, 9.5% scored 4 and 3, and 4.8% scored 1. Furthermore, 71.4% indicated that it was important to carry out an appetite test as it helps to know if the child's condition is improving since it is conducted weekly and 57.1% reported that it indicates the child's condition. In addition, 47.6% indicated that appetite test is an important criterion for admission and 33.3% indicated that it helps to see if the child can be admitted to OTP. Table 20 further shows that 9.5% were able to recognise all the elements of the importance of appetite test.

The IDR all agreed that they carry out appetite tests in their health care facilities to children. However, knowledge on the steps of appetite test was poor in this group. Using client based sorting of responses two of the respondents mentioned two points out of the expected seven points and four cited one point each. The other staff members mentioned any key point in their explanations. In addition to the preset categories of steps of appetite test, health care staff elaborated further why appetite test should be done. They felt that appetite test helps to avoid wastage in terms of RUTF by giving only children who are able to eat. This was figured out from the following quote,

“... to know if the child is going to eat or food will go to waste”, “...and those who do not eat we advice to give favourite food and give them a reduced amount of RUTF...”

Other health care staff also felt that appetite test is also meant to help mother/caretakers who do not know how to feed their children by providing them with food that is already nutritionally sound and by making them to have time to feed their children. This was deduced from the following quote;

“...because some mothers or caretakers do not know how to give their children in a right way and others have got no patience with their children”, “to know whether the mother or caregiver is just lazy to care for the baby,

the mother may be frustrated so we help mother to give bit by bit.....”

It seems that health care staff feel that some mothers do not say the truth about children’s appetite. An element of health care staff trying to proof whether what the mother is saying is true about the child’s appetite was brought up. The quote,

“.....some mothers say that the child does not eat but it eats...”

Table 19b: Frequency Table for Knowledge and Practices

Variable	Freq	%	Variable	Freq	%		
8. Actions on Failure to Gain Weight							
If below admission weight on week 3 refer to outreach worker	Yes	5	23.8	If no weight gain by week 5 refer to stabilisation centre (inpatient)	Yes	15	71.4
	No	16	76.2		No	6	28.6
If no adequate weight gain by week 8 investigate (home visit &/or laboratory)	Yes	14	66.7				
	No	7	33.3				
9. OTP Key messages							
What RUTF is	Yes	13	61.9	Feeding children with RUTF	Yes	17	81.0
	No	8	38.1		No	4	19.0
Hygiene	Yes	18	85.7	Breastfeeding during illness	Yes	17	81.0
	No	3	14.3		No	4	19.0
Caring for sick children	Yes	17	81.0	Feeding sick children	Yes	16	76.2
	No	4	19.0		No	5	23.8
10. Actions During Follow up							
Link patients with community workers	Yes	9	42.9	conduct home visits (Caregivers are helped on child feeding when necessary)	Yes	20	95.2
	No	12	57.1		No	1	4.8
Refer patients when necessary	Yes	17	81.0	Give feedback to health facilities	Yes	18	85.7
	No	4	19.0		No	3	14.3
11. Discharge from OTP							
Cured	Yes	21	100.0	Defaulted (Absent for 3 consecutive weeks)	Yes	9	42.9
	No	0	0		No	12	57.1
Died (died during the time registered in OTP)				Transferred to inpatient care (condition has deteriorated)	Yes	6	28.6
Yes		12	57.1		No	15	71.4
No		9	42.9				
I. Cure criteria.							
>80% weight for height and no oedema for two consecutive weighing	Yes	11	52.4	No oedema for 2 consecutive weeks and clinically well	Yes	20	95.2
	No	10	47.6		No	1	4.80
two months in OTP and MUAC >11.0cm and 15% weight gain and clinically well	Yes	14	66.7				
	No	7	33.3				
Frequency of Follow Up by Health Care staff							
once a week		13	61.9				
No		1	4.80				
Daily		1	4.80				
Patient defaults		1	4.80				
2 times a week		2	9.50				
3 times a week		1	4.80				
2 times a month		2	9.50				

Weight gain: All the 21 respondents agreed that there are children fail to gain weight during the time they are admitted in the OTP. Table 18b shows that fifteen (71.4%) out of 21 respondents reported that if no weight gain by week five they refer the child to stabilisation

centre (inpatient), 14 (66.7%) reported that if no adequate weight gain by week eight they carry out an investigation (home visit &/or laboratory), and five (23.8%) reported that if the child's weight is below admission weight on week three they refer the child to outreach worker. Table 20 shows that 19% of staff recognised all the key actions to be taken when a child fails to gain weight.

Equally all IDR except those from Chelstone health facility indicated that there are children who fail to gain weight in their facilities. Almost all the health care staff said that children not gaining weight need further investigations but none of them were able to indicate the actual period that should take before investigations. The CTC field manual recommends eight weeks without adequate weight gain. Further investigation was brought up in such quotes as,

“...we do a diagnostic counselling and testing and also refer them to test for T.B...”

Investigating the social and economic status of the caretaker was also brought up in the discussion in the following way,

“...counsel the caretaker, find out her problems at home and economic problems as well then if all is okay, then advise caretaker for blood test for child....”

Health and Nutrition Education: Both respondents from SAR and IDR reported that health education is given to caregivers in their health facilities. Table 19b highlights the messages health care staff teach mothers/caregivers. It shows that hygiene was the most taught message (85.7%) by health care staff while explaining the meaning of RUTF was the least considered (61.9%). To further measure knowledge on the key messages that health care staff are expected to teach mothers/caregivers, a scale of six was developed using the number of key messages, hence by adding up all the yes responses for each individual gave the total individual score. Of the 21 respondents, 52.4% cited all six, 9.5% cited five, 14.3% cited four, 14.3% cited three, 4.8% cited one and zero respectively.

In IDR hygiene and child feeding are the well known and commonly taught key messages. However, none of them mentioned having taught breastfeeding during illness and what RUTF is. Although feeding sick children was not mentioned as such it was captured in statements made by health care staff such as the following,

“...we teach them about hygiene, importance of feeding the with plumpy nut before other foods and encouraging them to ing the baby to the clinic when it is sick...”

This is because most malnourished children are sick children by virtue of being malnourished and acquire infections easily.

Caring of sick children was mentioned by 3 health care staff. Some other messages mentioned in addition to preset messages were the importance of bonding between her and child and therefore they teach mothers to love their children. It was quoted,

“...some children do not eat because their mothers do not ave time for their children therefore we teach them to love their children so that they are motivated to eat.....”

Issues of growth monitoring and immunisation are also taught in some health facilities.

Most health care staff felt that health education is important to prevent malnutrition and reduce malnutrition levels. Others also indicated that it was an important way of imparting knowledge to mothers/caretakers. One of them explained that it is important to ensure that mothers continue to take care of their children even after discharge from One of the interesting issues raised was that of health and nutrition education being a good way of developing children to their full human potential so that they can contribute to the development of the economy. This thought was expressed in the following narrative,

“...So that mothers get used to important things and to know that they need to keep children well because they will be our future leaders...”

Follow Up of Patients: Ninety five percent of SAR reported that they do follow up patients while 4.8% said they do not. Table 19b highlights the responses that were given by health care staff showing that the majority (61.9%) indicated that follow ups are done once in a week in their health facilities. In addition, 95.2% reported that they provide help to caregivers on child feeding when necessary and 85.7% reported that they provide feedback to health facilities. Another 81 % reported that they refer patients when necessary and only 42.9% recognised the need to link patients with community workers. Using a scale of 4, knowledge on follow up action that were expected to be carried out during follow up measured. Thirty eight percent of health care staff scored 4 and 3 respectively, 19% scored 2 and 4.8% scored 0.

Unlike the SAR, the IDR all reported that they follow up on patients in their health facilities (weekly) and as part of outreach program. Concerning how often they conduct outreach follow ups Chawama, Chipata, and Chelstone reported that they do it weekly, Goerge and Mtendere do follow ups monthly and Kanyama 2 times in a month. Several actions being carried out during follow up were listed. Conducting home visits was the cited follow up action. The majority (5) of IDR indicated that follow up actions are carried out on defaulters. However, a few do follow up on children that are discharged to ensure that there is no relapse,

“...Advice caregivers on how to continue giving balance fo to clients after discharge from the program...”

Activities cited as being carried out during home visits were giving health education to mothers/caretakers on messages such as child feeding, of RUTF, growth monitoring, child care and hygiene and carrying out anthropometric measurements and investigations.

In some health facilities outreach follow up in the OTP is a responsibility of volunteers as a health worker was quoted saying,

“...I am not sure, I have not done it myself. It is mostly volunteers who do it...”

However, this might have meant home visits. In addition to the above, follow up is also carried out through weekly visits by mothers to health facilities.

All the health facilities (IDR) except for Chelstone and George reported that there are people who fail to access the OTP services. They cited those stay very far, prostitutes, orphans, people with myths and those ignorant about the program and mothers wanting to maintain status quo. The health care staff were quoted saying,

“...middle class people (others slightly rich people) because of stigma do not want to come to the clinic...”

The main reasons cited for not accessing the program were lack of knowledge on importance of the program, long distance to the health facility and stigma as derived from the following narrative;

“...Some do not know that there is a program of that kind, others are just lazy and others cannot reach the facility (old people)” ” and stigma, quoted *“Mothers feel shy to bring the babies because they feel they could be laughed at and some stay very far...”*.

Other health care staff felt that some mothers were just lazy to take their children to the health facility as illustrated in the quote above.

Discharging the Patient: All the SAR (100%) were able to identify cured as a key discharge criteria. A further 57.1% reported death during the time a child is registered in OTP and 42.9% reported defaulting. Transferring patients to inpatient care was the least recognised (28.6%). Using a scale of 4, 14.3% knew all the four criteria, 33.3% knew 3, 19.0 % knew 2 and 33.3% knew 1.

Table 20: Frequency of Knowledge Composites

Knowledge composite	Frequency	%
Importance of CTC	6	28.6
Core operating principles	5	23.8
Child referral	2	9.50
CTC components	2	9.50
OTP criteria	5	23.8
Inpatient criteria	3	14.3
Appetite test	3	14.3
Importance of appetite test	2	9.50
Failure to gain weight	4	19.0
OTP key messages	11	52.4
actions during follow up	8	38.1
discharge from OTP	3	14.3
cure criteria	9	42.9

To determine whether respondents knew what cure meant as a criterion for discharge, a question was asked to find out how they decide that a patient is cured and is ready for discharge from OTP. Of the 21 respondents, 95.2% reported no oedema for 2 consecutive weeks and clinically well, 66.7% reported two months in OTP, MUAC >11.0 cm, 15% weight gain and clinically well and 52.4% reported >80% weight for height and no oedema for two consecutive weeks. Table 20 shows that 42.9% of the staff knew all the elements of cure.

The IDR were also able to recognise almost all the 3 cure criteria although described in simpler ways. They described the 80% W/H as quoted,

“Adequate weight gain using a paper for standard deviation or weight table”.

The majority also indicated that there should be no oedema and MUAC should be above 11 cm and the child should be well. Two respondents also indicated that the child has stayed in the program for 2 months while taking into consideration other factors as well

Deaths: When asked what they do when a child who is admitted to the program dies, the majority said that they do not do anything. A few explained that they do some investigation on what killed the child. One further said that they discharge the child from the OTP.

RUTF: so far only 2 types have been reported (Those that come in sachets and bottles). However, bottled RUTF was reported to be quite uncommon and was only used in 2005. Health

facilities store RUTF in various places such as store m (Chelstone, Chawama), offices (George, Chipata) and pharmacy (Mtendere).

When asked what RUTF is, the majority (5 out of 8) said it is 'ready to use therapeutic food', 2 of them said it was a peanut but with special quality another said it was a mixture of ingredients,

"...It has skimmed milk, oil etc because a mother can't give one by one of milk, oil and other ingredients. It is a peanut..."

According to health care staff, RUTF is imported from then VALID and DHMT distribute the RUTF through the Chilenge clinic.

All health care staff indicated that health facilities sometimes run out of RUTF except for Chelstone. Others indicated that this happens once in a year (Chawama, Mtendere), and George indicated one week per months. Staff from Chipata health facility had different opinion as they indicated once and twice in a year. Others mentioned that it rarely happens. They were able to remember the periods when they run out of RUTF. This could be seen from the following quote,

"....about once a year e.g. this year for 2 weeks in September we did not have RUTF..."

Health care staff were also asked what they do when they run out of RUTF. The most common action reported was to ask mothers/caretakers to use whatever they have at home to feed the child. Sometimes supplementary feeds are provided if available in the health facility. Rationing of RUTF and cooking demonstrations were also mentioned and observed in some health facilities.

Intersectoral Collaboration: All health care staff interviewed indicated that it is good for their health facility to work with other organisations. The given for their opinion were that other organisations provide food supplements, training, provide RUTF, and social welfare support to those who need it. Several organisations were cited as their collaborating institutions. These were CIRDZ, WFP, CONTESA, Medical stores, Child Advocacy International (CAI), JICA, and Salvation Army (Table 21).

Table 21: Collaborating Organisations

Health facility	Organisation	Areas of Operation
Chawama	- CIRDZ	- Provide ARVs
	- CONTESA	- Support in feeding the moderately & severely malnourished and vulnerable children
	- WFP	- Intends to start supporting on supplementary feeding
Chelstone	- VALID	- Provide RUTF
	- Medical Stores	-
Chipata	- Child Advocacy International (CAI)	- Provide soya (HEPS)
	- VALID	- Provide RUTF
	- JICA	- Provide community basket fund initiative
	- CIRDZ	- HIV/AIDS Program
George	- Salvation Army	-
Kanyama	- None	- None
Mtendere	- VALID	- Provide RUTF

Most of the volunteers were found through the NHC. In most facilities information was passed through notices with a condition that they required people who could read and write. Other health facilities got people who were already volunteers in other sections of health facilities such as the T.B. Regarding how often they receive officers from the DHMT and partners for supervisory visits, health care staff had varying opinions. Some are visited weekly, others twice a month or monthly.

5.8 Practices of health personnel

This section gives results on the practices of health staff in managing the severely malnourished children.

Health care staff were observed on how they conduct the OTP session specifically with new admissions. Measuring of oedema was observed in 14 of 16 health care staff. All the 16 health care staff were observed in MUAC and weight measurements while 7 were observed on taking height measurement.

Oedema: Health care staff are expected to correctly examine children for oedema which is one of the key admission criteria in OTP. The data showed that most of the staff knew how to check for oedema except that very few (7.1%) repeated the thumb placing exercise on the lower leg. A further 25% did not examine using the recommended steps but just used visual check.

MUAC: A total of 16 health care staff were observed for MUAC measurements. Of these 11 (68.8%) made an effort to find the half way point of the arm before placing the tape on the arm. A further 9 (56.3%) ensured that the arm was hanging down the side of the body and was relaxed. The majority of the staff (93.8%) took measurements at a point between the shoulder and the tip of elbow.

Weight: All the 16 health care staff observed ensured that children were weighted with minimum clothes. Adjusting of the scale to 0 was observed in 13 health care staff. Of these 61.5% adjusted the scale before weighing a child. Further observations were made to see how children are put on the scale, 93.8% of the 16 health care staff ensured that children were hanging freely (that is, not touching anything) and 56.3% ensured that the scale was put at eye level. All the 16 staff recorded the weight measurements to the nearest 0.1 kg.

Height: Height measurements are important in the OTP especially for children between 6-11 months who need to be admitted with MUAC only if they had a height of >65cm. Observations were done in 7 staff. All of them ensured that the measuring board was placed on a hard flat surface and shoes and/or huts were removed from the child before weighting. 57.1% ensured that children's feet were flat and together in the centre and against the back and another 14.3% put the children's legs straight and heels against the board. All staff measured to the nearest 0.1 cm.

Appetite test: Table 22 highlights the results of the appetite test. Half (8) of the health care staff out of 16 conducted an appetite test. However, none of them conducted it in a quiet place. Two (25%) out of eight health care staff did explain to the caretakers the purpose of the appetite test and the process of conducting it before carrying out the exercise. Further 5 (62.5%) reminded the caretakers to wash their hands, eight (100%) helped Caretakers to offer RUTF at the same time encourages the child to eat, none of the staff offered water to children while eating RUTF and 1 (12.5%) measured the amount of RUTF the child took.

Table 22: Appetite Test

Steps of Appetite Test	Total Observed	Yes	No
		No.(%)	No.(%)
Conducted in a quiet place	8	0(0)	8(100)
Explained to the care taker the purpose of the test and how it is going to be conducted.	8	2 (25)	6 (75)
Care taker washed her hands	8	5 (62.5)	3 (37.5)
Caretaker offers the RUTF and at the same time encourages the child to eat	8	8 (100)	
Child was offered plenty of water	8	0	8(100.0)
Amount taken was measured		1 (12.5)	7 (87.5)

N=8 observed staff

Using a scale of 6, 1(12.5%) out of 8 health care staff that were observed for appetite test scored 4, another 1 (12.5%) scored 3, 3 (37.5%) scored 2 and 3 (37.5%) scored 1.

Health care staff were also observed on how they give RUTF. A total of 13 health care staff were observed and of these 76.9% give the correct amount of RUTF to children while 23.1% did not give the correct amount according to the distributing table used in health facilities.

Health education: All clients especially at admission are expected to be given health education on key messages that are provided in the OTP. Fourteen (87.5%) out of 16 health care staff were observed for health education to mothers/caretakers. Of these, 9 (64.3%) offered some health education while 35.7% did not. Of the 9 that gave health education, 1 (6.3%) explained what RUTF is, 7 (77.8%) discussed how to feed children with RUTF, (88.9%) discussed hygiene practices, 4(44.4%) discussed breastfeeding during illness, 7 (77.8%) discussed care of sick children and 4 (44.4%) discussed feeding of sick children (Table 23).

Table 23: Proportions of Staff Giving Health Education

Health Education points	Total Observed	Yes	No
		No.(%)	No.(%)
What is RUTF	9	1 (11.1)	8 (88.9)
Feeding children with RUTF	9	7 (77.8)	2 (22.2)
Hygiene	9	8 (88.9)	1 (11.1)
Breastfeeding during illness	9	4 (44.4)	5 (55.6)
Caring for sick children	9	7 (77.8)	2 (22.2)
Feeding sick children	9	4 (44.4)	5 (55.6%)

Note: n=9 observed staff

To further assess the practices carried out by health care staff a scale of 6 was used. Twenty two (22.2%) gave five messages, 22.2% scored 4, 44.4% scored 3 and 11.1% scored 1.

Constraints Raised by Health Care Staff

RUTF: Staff demanding for RUTF was reported to be one of the problems. Some health care staff asks for RUTF even if they do not have children admitted to the program as indicated from the following narrative;

“some members of staff want also to benefit from the supplies”.

Such kind of demands makes health care staff to have shortages when accounting for supplies for OTP clinic sessions.

Some mothers/caretakers who do not meet admission criteria demand to be provided with RUTF. Some of these could be suspected cases from the community whose anthropometric measurements do not meet admission criteria at the health centre. Others could be self referrals who just want to get food for their children. This was asserted by the health care providers;

“...People who are not enrolled (do not qualify) in the program also want to be getting RUTF...”

Health care providers had this view that even those admitted in the program still want to get the same amount as other clients because they probably did not understand that the amount is determined by weight of the child. This resulted in a lot of arguments with health care staff and mothers. This is supported in the following narrative;

“Some would want more (RUTF) like the others when child does not apply (qualify) for that number”.

An inadequate supply of RUTF is a problem that is faced by some health facilities. Shortage of it leads to staff rationing RUTF and mother/caretakers leaving without RUTF. In addition to RUTF some health care staff indicated that they lack supplementary feeds especially for children discharged from OTP. This outcry was as a result of some children being brought back with relapses as one health worker had this to say;

“There are a lot of babies who need to be provided with something to support them. There is need to provide enough food so that those who are discharged also get to lessen relapses”.

Cooking demonstrations was another activity indicated lacking in some health facilities.

Staffing: Several constraints were brought out regarding staff welfare. For instance many of them complained of long working hours for volunteers. The initial arrangement was for them to work for a certain number of hours but these were exceeded. Despite working longer hours than agreed the volunteers were not given any incentives such as allowances and/or refreshments. One volunteer said this;

“working hours exceeds to more than 2 hours as a volunteer we were told to work for 2 hours so any extra hour an allowance must be given”.

Initially a small allowance was being given which was not honoured.

Shortage of staff was also identified by most staff. This included both the nurses and volunteers. This shortage was related to increased number of clients per OTP session. One staff had this to say;

“...People working in the program are few. There are too many clients...”

Working in the CTC program does not lead to staff (nurses, environmental officers, nutritionist) earning any allowances compared to other programs. This makes a lot of staff not to work in the program. This was quoted from one staff,

“...other staff refuse to work in the OTP because of no allowances...”

Through probing it was deduced that some program pay staff allowances every time they work such as those who do HIV/AIDS counselling.

Staff (especially volunteers) reported lack of utilities especially during rainy season. They are not provided with items such as raincoat, umbrellas, and gum boats to allow them to get to the health facility easily and even to conduct follow ups especially home visit. Some staff felt that they needed to be provided with transport even in the form of bicycles to ease their movements.

Program Implementation: It was indicated by one health care staff that there has been no complete evaluation of the program. Data may be collected but may not be compiled into a comprehensive report for other program officers to make reference to. Many health care staff expressed high default rate as one of the problem they were facing. They attributed this to wrong home addresses given to health care staff by the mothers/caregivers making it difficult to follow up when they do not show up at the clinic.

They explained that defaulting cause children not to take RUTF as required to help in the process of recovery. They further mentioned lack of transport for health care staff to carry out follow up activities

Some staff indicated that some of their clients travel Long distance to access the service making it difficult for them to attend the OTP services as required. They had this to say;

“...Some mothers they live far away from the clinic they cannot afford to be coming every week, let’s say kasisi...”

There were still some health care staff who felt that they did not have adequate information/knowledge on nutrition.

Infrastructure: Some health facilities do not have adequate infrastructure to operate effectively. Staff complained of loss of records due to too many programs taking place in one room. In addition space is also inadequate to operate well. Confidentiality was seen as a problem when counselling mothers/caretakers

Chapter 6: Discussion of Findings

6.1 Summary of Main Findings

The purpose of the study was to evaluate the performance of the OTP which provides service to malnourished children. Overall children admitted in the OTP program performed well (85.8%) using the stated five indicators (weight gain, length stay, recovery rate, default rate and death rate). The findings are similar to other studies that OTP prevents further illness and death among the severely malnourished children (Grobler, 2004; Collins, 2006). Nonetheless, the study showed contrasting differential health centre specific performance levels ranging from 73% for N'gombe to 100% for Matero Reference. The likely explanation of variation is high in the section for determinants of performance. Differential was also observed between the two project years with high performance seen in the first project year.

It is possible that biases may have influenced findings in each of the 5 factors that were used to measure performance. Of all possible biases it is likely that the selection bias had a least impact if present. It is the measurement biases if present that could have impacted on these findings. Weight measurements for instance have been used as an excellent measure of children's growth worldwide. However, accuracy can be compromised if health care staff taking measurements have not been well oriented to taking readings and if scales are not of good quality. The OTP uses mostly the Salter scale which is recommended by partners (FANTA, 2003) and are known to be accurate reading to the nearest 0.1 kg. Although mistakes arise from weight measurement these are usually evenly distributed overtime with same staff taking measurements. Reliability of scales is also affected by the frequency of service of machines. However, evaluating the measurement tools was not part of this study. Other measurements such as length of stay of the child in the program, recovery rate, default and death rate were less likely to present with errors as they were measured from the weekly follow up and not reported by caretakers. Default rates were not well investigated in the program therefore, what may be reported as high default could be some death, self referral to inpatient or migration of families. In this study default rate may have been over reported and probably death rates and transfers under reported. If default rates

could have been over reported it only means that the study underestimated the performance of children.

However in general selection bias may not be ignored given that there was none response rate of 3%. It is reasonable to believe that a non response rate of 3% is significantly small to influence these findings. This argument is further supported by the fact that the records of children not included in the study were from homogenous group of the same age range and the social economic characteristics did not differ from those whose records were included.

Regarding health care staff, consultation between respondents may have occurred especially that some of the volunteers could not read adequately. Observer bias may also have occurred during observations as some health care staff may have realised that they were being observed as they were carrying out activities.

6.2 Main Findings

In the next section we look at various components of performance in detail. Firstly we will discuss the determinants of performance; secondly the factors of performance, thirdly the food availability and adequacy, fourthly program logistics, knowledge and practices of health care staff and finally the study implications.

Determinants of Performance

Multivariate logistic regression revealed three major determinants of performance. It showed that source of admission of children (either referred from community, health facility or inpatient), appetite of the child at admission (either good, poor or none) and health facility is associated with performance of children. Source of admission of children seem to be one of the causes of poor performance (OR, 0.01, 95% CI 0.00-0.30). Performance of children may have varied depending on where children are referred from. In addition, health care seeking behaviour and child care is poor as high proportions (69.1%) of children admitted to OTP were referred from the health facilities. This appears reasonable in that most likely due to poor health care seeking behaviour children are presented to the health facility when they are very sick making the process of recovery slow. This may even be worse when they are referred from the community where health care may not yet have been initiated. If this assertion is true, it is

therefore not surprising to see that poor appetite and source of admission of a child are key determinants of performance. The high number of children referred from health facility to OTP may also indicate that case finding (both active case finding and self referral through community mobilisation) is not frequently done in the communities. Children are discovered to be malnourished when they are already very sick with illnesses such as diarrhoea and ARI that may be as a result of poor nutrition status of children. In addition poor appetite may be the result of poor liver and/or gut function due to severe malnutrition, infect or behavioural issue (Valid International, 2006)

Association of health facility with performance is also an important factor in terms of access to health services and also the quality of services that children receive. Quality may be affected by the orientation of staff, workload of staff, amounts of RUTF provided, logistics available, the level of staffing and health education given to mothers/caregivers. It can be concluded that in health facilities where services were not of good quality, the children were not likely to perform well. In this study very few children received adequate amount of RUTF. Most staff were oriented for only one day reflecting the quality of skills received. However, staffing levels seem to be within the CTC criteria of 10 patients per health worker (Table 10) but most of the time there is usually one health care staff to go through the procedures such as appetite test, quantifying and recording amount of RUTF given to mothers and counselling mothers while volunteers would help in anthropometric measurements and giving RUTF sachets with instructions from the health care staff. This makes the health care staff to be over worked. All the sites visited except for Kanyama had only one health care staff working in the CTC with several volunteers

The lack of association between breastfeeding and performance of the children in multivariate analysis was unexpected considering the important role that breastfeeding plays in child survival in reducing nutritional consequences, morbidity and mortality. However in univariate analysis the model showed a significant difference in the odds among children who breastfeed (OR 2.08; 95%CI 1.17-3.70). Lack of breastfeeding was a risk factor of poor performance (OR 0.48; 95%CI 0.27-0.85).The findings also show a very high rate of non adherence to feeding recommendations among children admitted to OTP despite the many Infant and Young Child

Feeding (IYCF) trainings that have taken place in Lusaka district. Zambia recommends that children should be exclusively breastfed for the first 6 months and thereafter other foods should be introduced while continuing to breastfeed up to 2 years or beyond. For HIV positive mothers two options are recommended which includes exclusive breastfeeding (MOH, 2007). Unlike the DHS (2003) which shows that 98% of children in Zambia are breastfed for sometime after birth, the breastfeeding rate among children admitted to OTP is very low. The low rate of breastfeeding may be an indication of spill over of messages of feeding options for mothers who may decide to use replacement without seeking help from trained personnel. This may also result from health workers passing on wrong messages due to inadequate knowledge and skills on infant feeding or non acceptability of infant feeding options.

Confusion due to many breastfeeding messages that have been passed on over the years cannot be ignored. Studies revealing that HIV can be passed on in breast milk in the 1990s lead to many changes in infant feeding. It was first indicated that HIV positive mothers should not breastfeed leading to formulation of many infant feeding options WHO/UNAIDS such as exclusive breastfeeding, replacement feeding, heat treating milk, wet nursing and milk banks. These and many other messages such as the reversing to 2 options have contributed to the mix up in the use of messages. High rate of non adherence to breastfeeding may also indicate lack of strong community mother support systems that allow mothers to help each other in infant feeding. However, studies have also reported low family income, low maternal age, prim parity and mothers returning to work (Mascarenhas et al, 2006 in: Chudasama et al, 2009), beliefs among mothers and health care staff and routine hospital practices (McDivitt et al, 1993) as some of the factors that may interrupt breastfeeding.

Breastfeeding has been known to reduce incidence of malnutrition, and diseases (Chantry, 2009; Lenore, 1989; Popkin, 1990; Howie, 1990; WHO, 2000) and mortality (Edmond, 2006; Black, 2008) if it is conducted in the right way. It is the only source of nutrition in the first 6 months of life while it continues to provide half or more of the child's nutrients from 6-12 months and about one third in 12-24 months (WHO/UNICEF, 2006), therefore absence of optimal infant feeding makes the children susceptible to malnutrition especially in poor setting such as the areas where OTP children came from. The high none breastfeeding rate among the children admitted to the OTP are factors worth to investigate. My study was only limited to

studying records of children that were admitted to OTP but did not extend to look at maternal factors affecting feeding of children in the OTP.

There was no association between age and performance, and support status and performance of children. This was an unanticipated result. The majority of children admitted are those in the age range of 12-23 months. Other studies have demonstrated that this is the age when malnutrition is most likely to occur (Shrimpton, 2006). During this period rapid growth is accompanied by poor quality and unsafe complimentary feeds. Failure of growth at this period of life has most detrimental effect. However, using the chi-square test, age is an important factor in determining the length of stay of the child in the OTP thus how long it takes to be cured (Table 16). Zeete, (n.d) defines appropriate care seeking as the need to take the child for treatment outside the home is recognised, that the care is not delayed, and that child is taken to an appropriate health facility or provider During the period under study, care was determined by the presence of a mother at admission who is likely to provide the needed care promptly. For instance it has been found that seeking prompt and appropriate care could reduce child deaths due to ARI by 20% (WHO, n.d In; Chandrashekar et al, 2006).

Despite the fact that age of children and distance which mothers travel to get to the health facilities were found not associated with performance in this study, the two factors have been found to be important determinants of nutritional status elsewhere. Distance for instance is usually associated with health seeking behaviour of individuals and has tended to affect how often families seek health care when needed (Arbor, 1990; Abbas, 1986). In this study distance did not seem to be an issue of concern in the regression analysis. However, using chi-square analysis distance was an important factor in determining recovery and death of children (Table 16).

Although some studies found that lack of education in mother, large family size of ≥ 4 , proximity to health facility and low income are risk factors for malnutrition (Asokumar And Enahoro, 1991, Mbagaya, 2005), no association was found between family size and performance of children in this study. However, the study did not collect information on mother education and income status. Nonetheless, the type of health facility that a family uses may be a proxy indicator

of their social economic status. In this case all the eleven health facilities studied seemed to cater mostly for the low income groups in terms of OTP services

There was no variation in the performance between health centres that cater for high density and medium density areas. This is because it is almost the same class of people who get services from the health facilities (either high or medium density placed). For instance the of children receiving OTP services at kamwala health centre (medium density) were from Misisi, John Laing, Kuku, Franc, Chibolya, Chawama and Kanyama. Very few were from within kamwala residential area. This indicates that the health facility was a good indicator of social economic status of people attending the OTP.

The findings of this study are in line with the proximate determinant conceptual framework (Figure 1) which indicates that malnutrition results from inadequate food intake, poor food utilisation in the body and disease which are also a result of food insecurity, poor health seeking behaviour, poor environment conditions, quality of health services and many other factors. Performance of children in this study was also associated with the food security and health seeking behaviour. Lack of breastfeeding denies the child's right to food and care received through the bond created between the mother and child breastfeeding. Late presentation of children to health care (in this case 56.6% of children- Table 12) depicts poor health care seeking behaviour and child care practices which worsen diseases. Both denial to food and worsened disease lead to malnutrition thus poor growth.

Factors of Performance

The program performance in terms of the five factors was not very different from the CTC set criteria. The children gained an average of 5.7 g per kg body weight per day (SD, 4.89) well over the CTC recommendation of >4 g per kg per day with 60% of children gaining above 4 g per kg per day. A similar outcome was reported for a project in Wollo, Ethiopia where children had an average weight gain of 4.4 g per kg per day (Collins, 2004). Grobler (2004) associates the rate of weight gain to amount of RUTF a child takes, absence of infections and positive care and feeding practices. Although the findings show that children may not be given adequate amounts

of RUTF (Figure 6), they also show that children are given medication (especially amoxicillin and anti-malaria drugs) immediately they are admitted to the OTP (Table 12) such that by week 3 of admission most children will have been recovered from most illness (Figure 3). This is a good behaviour practice contributing to good child performance.

More than 70% of children stay a recommended less than 60 days in the program with a mean stay of 48.04 days. This is far much less than the 81 average days of stay in the Wollo program (ibid). These achievements were met amidst many challenges that the OTP program was facing such as understaffing leading to workload burden among staff, shortage of transport to transport RUTF to various destinations and staff to carryout duties, inadequate drugs such as amoxicillin (LUDHMT, 2009.VALID, 2009) and shortages of RUTF. Such good outcomes coupled with such challenges indicate that children are provided with other foods at home in addition to RUTF, therefore a complement in terms of providing nutrients. In addition, in such a state the body has a crave for nutrients and thus utilises nutrients efficiently in such a way that an improvement in diet makes a big difference in child recovery (Miller, 1976).

The recovery rate in the study was 59% compared to the CTC recommended recovery rate of 75%. Using chi-square measurement, age was associated with length of stay and recovery rate of children. Children in the age range of 12-23 months were likely to stay the recommended period in the OTP ($P_v=0.02$) and recover from severe malnutrition ($P_v=0.04$). However, this was accompanied by high default rate of 31.1% against the recommended CTC criteria of 15% (MOH, 2008). The CTC recommendations associates default rate to acceptability of the programme by both health workers and clients. Accordingly to the CTC manual (Valid int., 2006), a default rate higher than the recommended 15% reflects poor access to the programme, inappropriate care/treatment or events such as migration. The children who defaulted meant they did not complete care as required for them to recover. If this is not checked may lead to a rise in mortality rates among children admitted to the OTP program thus fail to attain the MDG 4 which calls for reduction of mortality among children. Using chi-square method, association of key variables and distance revealed distance as an important factor in children defaulting and dying. Long distance was associated with high default and death rate. Other reasons from literature reveals caretakers default where RUTF is not always available, lack of awareness about

treatment length, caretaker falling sick, long waiting time at the OTP due to shortage of staff and wrong addresses provided such that children can't be easily followed up (LUDHMT, 2009;.VALID, 2009-Unpublished). High default may also be a result of unreported deaths and self transfer/referral of patients to stabilisation centre before the next OTP session. In the absence of a complete study on why caretakers default, it is difficult to know the real factors for high default rate. The default rate is also in line with the loss of 31.5% of children admitted to OTP (Figure 2) by week 3. This loss is most likely due to children who default early. It is also important to note here that the CTC indicators that are used in most literature are rural based while the program in Lusaka was urban based therefore interpretation of results should be done with caution as population densities and life styles are different.

Other factors of performance

Although the CTC program indicates weight for height as one of the criteria for admission in the OTP (Valid International, 2006, MOH, 2008), most health facilities do not take height measurements. This is supported by non availability of height boards in health facilities and the low number of children (1.1%) whose height measurements were taken during their admission period. It is also possible that children below 6 months are admitted even if they may be less than 65cm height against the CTC set criteria which recommended that children below this age should only be admitted to OTP if their height is above 65cm.

Aggregated data on diseases (table 15) showed that presence of illness especially at admission was not associated with performance neither did with the provision of medications. However, ARI and diarrhoea were found to be common in children admitted to OTP. These are common infections that accompany malnutrition (Schaible, 2007; WHO, 2002). Infection, particularly frequent or persistent diarrhoea, pneumonia, measles and malaria, also undermines a child's nutritional status (WHO, 2010)

There seems to be poor reporting when giving medication to children except for amoxicillin and anti-malaria drugs. Vitamin A supplementation is the least among all the drugs. This may be due to the fact that health workers probably do not indicate if the child received vitamin A in the last 30 days before admission or probably it is not considered as a drug of importance

(attitude) thus affecting reporting of receipt of drugs resulting in difficulties knowing whether the drugs were out of stock or not. Staff may also not know how it is supposed to be given or if it is just an attitude problem of not knowing the important role vitamin A plays in child survival and recovery.

Food Availability and Adequacy

Food supplies in terms of RUTF seemed to be inadequate. Although health care staff reported rare incidences of RUTF running out (except for George health facility which normally does not have RUTF at least one week in a month) the low average amounts given to children (Figure 7) and the low proportions of children (Figure 6) given correct amounts indicate inadequacies in the amount of RUTF given. The good performance despite poor RUTF distribution may be indicating that children are given other foods at home in addition to RUTF. The high proportion of staff (76.9%) giving correct amount of RUTF during observation may be a result of improvements in the current RUTF stock or bias that may have been introduced due to knowledge by staff that they were being observed. Shortage of food stuff, was also cited as one of the constraints faced by health facilities. The inadequacies in the provision of RUTF and the shortages reported may be caused by poor logistics making it difficult to make efficient deliveries to health centres especially those with high population such as Chipata, George and Chawama.

Other supplies except for Salter scales and OTP and ration cards were inadequate. Height boards were scarce commodities. It is most likely this was the reason why most health facilities were not taking heights in children

Logistics seems to be inadequate in all health facilities. None of the health facilities reported easy access to their communities mostly due to lack of vehicles. Poor logistics may be one of the reasons why most defaulting pairs (mother and child) were not being followed up adequately. Some health facilities reported storing their food stuffs in the office which may not meet the conditions required for food storage. Gillman (2003) in her experience in managing a nutrition program highlighted that commodities need to be in the right place at the right time to effectively treat malnutrition which is difficult to achieve with poor logistics.

Knowledge and Practices of Health Personnel

The staff interviewed for both self administered questionnaire and in-depth were able to bring out the key elements of why the CTC program was important in their areas.

Knowledge on the CTC components varied in the two group as some components seems to be well known (OTP-90.5%, supplementary feeding-85.7% and community mobilization-85.7%) by health care staff who responded using Self Administered questionnaire (SA) although other components such as inpatient and local food production were not. The respondent of the In-depth interview (IDI) group were only able to cite 3 components. However, the components that were cited were similar to the SA group. The none mentioning of the local food production in the IDI group and a low score (28.6%) in the SA may indicate poor knowledge of it or none implementation of the component such that it does not come easily in the minds of health workers. The composite on CTC components further reveals poor knowledge in this area as only 9.5% were able to list all the CTC components. Nonetheless, at least the 4 critical components were brought in varying levels.

The knowledge on referral of children was similar in both groups. Referral by health facilities where children are taken for treatment was very highly known both groups (SA-95.2% and IDI-6). Although referral by community based providers seemed to be well known (95.2%) in the SA group, it was least known in the IDI group as only 1 respondent mentioned it. In both groups mother to mother and self referrals were uncommonly known.

There is high knowledge on admission criteria related to oedema. Very few health care staff recognized Visible Severe wasting and weight for height of $<3SD$ and criteria for children less than 6 months as criteria for admission. This is supported lack of height boards in most health facilities (Table 17). The observations on anthropometry measurements (oedema, MUAC, weight and height) also revealed average knowledge on all the four but there were still some staff using visual check for oedema (25%), not ensuring good arm position when taking MUAC, not

putting scale to eye level when taking weight and poor posture in height taking. This may lead to inaccurate procedures. Overall the knowledge on admission criteria was good as most health care staff were able to give all the criteria correctly. Knowledge of the criteria for admission results in correct admission of children to the OTP. However, poor knowledge in some components cause some to be incorrectly admitted

Although almost all respondents agreed that they conduct the appetite test in their health facilities the responses were very different between the staff that responded using the self administered questionnaire and the in-depth interview . The SA group showed to have more knowledge on some elements of the appetite test which was not easily brought out in the IDI groups. The observations similarly showed inadequate practice on conducting appetite test. Only one carried out 4 of the 6 steps and 1 carried 3 of the steps while the rest carried out less than three steps. Poor knowledge on appetite test implies improper health care practices among health care staff in admitting and assessing children in OTP. Although not used singly, appetite test also helps to determine where the child can be admitted and whether should continue on RUTF and need liquid therapeutic foods.

Although the SA respondents seemed to have good knowledge on what actions to carry out when the child fails to gain weight this was not the case with IDI respondents. On the other hand, using the total score for all 3 actions (19%) in the SA group, it can be said knowledge in both groups on actions to take was low. Inadequate knowledge in what actions to carry out when a child fails to gain weight entails that no action are taken on such children to help them recover. This results in irreversible consequences such as stunting and metabolic disorders which manifests later in life and even deaths for the lives which could have been saved.

Regarding health education, all the 3 groups (self administered questionnaire, in-depth interview and observations) seemed to have good knowledge on hygiene issues, feeding children with RUTF and caring and feeding the sick children all ranged above 70%. However, issues of breastfeeding and explaining what RUTF was were not brought out in the IDI group. If health care staff are ignorant on appropriate ways of feeding children, they will not encourage mothers to correctly do it. Poor knowledge of staff in breastfeeding and lack of breastfeeding for more

than half of the children aged 6-24 months implies a serious problem that need to be addressed. Because staff lacked knowledge in infant and young children they could not provide correct help to mothers especially those who are HIV positive and those of unknown status to make informed choice. Health education is also biased towards other areas neglecting the key child survival issues on infant and young child.

Concerning follow up actions of patient admitted to the OTP, the SA group revealed high knowledge on what actions they take when doing outreach follow ups but this was not the case with the IDI group which only cited one activity (conducting home visits by citing the activities they do such as providing health education and assessing the child). On average, health care staff were not very knowledgeable on activities they are expected to conduct during outreach follow ups. This may mean very few outreach follow ups are conducted to promptly link patients to community based groups that would cushion some of their needs. This also entails inadequate referral of patients back to health facilities when the condition continues to deteriorate resulting in community deaths.

The discharge criteria for cure were well known by both groups. The IDI also was able to bring out all key factors though described in different ways. Proper discharge reduces relapses and deaths in the community.

6.3 Limitations

Cross sectional surveys are some of the commonly used methods to determine the prevalence of factors of interest such as disease (Bonita, 2006; Hennekens., n.d) and in this study it refers to the performance of children in OTP. They can also be useful for raising questions as to whether there are any associations (ibid) but it is not easy to establish clearly the relationship between the exposure and the outcome. However, ascertaining associations was not the main aim of this study but to determine performance of program. Furthermore, the research used the PPS method which helps to ensure that key subgroups are accurately represented in the sample (Freedman, 2006). In this case all the health facilities contributed to the sample size according to the number of records they had.

The study only used the records of the discharged children to measure the performance but did not follow up discharged children to measure the current status. Use of records could not allow including other factors such as education of mother that might have explained the performance of the child.

Use of records did not also allow the use of qualitative data to find out why majority of mothers of children enrolled in the OTP were not breastfeeding their babies even if they were in within the age range that required breastfeeding. Could not further find out why mothers/caretakers take their children to the healthy facility late.

Chapter 7: Conclusion, Policy Implications and Recommendations

7.1 Conclusion

In this study the extent to which the OTP Program performed against the CTC set indicators was examined. The findings show a high level of good performance which was associated with several determinants.

The logistic regression analysis involving both univariate and multivariate methods established that source of admission, appetite of the child at admission and the health facility providing the OTP services were important predictors of performance. The Cox and Snell R Square and the Nagelkerke R Squared indicated that between 39.9% and 61.0% of the variability was explained by the variables in the model. Breastfeeding status at the time of admission was also important in univariate analysis. The role of breastfeeding on improving child health, growth and development has also been demonstrated by other studies (Popkin, 1990; Howie, 1990; Victoria, 1987; Aniansson, 1994). These findings are also consistent with the Proximate Determinant Conceptual framework which depicts that good nutrition is a factor of food security, maternal and child practices and environment and health services, therefore directing efforts on one factor will not yield many successes. Factors such as age, distance, and sex were not found to be significant determinants of performance. In addition, weight gain children, length of stay and death rates indicators were above the recommended CTC criteria while the default rates and recovery rate (cure) were below the recommended CTC criteria calling for intensified efforts at ensuring children are referred quickly for care.

The knowledge of staff was fairly good but requires to be intensified especially in the area of infant and young feeding practices, health information and education, and health care practices in order to provide the required support.

However, the research had limitation in that it depended on records of children already discharged. Socioeconomic factors that might have affected performance of children such as education of the mother, income level, perception of mother on the diseases and others would have been critical on providing a comprehensive picture of SAM at OTP.

7.2 Implications for Policy

The findings show that there was good performance of the program necessitating the need for program scaling to other remaining provinces and districts. However, the focus was on management of severely malnourished children but the critical question is, is it feasible, sustainable, cost effective.

7.3 Recommendations

Research

In light of the above policy implication it is therefore important to consider carrying out a cost effectiveness study of the program and a detailed further investigation of factors associated with poor feeding practices among OTP children especially low rates of breastfeeding. There is also need to investigate the causes of high default rates in health facilities to make the program more effective

Program Implementation

Improving poor feeding practices among children may call for a ‘big campaign’ on infant and young child feeding in communities to counter misinformation that may exist among caretakers, families and /or health care staff and to empower caregivers with the knowledge on the importance of optimal infant feeding practices. This can be done through mass media (radio, television and films) and printed materials like leaflets, flipcharts, posters and booklets. Such kinds of campaigns have demonstrated good coverage of about 93% in some countries (Gueri, 1979, McDivitt, 1993). Furthermore, knowledge of health care staff need to be strengthened especially in areas of appetite testing, actions to take when child fails to gain weight and health education messages especially teaching breastfeeding.

Although it may not be necessary to give all children admitted to the OTP all routine medication due to prior provision through either routine supplementation/medication or during CHWk it is important that health care staff indicate on the card that medication was already provided to the child. This is important to remove uncertainties as to why some children were not given some drugs.

Children are not given the correct amounts of RUTF therefore, there is need to investigate whether this short fall is due to supply problem, poor recording or artificially made.

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9.0 Annexes

Annex 1 (a): Millennium Development Goals

Number	Goal
1	Eradicate extreme poverty
2	Achieve universal primary education
3	Promote gender equality and empower women
4	Reduce child mortality
5	Improve maternal health
6	Combat HIV/AIDS, malaria and other diseases
7	Ensure environmental sustainability
8	Develop a global partnership for development

Extracted from SCN:2004:21

Annex 1 (b): Average Weight for Age for Boys and girls

	Boys (kg)	Girls(kg)
Birth	3.3	3.2
6 months	7.3	7.2
1 year	9	8.9
2 years	11.5	11.4
3 years	13.8	13.9
4 years	16	16.1
5 years	18.2	18.2

Annex 2: Questionnaires

2.1 Recording Tools (Under – five Children)

Performance Evaluation of Twelve Outpatient Therapeutic Care (OTP) Centres in Lusaka District University of Zambia, School of Medicine

Recording Officer	Date:
1. Health centre	2. Identity number
3. Distance (time of travel)	4. Date of admission to OTP
5. Residential area	
6. Support status 1. Mother 2. Father 3. Others (specify)	1. Alive, 2. Dead 3. Not indicated 1. Alive, 2. Dead 3. Not indicated 1. Alive, 2. Dead 3. Not indicated
7. HIV Status 1. Mother 2. Child	1. Positive 2. Negative 3. unknown 1. Positive 2. Negative 3. Unknown
8. Total number of people in the family	
9. Age of the child at admission (months)	
10. Sex of the child	1. Female, 2. Male
11. Source of admission	1. Community 2. Health centre 3. Inpatient wards 4. Not indicated
12. Readmission (relapse)	1. Yes 2. No 3. Not indicated
13. Anthropometry at admission 1. MUAC 2. Weight 3. Height 4. Weight for height	[_____] cm [_____]M [_____]cm [_____]
14. Admission criteria 1. Oedema 2. MUAC <11.0cm 3. Visible severe wasting 4. <-3 Weight for height 5. Others (specify)	[_____] [_____] [_____] [_____] _____
15. History on admission 1. Diarrhoea 2. Vomiting 3. Cough 4. Appetite 5. Breastfeeding	1. Yes, 2. No 3. Not indicated 1. Yes, 2. No, 3. Not indicated 1. Yes, 2. No 3. Not indicated 1. Good, 2. Poor 3. none 1. Yes, 2. No 3. Not indicated
16. Routine medication (admission) 1. Antibiotic given(amoxicillin) 2. Vitamin A 3. Measles immunisation 4. Anti-malarial (specify) 5. Fully immunised 6. Folic acid 7. Mebendazole	1. Yes, 2. No 3. Not indicated 1. Yes, 2. No 3. Not indicated

17. Follow up																	
17. Week	A d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17.1. Oedema (+, ++, +++)																	
17.2. MUAC (cm)																	
17.3. Weight (kg)																	
17.4. Height (cm)																	
17.5. Diarrhoea (no. of days)																	
17.6. Vomiting (#days)																	
17.7. Fever(# days)																	
17.8. Cough(# days)																	
17.9. Anaemia (Y/N)																	
17.10. Appetite check for RUTF (Good, Poor, Refused)																	
17.11. Number of Units of RUTF given																	
17.12. Outcome (death, default, discharged, Transferred)																	

Check of on the card to see if:

A. Cases of failure to recover are investigated through discussion at programme site, home visits etc. _____

B. Cases of default are investigated. _____

C. Discharge criteria include non-anthropometric indices (e.g. Good appetite, absence of diarrhoea, fever, parasitic infestations). _____

2.2 In-depth Interview Guide for health Care Staff

Performance Evaluation of Twelve Community-based Therapeutic Care (CTC) Centres in Lusaka District

University of Zambia
School of Medicine

Question	Answer
Section A: General Information	
Health centre	
Identity number	
1. Age of respondent _____	
2. Sex of respondent: a. Female b. Male	
3. Educational level	1. primary, 2. secondary, 3. Tertiary
4. How long have you worked in the CTC program_____	
2. Have you had training in CTC program management?	1. Yes, 2. No
4a. If yes, where was the training held? _____	
3. How long was the course _____	
Section B: Importance of CTC	
4. Do you think it is important to have a CTC program in your health facility?	1. Yes, 2. No
5. If yes, why do you think it is important to have a CTC program in your health facility? (<i>Probe for advantages- easy access, increased coverage, timeliness, sectorial integration and capacity building</i>)	
6. How many components does the CTC Program has? _____	
7. Mention the components?	
Section C: Admission criteria	
8. How do you find the severely malnourished children that you admit in your health facility?	
9. Is there a criteria to use to admit children to CTC program?	1. Yes 2. No
10. If yes, what criteria do you use to decide which children to admit to CTC program?	
11. How do you decide which children to keep in	
a. Outpatient therapeutic program?	
b. In patient therapeutic feeding unit?	
12. What constraints do you face in admitting the children to the OTP program?	
13. If there are any constraints, how do you think the problems can be solved?	
14. What is the medical management on admission in OTP? (<i>How do you manager the malnourished children medically when they are admitted for the first time in the OTP Program</i>)	
Section D: Appetite test	
15. Is the appetite test done to all children admitted to CTC program?	1. Yes 2. No
15a. If yes, how is it done?	
16. Why do you think it is important to carry out an appetite test	
Section E: Weight Gain	
17. Are there children who fail to gain weight?	1. Yes, 2. No
17a. If yes, What do you do when they fail to gain weight?	
Section F: Health and Nutrition Education	
18. Is health and nutrition education and counselling given to care givers in your health facilities?	1. Yes, 2. No
18a. If yes, what key messages are given to parents or caregivers of children in outpatient therapeutic feeding program	
19. How often are caregivers given health and nutrition education? _____	
20. Why do you think it is important to give health and nutrition education?	
Section G: RUTF	
21. What is RUTF?	
22. Where do you get your supply for RUTF?	
23. Are there times when you stay without RUTF at your health facility?	1. Yes, 2. No
24. If yes, how often?	
25. What do you do to the children who run out of RUTF when it Is not available at the heath facility? (<i>probe for</i>	

<i>alternative foods, or if children are given dry rations)</i>		
26. How many types of RUTF do you receive? <i>(List all and probe for manufacturers)</i>		
<i>RUTF</i>	<i>Source</i>	<i>Manufacturers</i>
27. Where do you store your RUTF supplies?		
28. What constraints do you face when distribution RUTF clients?		
Section H: Follow up of patient		
29. Do you follow up patients admitted to the program 1. Yes, 2. No		
30. If yes, how often do you conduct follow up? If no, why not?		
31. What actions do you carry out during follow up?		
Section I: Coverage		
32. What is the coverage of your CTC program? <i>(need to probe for number of severely malnourished children in the catchment area and number admitted to the program)</i>		
33. Is there a group of people failing to access the OTP service? 1. Yes, 2. No		
34. If yes, which group of people fail to access the OTP service mostly?		
35. Why are they failing to access the service?		
Section J: Discharge criteria		
36. How are children discharged to Supplementary feeding Program? <i>(Lobby if it Includes non anthropometric indicators e.g. no diarrhoea, fever, parasitic infection etc. Check records also)</i>		
Section K: Deaths		
37. What do you do if a death occurs with the child admitted to the OTP? <i>(lobby for any investigations done, ask for reports if any)</i>		
Section L: Intersectoral collaboration		
38. Do you think it is important for your institutions to work with other organisation? 1.Yes, 2. No		
38a. If yes, why is it important to work with other organisations		
39. Are there other organisations you work with in the CTC Program? Probe for public health(HIV/AIDS prg, agriculture, water and sanitation institutions)		
40. How did you find the volunteers you are working with in the OTP program?		
Section M: Supervision		
41. How often do you receive people from the DHMT and other partners to see what you are doing?		
42. In the past one month, who visited you?		
43. What challenges are faced by the program?		

Are there any recommendations you would like to make about the program?

2.3 Self Administered Questionnaire for health Care Staff
Performance Evaluation of 12 Community-based Therapeutic Care (CTC) Centres in Lusaka District
University of Zambia, School of Medicine

A. General Information

Questionnaire number..... Date of Interview.....

Health centre.....

Age of respondent:

Sex of respondent: 1. Female 2. Male

Educational level: 1. Primary 2. Secondary 3. Tertiary

Indicate whether: 1. Nurse 2. Volunteer 3. Others (Specify).....

1. How long have you worked in the CTC program.....
2. Have you had a training in CTC program management 1. Yes 2. No
- 2a. If yes, where was the training held?
3. How long was the course? 1. Hours 2. 1 day 3. 2 days 4. 3 days

B. Importance of CTC

4. Do you think it is important to have a CTC program in your health facility? 1. Yes 2. No

4a. If yes, why do you think it is important to have a CTC program in your health facility (*Tick (v) for any correct answers*)

- Empowers the community
- Increases program ownership,
- Increases program coverage.
- Strengthens case finding, referral, follow up and monitoring of activities
- Others (Specify) _____

5. What are the core operating principals of CTC?

- Easy access,
- Increased coverage,
- Timeliness,
- Sectorial integration
- Capacity building
- Others (Specify) _____

6. How many components does CTC have?

7. Mention the components. (*Tick (v) for any correct answers*)

- Community mobilisation (Outreach work)
- Outpatient Therapeutic Program (OTP)
- Inpatient facility (stabilisation centres)
- Supplementary feeding program (SFP)
- Local food production
- Others (Specify) _____

8. How are children referred to OTP program? (*Tick (v) for any correct answers*)

- Self referral
- Mother to mother referrals
- Referral by community based providers and volunteers
- Referral by health facility or other nutritional programs
- Others (Specify) _____

C. Admission criteria

9. Is there a criterion to use to admit children to CTC program? 1. Yes 2. No

9a. If yes, what criteria do you use to decide which c dmit to? (*Tick (v) for any correct answer*)

a. Outpatient therapeutic program of CTC program

- Bilateral oedema (+ or ++)
- MUAC <11 cm
- Weight for height < 3SD
- Visible severe wasting
- Others (Specify)_____

b. In patient therapeutic feeding unit

- Oedema +++
- MUAC <11 cm with complications
- Weight for height Z-score <-3SD with complications
- Visible severe wasting with complications
- For children <6 are unable to breastfeed or W/H<-3
- Others (Specify) _____

D. Appetite test

10. Is the appetite test done to all children admitted to OTP program? 1. Yes 2. No

10a. If yes, how is it done? (*Tick (v) for any correct answers*)

- To be conducted in a quiet place
- Health worker should first explain to caregivers the purpose of the test and how it will be conducted.
- The caregiver should first wash hands
- Caregiver sits comfortably with baby on laps and offers the RUTF
- Caregiver offers RUTF while encouraging the child to eat
- Child should be offered plenty of water
- Amount taken should be measured when the child is through with eating.
- Others (Specify) _____

11. Why do you think it is important to carry out an appetite test? (*Tick (v) for any correct answers*)

- It is an important criteria for admission
- It indicates the child's condition
- To see if the child can be admitted to OTP
- It helps to know whether the child's condition is improving since it done weekly
- Others (Specify)_____

E. Weight Gain

12. Are there children who fail to gain weight? 1. Yes 2. No

12a. What do you do when they fail to gain weight?

- if below admission weight on week 3 refer to outreach worker
- if not weight gain by week 5 refer to stabilisation centre (inpatient)
- if no adequate weight gain by week 8 investigate (Home visit &/or laboratory)
- Others (Specify) _____

F. Health Education

13. Is health and nutrition education and counselling given to care givers in your health facilities?

1. Yes 2. No

13a. If yes, what key messages are given to parents or caregivers of children in outpatient therapeutic feeding program? (*Tick (v) for any correct answers*)

- What RUTF is
- Feeding children with RUTF
- Hygiene
- Breastfeeding during illness
- Caring for sick children
- Feeding sick children
- Others (Specify)_____

G. Follow up of patient

14. Do you follow up patients admitted to the program 1. Yes 2. No

14a. If yes, how often do you conduct follow up? _____

15. What actions do you carry out during follow up? (*Tick (v) for any correct answers*)

- Link patients with community workers
- conduct home visits (Caregivers are helped on child feeding when necessary)
- Refer patients when necessary
- Give feedback to health facilities
- Others (Specify) _____

H. Discharging the patient

16. How is the patient discharged from the OTP?

- Cured
- Defaulted (*Absent for 3 consecutive weeks*)
- Died (*died during the time registered in OTP*)
- Transferred to inpatient Care. (Condition has deteriorated)

17. How do you decided that the patient is cured and is ready for discharge from OTP

- = 80% weight for height and no oedema for two consecutive weighing
- No oedema for 2 consecutive weeks and clinically well
- Two months in OTP and MUAC =11.0cm and 15% of weight gain and clinically well
- Others (Specify) _____

Are there any constraints you face in the day to day running of the OTP program? 1. Yes 2. No
If yes, what are these constraints? _____

How do you think the constraints can be sorted solved? _____

2.4 Questionnaire for Logistics and staffing
Performance Evaluation of Twelve Community-based Therapeutic Care (CTC)
Centres in Lusaka District
University of Zambia
School of Medicine

Section A: Equipment and Supplies

What kind of supplies does your program receive? *(List all. Probe whether they are in adequate amount or not?)*

Supply	No. Supplied	No. recommended
Scales		
Height board		
Electronic calculator		
WHM table		
Pens		
Scissors		
Clock with second hand		
Bucket with lid		
Soap for washing hands		
Small bowl		
Hand towels/paper towels		
Water jug with lid		
Plastic cups		
Metal spoons		
Teaspoons or medicine cups		
Thermometer		
OTP Cards for new admission		
OTP ration cards for new admissions		
Clear plastic envelopes		
Others (specify)		

Where do you get your supplies from? _____

How long do the supplies you receive last? _____

What challenges are you facing in maintaining the supplies? _____

Section B: Logistics

How far are your screening sites? *(Ask for the furthest)* _____

How do you get there? _____

What challenges do you face with logistics? _____

Are there some ways you feel can be used to solve the challenges? _____

Section C: Staffing

How many people work in the OTP program? _____

What is the average number of SAM patients? _____

What is the average admission per OTP day

What challenges you are facing in terms of staffing? _____

2.5 Observation Form

Performance Evaluation of 12 Community-based Therapeutic Care (CTC) Centres in Lusaka District University of Zambia School of Medicine

Healthy Facility _____ Date _____

Admitting the Child

1. Did the health care staff assess the child using any of the following?
a. Oedema b. MUAC c. Weight d. Height

2. Indicate by ticking(v) in the boxes if task correctly done and (x) if not correctly done?

Oedema	MUAC	Weight	Height
<input type="checkbox"/> Thumb placed on top of each foot and placed firmly <input type="checkbox"/> Held for 3 seconds by counting "101, 102, 103 and then pressure removed <input type="checkbox"/> Exercise repeated on the lower leg <input type="checkbox"/> Child checked by just looking	According to age <input type="checkbox"/> 6-11 months height >65cm <input type="checkbox"/> 12-59 months <input type="checkbox"/> Half way point of the arm found <input type="checkbox"/> Arm hanging down the side of the body and relaxed <input type="checkbox"/> Measurement taken at midpoint between the shoulder and the tip of elbow	<input type="checkbox"/> Child weighed with minimum clothes <input type="checkbox"/> Scale adjusted to zero <input type="checkbox"/> child hanging freely and not touching anything <input type="checkbox"/> scale eye level <input type="checkbox"/> Measurement recorded to the nearest 0.1kg	<input type="checkbox"/> measuring board placed on hard flat surface <input type="checkbox"/> shoes and/or hats removed <input type="checkbox"/> Child's feet flat & together in the centre & against the back <input type="checkbox"/> child's legs are straight & heels against the board <input type="checkbox"/> Measurement taken to the nearest 0.1 cm

3. Was the child correctly:

a. Admitted to the OTP program	<input type="checkbox"/> Oedema of both feet (Bilateral + or ++) <input type="checkbox"/> MUAC =11.0 cm(red) <input type="checkbox"/> Weight for height <-3 SD. <input type="checkbox"/> Visible severe wasting
b. Referral to nutrition clinic (Supplementary feeding Program)	<input type="checkbox"/> 11 > MUAC<12.5cm (yellow) <input type="checkbox"/> Weight loss for 2 consecutive under dotted -3 z scores <input type="checkbox"/> Under lower line -3 z scores
c. Referred to Inpatient if:	<input type="checkbox"/> Weight <input type="checkbox"/> Oedema +++ <input type="checkbox"/> <11cm with complications <input type="checkbox"/> <-3 sd with complications <input type="checkbox"/> Visible severe wasting with complications. <input type="checkbox"/> Intractable (uncontrable) vomiting, unable to drink or breastfeed, diarrhoea, pneumonia (severe respiratory problems), convulsions or unconscious. <input type="checkbox"/> Temperature over 39°C or under 35°C. <input type="checkbox"/> Less than 6 months = Unable to breastfeed or W/H <-3sd
d. Not admitted to the program	

4. If appetite test is conducted, tick (v) if task done and (x) if not done

Task	Tick(v)done & (x)not done
Is it conducted in a quiet place?	
Health worker explained to the care taker the purpose of the test and how it is going to be conducted.	
Care taker washed her hands	
Caretaker offers the RUTF and at the same time encourages the child to eat.	
The child was being forced.	
Child was offered plenty of water.	
Amount taken was measured.	
Time taken to conduct appetite test	

5. Was the child given correct amount of RUTF? _____ Tick (v) if task correctly done and (x) if not correctly done. Use the guide below to make decision. (Age_____ RUTF_____)

RUTF in Packet of 92g or 100g

Weight of children in kg	Packets per week	Packets per day
3.5- 3.9	11	1.5
4 – 5.4	14	2
5.5 - 6.9	18	2.5
7 – 8.4	21	3
8.5 – 9.4	25	3.5
9.5 - 10.4	28	4
10.5 – 11.9	32	4.5
12.0 – 14.9	35	5
15.0 – 19.9	45	6.5
20.0 – 24.9	60	8.5

Community RUTF Ration: RUTF in Bottle of 250g

Weight of child (kg)	Bottles per week	Ration per day
3.5- 3.9	4	½
4 – 4.9	5	2/3
5.0 - 5.9	5	¾
6.0 – 7.9	7	1 bottle
8.0 – 9.4	9	1 ¼ bottle
9.5 - 10.9	11	1 ½ bottle
11.0 – 11.9	12	1 ¾ bottle
>12.0	14	2 bottles

Health Education

Observe the kinds of messages mothers are given. (Tick (v) if any of the messages below are given and write down other messages given in the free spaces below).

- What RUTF is
- Feeding children with RUTF
- Hygiene
- Breastfeeding during illness
- Caring for sick children
- Feeding sick children
- Others (Specify)_____

Annex 4: Record Card

ADMISSION DETAILS: OUTPATIENT THERAPEUTIC PROGRAMME

6450

Name	[REDACTED]			Reg. N°	23 106 /OTP		
Locality / Zone	10-			Compound / Village	Kaheliki		
House details / landmarks	macha			Mother dead (D) / Alive (A)	A		
Name of carer				Time to travel to centre	30 minutes		
Age (months)	22	Sex	M () F (X)	Total number in household	4		
Date of admission	28/6/06						
Admission	direct from community (X)	from health centre	from inpatient ward	refusal to inpatient ward	readmission (relapse)	yes	no (X)
Additional food							
HEPS	yes	no (X)			Household ration	yes	no (X)
Admission anthropometry							
MUAC (cm)	11	Weight (kg)	7.4	Height (cm) (if used)	W / H % (if used)		
Admission criteria	Oedema (X)	MUAC <11.0cm (above 6mths if >65cm)	Visible severe wasting	<-3 W / H (if used)	Other (specify)		
History							
Diarrhoea	yes	no (X)		# stools / day	1-3 (X)	4-5	>5
Vomiting	yes	no (X)		Passing urine	yes (X)	no	
Cough	yes	no (X)		If oedema, how long swollen?	2 weeks		
Appetite	good (X)	poor	none	Breastfeeding	yes	no (X)	
Additional information							
Physical examination							
Respir. rate (# / min)	<30	30 - 39	40 - 49	50+ (X)	Chest retractions	yes	no (X)
Temperature °C	35.8			Dehydration	normal	moderate (X)	severe
Eyes	normal	sunk (X)	discharge	Mouth	normal	sores (X)	andida
Ears	normal (X)	discharge		Hands & feet	normal	cold (X)	
Enlarged lymph nodes	none (X)	neck	axilla	groin	Disability	yes	no (X)
Skin changes	none	scabies	peeling (X)	ulcers / abscesses			
Additional information							
Routine medication: admission							
ADMISSION:	drug	date	dosage	drug	date	dosage	
	Amoxicillin	28/6/06	125mg tds x 5d	Fansidar	28/6/06	1 tab b.i.d.	
	Vitamin A (if not in last 6 months)	28/6/06		or Co-artem.			
	Measles immunisation	yes	no	date	Fully immunised	yes (X)	no
2nd VISIT:	drug	date	dosage	drug	date	dosage	
	Mebendazole	29/6/06	5 tabs 5d	Folic acid	28/6/06	1 tab daily	
Other routine medication							
TB treatment	yes	no		cotrimoxazole (prophylaxis)	yes	no	
Additional information							
Other medication							
drug	date	dosage		drug	date	dosage	

Back Side of Record Card

FOLLOW UP: OTP

NAME											REG. N°	23 / 06 / OTP					
Week	ADM.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Date	28/8	4/9	11/9	18/9	25/9	1/10	8/10	15/10	22/10	29/10	5/11						
Anthropometry																	
oedema (+ ++ +++)	++	++	+	N	N	N	N	N	N	N							
MUAC (cm)	11	12	12	14	14	14.6	14.8	14.8	14.8	14.8							
Weight (kg)	7.4	7.5	7.8	7.9	8.7	9.3	9.4	9.9	10.6	10.5							
Weight loss* (Y/N)	Y	Y	N	N	N	N	N	N	N	N							
Height (cm) (if used at clinic)																	
W/H (if used at clinic)																	
* WEIGHT CHANGES: MARASMICS: if below admission weight on week 3 refer for home visit If no weight gain by week 5 refer to INPT																	
History																	
Diarrhoea (# days)	N	N	N	N	N	N	N	N	N	N							
Vomiting (# days)	N	N	N	N	N	N	N	N	N	N							
Fever (# days)	N	N	N	N	N	N	N	N	N	N							
Cough (# days)	N	N	N	N	N	N	N	N	N	N							
Physical examination																	
Temperature (°C)	35.8	35.5	37.5	36.3	36.4	36.1	36.0	36	36.2	36							
Respiratory rate (#/min)	56	57	62	58	60	59	58	50	52	54							
Dehydrated (Y/N)	Y	N	N	N	N	N	N	N	N	N							
Anaemia / palmar pallor	Y	N	N	N	N	N	N	N	N	N							
Superficial skin infection (Y/N)	Y	Y	N	N	N	N	N	N	N	N							
Appetite check / feeding																	
RUTF test Good / Poor	G	G	G	G	G	G	G	G	G	G							
RUTF (# units given)	7	7	2	7	9	9	9	9	9	9							
Action / follow up																	
ACTION NEEDED (Y/N)	Y		N	N	N	N	N	N	N	N							
Other medication (see front of card)																	
Name examiner	M.M	h.m	D.D	l.m	M.M	h.m	M.M	N.M	M.M	M.M							
VISIT OUTCOME	Refused		OK	OK	OK	OK	OK	OK	OK	C							
OK=continue A=absent D=defaulter (3 absences) T=transfer RT=refused transfer C=cured NC=non cured HV= home visit X=died																	
Action taken during follow-up (include date)																	
Mother refused to go to U.T.H. Discharged.																	

Annex 5: Severe Malnutrition Key indicators

From the outset, clearly defined and agreed criteria for set-up and closure of the program are established (see guidance note 1, in Sphere Project (2 4

- Coverage is >50% in rural areas, >70% in urban areas and >90% in camp situations (see guidance note 2).
- The proportion of exits from therapeutic care who have died is <10%, recovered is >75% and defaulted is <15% (see guidance notes 3-5).
- Discharge criteria include non-anthropometric indices such as good appetite and the absence of diarrhea, fever, parasitic infestation and other untreated illness (see guidance note 4).
- Mean weight gain is >8g per kg per person per day (see guidance note 6).
- Nutritional and medical care is provided according to ly recognized therapeutic care protocols (see guidance note 7).
- As much attention is attached to breastfeeding and psychosocial support, hygiene and community outreach as to clinical care (see guidance note 8).
- There should be a minimum of one feeding assistant for 10 inpatients.
- Constraints to caring for malnourished individuals and affected family members should be identified and addressed (see guidance note 9).

Annex 6: Examples of Logistics and Supplies

Supplies	Logistics
RUTF	Vehicles
Routine medications	Transport of staff and RUTF to OTP sites
Scales, MUAC tapes	
Height boards	
Structural (possibly)	
Record cards*	

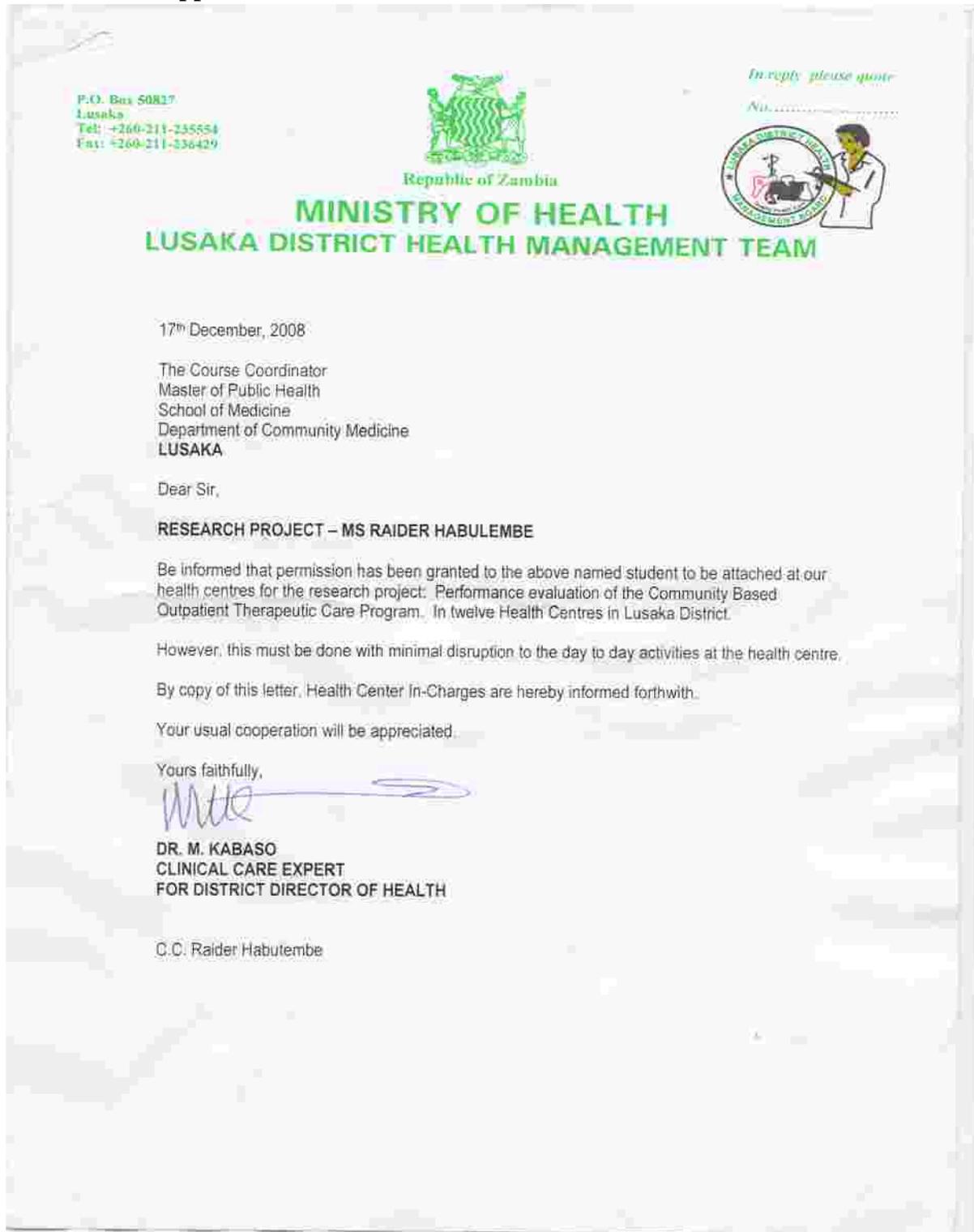
Source: Gatchell (2006)

Equipment (per site)			
Item	Amount	Item	Amount
1 OTP file for admission cards	1 per clinic	13 Small jug	1
2 Marker pens (permanent ink)	2	14 Hand towels/paper towels	2
3 Clipboards	2	15 Water jug (with lid)	2
4 Stapler and box of staples	1	16 Plastic cups	10
5 Pens	3	17 Metal spoons	2
6 Scissors	1 pair	18 Teaspoons or medicine cups	6
7 Notebook	1	19 Thermometer	3
8 Calculator	1	20 Salter scale (25kg) plus pants	1
9 Small clock with second hand	1	21 Height board	1
10 Bucket with lid	2	22 MUAC tape	2
11 Soap for hand washing	1 bar	23 Weight for Height % table	1
12 Small bowl	1	24 Nail clippers	1

Minimum Stock to Keep Topped Up			
1 OTP cards for new admissions	100	6 Drinking water	1 Jerry can
2 OTP ration cards for new admissions	100	7 Sugar to make 10% sugar water solution	500g
3 ID bracelets (optional)	100	8 Soap. For OTP children plus extra for children referred from the community but not fulfilling admission criteria.	500 bars
4 Clear plastic envelopes (for filing OTP cards)	100	9 RUTF	(see separate list)
5 Bags for carrying RUTF (if required)	100	10 Medicines and dressings	(see separate list)
Medicines (per 500 children)			
Routine Medicines: per 500 children			
1. Amoxicillin syrup 125mg/5ml	500 bottles	5. Artesunate tablets *	600 tablets
2. Mebendazole 100mg	4 tins	6. Vitamin A capsules	1 tin
3. Paracheck (malaria rapid test)	200	7. Measles vaccine (where not possible to refer to an existing EPI programme)	100 doses
4. Fansidar *	1 tin		
*if Artemisinin-based combination therapy blisters available, 200 kits.			
Additional Medicines: per 500 children			
1 Chloramphenicol syrup or tablets	100 bottles or 1 Tin	8 Betadine solution	2 bottles
2 Tetracycline eye ointment	50 tubes	9 Quinine (or suitable 2nd line anti-malarial)	1 tin
3 Nystatin suspension	20 bottles	10 Ferrous Folate (or iron sulphate and folic acid) – for treatment of anaemia	1 tin
4 Paracetamol syrup or 100mg tablets	2 bottles or 1 Tin	11 Cotton wool	5 rolls
5 Benzyl benzoate 200ml	100 bottles	12 Examination gloves – non-sterile	1 box
6 Whitfields ointment	50 tubes	13 Medicine bags	100 bags
7 Gentian violet – powder	1 tin	14 ReSoMal	2 packets
Dressing Materials (where needed)			
1. Gauze 10x10	20 packets	4. Zinc ointment	10 tubes
2. Small bandage	10 pieces	5. Normal saline for wounds 100ml or 200ml	10 pieces
3. Tape	2 rolls	6. Dressing scissors	2 pairs
RUTF: Each child in the OTP consumes about twenty packets of RUTF a week. Total consumption in the OTP is calculated as follows:			
A. Number of OTP beneficiaries	A	D. Monthly carton consumption for OTP	C/150
B. Monthly consumption per child (@20 packets /child/week)	80	E. Monthly net weight (MT) (@13.8kg/carton)	D x 13.8/1000
C. Monthly packet consumption for OTP	A x B	F. Monthly gross weight (MT) @ 14.9kg/carton)	D x 14.9/1000

Annex 7: Letters of Approval

7.1 DHMT Approval letter



7.2 School Approval letter



THE UNIVERSITY OF ZAMBIA SCHOOL OF MEDICINE

Telephone: 252641
Telegram: UNZA, Lusaka
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Email: kbowa@yahoo.com

P.O. Box 50110
Lusaka, Zambia

=====

05th November, 2008

Ms Reider Habulembe
Department of Community Medicine
LUSAKA

Dear Ms Habulembe,

RE: GRADUATES PROPOSAL PRESENTATION FORUM (GPPF)

Having assessed your dissertation entitled "**Performance Evaluation of Community Based Outpatient Therapeutic Care Program on Malnutrition in 12 Health Centre in Lusaka District.**" We are satisfied that all the corrections to your research proposal have been done. The proposal meets the standard as laid down by the Board of Graduate Studies.

You can proceed and present to the Research Ethics.

Yours faithfully,

Mr. K. Bowa, MSc, M.Med, FRCS, FACS
ASSISTANT DEAN, POSTGRADUATE

c.c. Head, Department of Community Medicine

7.3 Ethics Approval letter



THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

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Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

Assurance No. FWA00000338
IRB00001131 of IORG0000774

28 November, 2008
Ref.: 006-11-08

Ms Raider Habulembe
Chilanga, Game and Fisheries Yards
House No. 1150
CHILANGA, LUSAKA

Dear Ms Habulembe,

**RE: SUBMITTED RESEARCH PROPOSAL: "PERFORMANCE EVALUATION OF
COMMUNITY BASED OUTPATIENT THERAPEUTIC CARE PROGRAM ON
MALNUTRITION IN 12 HEALTH CENTRES IN LUSAKA DISTRICT"**

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee Secretariat on 20 October, 2008 where changes were recommended. We acknowledge receipt of the revised research proposal with clarifications. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).

Yours sincerely,


Dr James C. Munthali
A/CHAIRPERSON

Date of approval: 28 November, 2008

Date of expiry: 27 November, 2009