

## Technical Background Paper

# Key issues in the success of community-based management of severe malnutrition

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## **Abstract**

There are three major factors determining the impact of community-based programs for the treatment of severe acute malnutrition. 1. People must be able to access the service with socio-economic costs that are acceptable to them; 2. Efforts and resources must be put into engaging and mobilising the population to help people understand and accept the service provided; 3. The local primary health care system must have sufficient resources, organisation and supervision to deliver simple outpatient therapeutic protocols with consistently quality.

If programs are designed to satisfy all these basic requirements then cases of severe acute malnutrition tend to present early. If cases present early, they are simple to treat and community-based management has high recovery rates. The outcomes from 20,976 cases of severe acute malnutrition presenting to 21 CTC programs implemented in Malawi, Ethiopia North & South Sudan between 2001 – 2005, indicate that community-based programs can attain excellent rates of recovery and coverage. These programs achieved recovery rates of 78.1% and mortality rates of 4.3%. Coverage rates were approximately 73%. 74% of the severely malnourished children who presented were treated solely as outpatients. Initial data indicate that these programs are affordable with the costs-effectiveness of emergency CTC programs varying between \$12 and \$132 / year of life gained. This high cost effectiveness of CTC programs is due to the precise targeting of resources towards severely malnourished children who are at a high risk of dying and compares favourably with other mainstream child survival interventions as such as vitamin A provision.

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## Glossary

CFR	Case fatality rate
CSAS	Centric systematic area sampling
CSB	Corn Soya blend
CTC	Community-based therapeutic care
EPI	Extended programme of immunisation
FGD	Focus group discussion
IMCI	Integrated management of childhood illness
MCH	Mother and child health
MoH	Ministry of Health
MUAC	Mid upper arm circumference
NGO	Non governmental organisation
NRC	Nutritional rehabilitation centre
OTP	Outpatient therapeutic programme
PHC	Primary healthcare centre
PLWHA	People living with HIV/AIDS
RUTF	Ready to use therapeutic food
SAM	Severe acute malnutrition
SC	Stabilisation centre
SFP	Supplementary feeding programme
TFC	Therapeutic feeding centre
UNICEF	United Nations Children's Fund
WFA	Weight for Age, percentage of median
WFP	World Food Programme
WHM	Weight for height, percentage of median
WHO	World Health Organization

## Introduction

Malnutrition remains a major public health problem throughout the developing world and is an underlying factor in over 50% of the 10-11 million children under 5 years who die each year of preventable causes [1,2,3,4]. However, whilst the importance of under-nutrition (low weight for age) is commonly acknowledged, the importance of acute malnutrition is seldom, if ever mentioned. This is a serious omission; acute malnutrition is an extremely common condition, associated with high rates of mortality and morbidity and requiring specialised treatment and prevention interventions. Approximately 9% of sub-Saharan African and 15 % South Asian children suffer from moderate acute malnutrition [5,6] and approximately 2% of children living in developing countries suffer from severe acute malnutrition<sup>1</sup> [6]. This is equivalent to approximately 60 million children suffering from moderate and 13 million suffering from severe acute malnutrition at any one time. In India alone for example, approximately 2.8% of children under 5, approximately 6 million, are severely wasted [8,9] and in many poor countries such as Malawi, severe acute malnutrition is the commonest reason for paediatric hospital admission [10]. Although data are imprecise, it is known that the risk of mortality in acute malnutrition is directly related to severity, with moderate wasting associated with a mortality of between 30-115/1000/year [11,12,13,14] and severe wasting associated with a mortality rate of between 73-187 / 1000 / year [11]. Our analysis indicates this is equivalent to over 1.5 million child deaths associated with severe acute malnutrition and 3.5 with moderate acute malnutrition every year. This analysis is summarised in Table 1.

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<sup>1</sup> defined as severe wasting (<70% weight-for-height or <-3SD) or oedema [7] or a MUAC of < 110mm)

**Table 1 Analysis of the worldwide burden of acute malnutrition [6]**

Regions	Under-5 population 2000 (000's)	wasting prevalence (%)		wasting numbers (000's)		annual mortality numbers		
		moderate & severe	severe	<-2 z scores WFH total	<-3 z scores WFH total	between -2 & -3 z scores WFH *	< -3 z scores WFH**	< -2 z-scores total
Sub-Saharan Africa	106,394	10	3	10,639	3,192	565,768	421,767	987,535
Middle East and North Africa	44,478	7	2	3,113	890	168,942	117,546	286,489
South Asia	166,566	15	2	24,985	3,331	1,644,950	440,201	2,085,151
East Asia and Pacific	159,454	4	-	6,378	-	484,528	-	484,528
Latin America and Caribbean	54,809	2	0	1,096	-	83,273	-	83,273
CEE/CIS and Baltic States	30,020	4	1	1,201	300	68,416	39,668	108,084
<b>Industrialized countries</b>	50,655	-	-	-	-	-	-	-
<b>Developing countries</b>	546,471	9	2	49,182	10,929	2,905,951	1,444,214	4,350,164
<b>Least developed countries</b>	110,458	10	2	11,046	2,209	671,290	291,918	963,208
<b>Total</b>	<b>707,584</b>			<b>60,228</b>	<b>13,139</b>	<b>3,577,241</b>	<b>1,736,132</b>	<b>5,313,373</b>

\* moderate mortality rate = 76/1000/year for children with < 80% WFH or -2 z scores (11)

\*\* severe mortality rate = 132/1000/year for children with MUAC < 110 (11)

This article describes a community-based model for addressing acute malnutrition called Community-based Therapeutic Care (CTC). CTC is a public health intervention based on the principles of coverage, access and cost-effectiveness. The model attempts to maximise population-level impact by focusing on providing effective therapeutic care to the majority of acutely malnourished people as outpatients, using techniques of community mobilisation to engage the affected population and maximise coverage and compliance. Wherever possible, programmes build on local capacity and existing structures and systems, helping to equip communities to deal with future periods of vulnerability. The CTC model treats people suffering from severe acute malnutrition using a combination of three treatment modalities, inpatient therapeutic, outpatient therapeutic and supplementary feeding according to the clinical and anthropometric characteristics at presentation. Ideally, those with moderate acute malnutrition and no medical complications are supported through a Supplementary Feeding Programme (SFP) that provides dry take-home rations. SFP are common in humanitarian operations but rarely exist in developmental settings. Those with severe acute malnutrition with no medical complications are treated in an Outpatient Therapeutic Programme (OTP). The patient attends an OTP site weekly or fortnightly to receive Ready to Use Therapeutic Food (RUTF), a course of oral broad-spectrum antibiotics, anti-helminth treatment, folic acid, and if appropriate vitamin A, measles vaccination and anti-malarials. People who are acutely malnourished and have additional serious medical complications are treated in an inpatient Stabilisation Centre until they are well enough to be transferred into the OTP. The inpatient protocols used in CTC are essentially the same as those recommended by the WHO [7] with the exception of the admission criteria and discharge criteria and the dietary protocols in the transition phase. This article focuses only on the Outpatient Therapeutic element of CTC.

## **Background**

Over the past 50 years case fatality rates for cases of severe malnutrition treated in health facilities in most developmental settings have remained largely unchanged at 20-30% for marasmus and up to 50-60% for kwashiorkor and have if anything, slightly increased from the 20% CFRs seen during the 1950s [15]. By contrast, for the past 30 years, management protocols implemented in specialist units have achieved case fatality rates in the order of between 1-5% [16,17,18]. CFRs achieved by humanitarian agencies treating acute malnutrition during emergencies have also improved greatly over the past 15 years and are now frequently under the 10% mortality level stipulated in the international “Sphere” standards for humanitarian interventions [19,20,21,22].

The reasons for the slow translation of scientific knowledge into impact are largely due to a combination of socio-economic factors and disregard of the medical community to accept the fact that severe acute malnutrition is a major killer. This disregard is evident in most ‘standard’ medical textbooks that to date, contain little on the management of severe acute malnutrition. The treatment of severe malnutrition occupies a unique position in-between clinical medicine

and public health. The causes of primary acute malnutrition are essentially poverty, social exclusion and loss of entitlement [23] and the vast majority of cases can be treated by economic development and public health measures designed to increase dietary quantity and quality alone, with no need for clinical inputs. The serious physiological consequences of acute malnutrition, such as reductive adaptation, marked immunosuppression and concurrent infection, generally appear late in the evolution of the condition<sup>2</sup> and become increasingly severe as the condition progresses. Acute malnutrition that has progressed to the stage where there are concurrent life threatening complications must be treated on an inpatient basis. However, inpatient treatment is associated with major opportunity and economic costs for the affected families and health service providers alike. These costs are often unaffordable and the results have been that inpatient therapeutic programmes often have low coverage, low recovery, high mortality rates and high default rates.

The community-based management of severe acute malnutrition is an attempt to achieve sustainable impacts at a population level by taking the socioeconomic realities into account, balancing the potentially conflicting demands and ethics of clinical and public health.

## **The Community-based Therapeutic Care model**

CTC is based upon the fundamental principle that all people whose lives are at risk from malnutrition should receive appropriate care and assistance. The provision of care should be impartial, targeted solely on the basis of need. It should be delivered without discriminating between or within affected populations and should not favour any particular side in conflicts or disputes. In practice, this principle translates into a commitment and obligation to provide the largest possible proportion of the acutely malnourished population with access to appropriate care in a timely fashion for as long as necessary. The core operating principles are thus:

*Maximum coverage and access:* Programmes should be designed to achieve the greatest possible coverage and make services accessible for the highest possible proportion of a population in need. It aims to reach the entire severely malnourished population.

*Timeliness:* Programmes should catch the majority of cases of acute malnutrition before additional medical complications occur on top of the simple malnutrition. In humanitarian situations CTC programmes aim to start case-finding and treatment before the prevalence of malnutrition escalates.

*Appropriate care:* Programmes should provide simple, effective outpatient care for those who can be treated at home and inpatient care for those who require inpatient treatment in order to survive.

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<sup>2</sup> Historically these conditions have formed the focus of texts books and guidelines on the treatment of severe malnutrition because treatment has always been centralised and cases have presented late.

*Care for as long as it is needed:* Programmes should be designed to help ensure that people can stay in the programme until they have recovered, and it aims to ensure appropriate services continue to be available for as long as acute malnutrition is present in the population.

Implementing these principles in practice requires programme priorities, design and resources to be tailored to the particular circumstances of the programme.

### **The conceptual basis for a community-based approach**

CTC is founded on three important premises. The first is that if malnourished people access nutritional care early in the evolution of their condition and remain in a nutritional programme until they have recovered, then success rates are high. Conversely, if people access care late and/or they are deterred from staying in a nutritional programme for as long as they need to, then success rates are limited.

The basis of this understanding is that malnutrition is the result of a complex interaction of economic, social, political, nutritional and public health factors. The clinical course of malnutrition is a gradual decline in nutritional status from normal adaptation towards metabolic complication, immunosuppression, infection that further compounds the metabolic derangement, increased immunosuppression, more infection and eventual death. The severity of the condition is primarily a function of the stage of its evolution. As these changes progress, treatment must become increasingly intensive (and costly) if it is to succeed and units treating severe acute malnutrition are frequently confronted by extremely ill patients who require intensive medical and nursing care. However, most of these units are in the poorest parts of the poorest countries in the world and have severe resource and staff constraints. In addition, the carers of the malnourished patients almost always come from the poorest families and have great demands on their time and cannot afford to leave home for long periods of time to stay with their malnourished child during treatment.

However, if the condition is caught in the early stages, the technical aspects of treatment are simple: all that is required is a balanced diet of sufficient quantity and quality in terms of protein, carbohydrate, fat and micro-nutrients. The composition of such diets is now well researched, they are relatively cheap to produce and so long as the patient has appetite they are easy to administer, making success rates high and costs / treatment low. In practice this means that the actual clinical treatment of severe malnutrition is not the only crucial aspect of a successful programme. Instead, finding and treating cases of acute malnutrition early in the progression of their condition, before the metabolic and immunological aspects of the condition become marked are the major determinants of success.

The second premise underpinning CTC is that in order to present early and comply with treatment people must understand, accept and participate in the programmes. To be

sustainable and effective, community-based programmes must involve the target populations. This is a major shift in attitude from clinically orientated inpatient programmes wherein professional health care workers provide health care to a largely passive clientele. In practice, there are several important features of programme design that are required to promote participation. The first is to minimise barriers to access. Physical and logistical barriers to presentation can be overcome by providing access to services close to where the target population lives. In the developmental setting, this involves delivering the Outpatient Therapeutic Programme (OTP) for the severely malnourished through the front line primary health care structures such as local clinics, health posts or temporary EPI vaccination points. In humanitarian responses it often involves creating new temporary OTP access points.

Social and cultural barriers to access although more subtle are equally important. These must be overcome by a range of measures. Foremost is the need for service providers to make initial investments into understanding the socio-cultural milieu in which CTC programmes will operate. These investments are not necessarily expensive or particularly time consuming, but they have to be planned properly and have sufficient appropriate resources allocated to them. It is important to realise that within any given society, marked socio-cultural differences exist, be they between town and country, educated and non-educated or employed and peasant. Even in MoH health care systems that employ "local" staff, there will still be socio-cultural issues that need to be explored if issues of vital importance to the target population are to be adequately addressed in programme design. Reducing socio-cultural barriers also requires sensitisation of the population to ensure that people understand the services that are available to them, and consultation to enable people to participate in programme development and implementation. This is vital in order to ensure that issues of importance to potential programme clients are factored into programme design. In particular, it is essential that programme designs take into account the socio-economic barriers (opportunity costs) of attendance to enable people to access treatment easily and stay in treatment with the minimum of costs to them and their families.

The third premise underlying CTC is that in order for programmes to move towards sustainability, there must be upfront investment in social mobilisation to ensure that key stakeholders can benefit from the positive feedback and kudos that successful individual cures generate. The positive feedback that is required if programmes are to generate sufficient and self-perpetuating motivation of community-based volunteers will only occur when communities feel some responsibility for service implementation. The nature of acute malnutrition offers unrivalled potential for this to happen and there is no other condition that is potentially so devastating to families but so easily treated with simple understandable measures (food) delivered by the families themselves. This is a vital advantage that community-based programmes treating severe acute malnutrition have that can enable these programmes to succeed where they have failed for most other conditions. However, this

potential must be cultivated right from the start of programmes. This requires appropriate resources and extensive engagement with the communities, key stakeholders and local health care providers to build understanding, trust and participation amongst all groups and to ensure that programmes are designed to reflect the priorities, constraints and resources of the target population.

This focus on engagement, building understanding and participation of communities and local stakeholders distinguishes community-based models from more usual health extension and outreach services. Treatment models based on this extension concept, such as 'Home Treatment' and 'Ambulatory Care', start with a medical focused and aim to extend services out from treatment centres into the community. Programmes are therefore designed more from the perspective of the health care providers and as such, in many contexts, have more difficulty in fostering sufficient understanding and participation to ensure the sustainable system of early presentation that must occur if these programmes are to succeed over the long-term. Decision over whether to employ community-based or extension models of treatment should be based upon an analysis of context specific factors.

### **The impact of CTC programmes**

Early CTC programmes investigated the feasibility of the community-based treatment of severe acute malnutrition in humanitarian responses. The first programmes, were implemented in 2000/1 and to date, we have monitoring data including outcomes from 23,511 cases of severe acute malnutrition presenting to 21 CTC programmes implemented in Malawi, Ethiopia North & South Sudan between 2001 – 2005. These programmes achieved recovery rates of 79.4%, mortality rates of 4.1% and default rates of 11.0%[21,24,25]. Transfer and non-recovery rates were 3.3% and 2.2% respectively. 76% of the severely malnourished children who presented were treated solely as outpatients and this figure has increased in the more recent programmes. These results exceed international standards for therapeutic care, in particular mortality rates are under half the SPHERE minimum standards and 4-5 times lower than those usually achieved by hospitals providing inpatient care to cases of SAM [15]. These results are presented in Table 2.

Table 2 CTC outcomes from severely malnourished aged under 59 months presenting to CTC programmes between Sep. 2000 and Dec. 2005 (N = 23,511)

Country	Figures for Period	No. SAM treated (OTP + SC)*	Direct OTP Admissions	Coverage ^	Outcomes OTP and SC combined					Comment^^	Rate wt gain g/kg/d	LOS
					Recovery	Default	Death	Transfer**	Non- recovery †			
Ethiopia - Hadiya ***	Sept 00 - Jan 01	170	100%	-	85.0	4.7	4.1	-	6.5			
N Sudan - Darfur	Aug 01 - Dec 01	806	?	30-64%	81.4	10.1	2.9	5.6	-		6.6 (M), 1.8 (K)	25 (M), 35 (K)
N Sudan - Darfur	Sept 02 - May 03	446	69%	> 60%	65.1	6.5	7.9	20.5	-		5.7	
Malawi - Dowa +	Aug 02 - Dec 03	1,671	19%	73% ^	69.4	15.0	8.9	3.0	2.8		5.9(M), 5.0 (K)	35
Malawi - Dowa+	Jan 04 - Dec 04	1,553	45%	72% ^	72.4	16.2	7.2	4.1	0.2		5.7	46
Malawi - Dowa	Jan 05 - Jul 05	1,696	63%	-	80.5	12.5	4.2	2.7	0.1		5.8	45
Malawi - Nkhotakota	July 03 - Nov 03	105	27%	-	58.9	27.8	10.0	3.3				
Malawi - Nkhotakota	Mar 04 - Dec 04	501	55%	-	61.9	23.2	8.9	1.4	4.6			
Malawi - Nkhotakota	Jan 05 - Jul 05	1,021	70%	-	76.7	16.3	6.0	0.9	-			
Ethiopia - South Wollo	Feb 03 - Dec 03	590	95%	78% ^	74.6	9.7	7.5	-	8.3		4.5 (M)/4.0 (K)	80
Ethiopia - South Wollo	Jan 04 - Dec 04	1,359	92%	-	82.7	4.2	4.9	-	8.2		3	82
Ethiopia - South Wollo	Jan 05 - May 05	856	96%	77% ^	83.4	6.0	4.6	-	5.6		3.2	85
Ethiopia - Wolayita	Apr 03 - Dec 03	194	24%	-	69.6	5.2	7.3	10.5	-	4 registered on closure		
Ethiopia - Wolayita ****	Aug 03 - Dec 04	460	91%	-	83.9	5.4	1.9	8.9	-	no SC data available		
Ethiopia - Wolayita	Jan 05 - Jun 05	245	100%	-	92.9	5.6	1.6	-	-			
Ethiopia - Sidama	Sept 03 - Aug 04	1,497	85%	78% ^	84.8	5.9	1.2	2.9	5.2		6.8 (M)/5.5 (K)	45 (M), 41 (K)
Ethiopia - Hararge	Apr 03 - Jan 04	232	99%	81% ^	85.8	6.0	4.9	3.3	-	49 registered on closure		
South Sudan - BEG	Jun 03 - Jan 04	610	92%	-	73.4	17.3	1.4	4.2	3.7	39 registered on closure		
South Sudan - BEG	Apr 04 - Dec 04	439	80%	82% ^	76.8	8.7	4.8	3.0	6.7			
South Sudan - BEG	Jan 05 - Jun 05	387	88%	-	61.5	14.5	2.5	4.5	16.5			
South Sudan - BEG	Jul 03 - Nov 03	696	71%	-	81.8	15.4	1.4	1.4	-	58 registered on closure		
Ethiopia - Hararge	Mar 04 - Oct 04	1,086	89%	56% ^	76.0	18.0	2.0	3.7	0.4	241 registered on handover	6.6 (M)/4 (K)	44 (M), 38 (K)
Ethiopia - Harage	Mar 04 - Oct 04	381	93%	56% ^	69.5	24.3	2.4	3.7	-	7 registered on handover	6.0 (M)/2.0 (K)	60 (M), 44 (K)
Ethiopia - W. Hararge	Feb 04 - Oct 04	1,377	71%	61% ^	88.0	6.8	3.4	1.1	-			
Ethiopia - Wollayita	Feb 04 - Oct 04	539	?	-	90.4	2.4	1.4	3.4	2.4			
North Sudan - West Darfur	Aug 04 - Jul 05	1,684	97%	75% ^	80.0	13.9	1.4	5.0	-			
North Sudan - West Darfur	Sept 04 - May 05	115	86%	-	58.6	36.2	3.4	-	1.4			
North Sudan - North Darfur	Dec 04 - Sept 05	172	90%	-	65.7	12.9	7.9	-	13.6			
Ethiopia - Awassa	Jun 05 - Oct 05	353	92%	-	95.0	3.9	1.1	0.0	0.0			
Niger - Maradi	Aug 05 - Dec 05	2,270	96%	-	87.7	4.3	2.6	4.6	0.4			
<b>Total</b>		<b>23,511</b>			<b>79.4%</b>	<b>11.0%</b>	<b>4.1%</b>	<b>3.3%</b>	<b>2.3%</b>			

This table presents the latest available monitoring data from CTC programmes supported by Valid International. As such it is constantly updated as and for some programmes data maybe missing or incomplete.

\* For ongoing programmes total treated includes children still registered in the programme and for closed programmes those still registered on closure. For data up to year end total doesn't include children registered in programme at the end of the year as they are included in the next year data

\*\* This represents transfers out of the programme to another agency TFC or a hospital that is not supported by the organisation

\*\*\* This was the only OTP programme with little mobilisation or community engagement

\*\*\*\* No SC data available - therefore transfer percentage includes those transferred to SC

† Non-recovered were those children who failed to achieve discharge criteria after 4 months in the programme. Before being discharged as a non-responder, home visits were conducted and where possible children received a medical referral and were tested in hospital for chronic treatable conditions such as TB.

^^ Children still registered on programme closure are not included in the outcome calculations

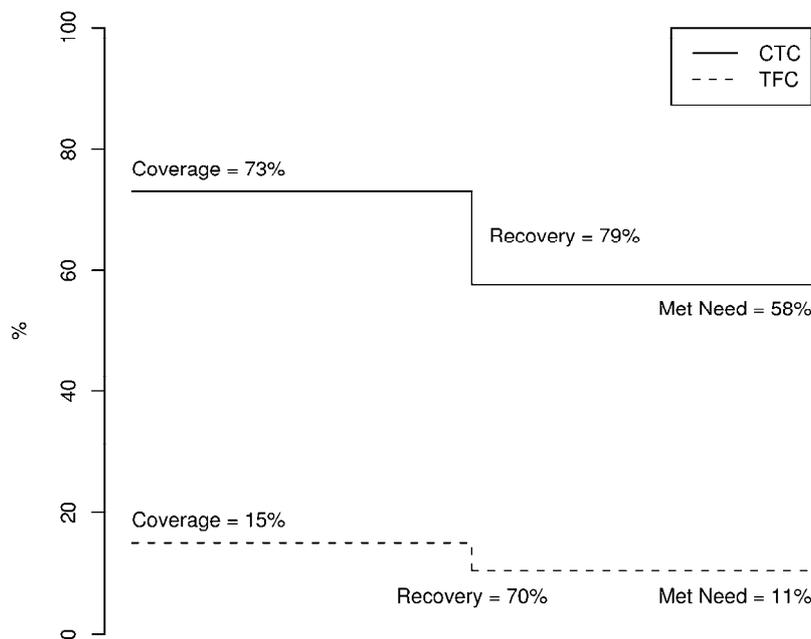
^ calculated using centric systematic sampling design and 'optimally biased sampling' and using a recent period coverage calculation (see below)

+ Initially the Dowa programme in Malawi had to follow the Malawi national protocols that stipulated inpatient care for all severely malnourished children. It was only when the inpatient centres became over-crowded the CTC programme started direct admissions into OTP. Once direct admission into OTP was perceived by local people as successful restrictions on direct admission into OTP were relaxed.

Rates of weight gain in OTP programmes were between 4-5 g/kg/day, lower than those recommended in the Sphere standards and lower than those seen in well functioning TFCs. Mean length of stay in these OTP programmes were correspondingly longer, between 40-50 days when WFM entry criteria are used (see below). These slower rates of recovery have not resulted in increased mortality rates or increased default rates, supporting the view that treatment in OTP entails little if any increased risk to the malnourished child and few opportunity costs to carers. This is very different to centre-based care, wherein the congregation of children in centres entails a greatly increased risk of exposure to foreign pathogens and many opportunity costs to carers. Under these circumstances rapid recovery is essential in centre-based programmes if low mortality and low default rates are to be obtained.

### **CTC programme coverage**

Coverage is a vital determinant of the impact of any health intervention. Figure 1 demonstrates this importance of coverage as an indicator of impact. High coverage but low cure-rate programmes will meet a higher proportion of need in a population than those with low coverage but high cure rate. In order to maximise impact, programmes must have both high coverage and high cure rates. The importance of coverage has recently been acknowledged with the addition of coverage indicators into the second edition of Sphere [26]. This stipulates therapeutic feeding programmes coverage standards of 50% for rural populations, 75% for urban populations and 90% for camp populations as a key indicator of programme performance [26].



**Figure 1** The relationship between coverage, cure rate and impact in the treatment of SAM. This figure compares data from community-based programmes with typical centre-based programmes where coverage rates are usually 15% or less [27,28,29] and cure rates rarely over 70% [30]

As part of the CTC research and development programme<sup>3</sup> jointly we have developed a new method for assessing coverage with greater precision [31](see below). We have now used this technique to assess 9 CTC programmes operating in rural environments. The average coverage in these programmes was 73% high, substantially higher than the 50% coverage standard for rural populations stipulated in the second edition of the Sphere standards[22], and considerably higher than coverage rates reported for humanitarian centre-based therapeutic feeding programmes[27,32]. These Data are presented in Table 3.

**Table 3 Coverage results from CTC programmes 2001 - 2005**

Program	Agency	Date	Coverage (%)	Method
N. Sudan	SC-UK	2001	30–64	indirect
N. Sudan	SC-UK	2003	> 60	indirect
Malawi	Concern	2003	73	CSAS
Ethiopia	Concern	2003	78	CSAS
Ethiopia	SC-US	2003	78	CSAS
Ethiopia	Care	2004	56	CSAS
Ethiopia	IMC	2004	61	CSAS
Malawi	MoH	2004	73	CSAS
S Sudan	Concern	2004	82	CSAS
Darfur	Concern	2004	75	CSAS
Ethiopia	MoH	2005	77	CSAS

### ***Non emergency CTC programmes***

Achieving long-term improvements in the treatment of severe acute malnutrition on a large scale requires that community-based management of SAM is implemented from existing MoH structures as a standard part of the primary health care package. The first two large programmes implemented in stable situation, those in Dowa district in Malawi, and South Wollo in Ethiopia, have now been operating for 2-3 years. From the start, these programmes implemented OTP through the local MoH clinics but supported this implementation with mobile teams consisting of NGO staff. In Malawi the programme used a combination of local missionary and church organisations and MoH hospitals for stabilisations centres. In Wollo, the stabilisation centre was situated in the local hospital, from the start has been run by local MOH staff with minimal NGO support. For over a year, the Wollo programme covering 2 woredas with a total target population of 469,280 (under five target population of 84,469), has been transitioning towards being implemented solely by the MoH staff of the pre-existing clinics and hospitals and NGO inputs have been progressively reduced. The only external inputs have been the purchase and transport of RUTF, intermittent monitoring/research inputs and support for 8 of the original 35 outreach workers. The MoH

<sup>3</sup> This is a 6 year programme jointed implemented by Valid International and Concern Worldwide  
Collins et al.

has been responsible for the implementation of OTP through their clinics and have continued to run the inpatient Stabilisation Centre operating in the district hospital. The outcomes up to May 2005 are presented in Table 4. This data indicates that recovery rates have remained unchanged during this transition and still exceed international standards. In January 2005, nine months into this transition, programme coverage rates for severely malnourished children estimated using the Centric Systematic Area Sampling (CSAS) method, were 77.3% (95% C.I. 72.0% - 82.2%) [33], similar to those of 77.5% (CI: 65.7%, 86.2%) obtained in June 2004 at a time when Concern Worldwide, an International NGO was implementing the programme [34].

Similar results have been obtained from the Dowa district programme in Malawi. In Dowa, the programme was initially implemented by Concern Worldwide largely through the MopH clinic system. In June 2003, Concern started a gradual process of handing over day to day responsibility for the programme to the local MoH. At present Concern still supply the RUTF and one outreach supervisor and monitoring / supervision visits. By May 2005, two years into this handover process, programme outcomes still exceed international standards for therapeutic feeding programmes (see Table 5). Coverage rates for severely malnourished children have also remained high. In June 2004, the programme coverage assessed by a CSAS survey was 72.2% (95% CI. 66.4%, 78.0%) [35], similar to the results of 73.64% (95% C.I. = 66.0%, 81.3%) obtained during the first CSAS survey implemented in March 03 at the height of the Concern Worldwide support [36].

**Table 4 Outcomes from the clinical cards of severely malnourished children presenting to CTC programme in Wollo Ethiopia, February 2003 - May 2005. N = 2,498\***

outcome	Overall		NGO implemented		MoH implemented	
	23/02/03 - 08/05/03		23/02/03-23/04/04		01/05/04-08/05/05	
Recovered	2023	81%	737	80%	1286	82%
Died (in OTP or SC/hosp.)	135	5%	58	6%	77	5%
Default	148	6%	67	7%	81	5%
Non-recovered **	192	8%	63	7%	129	8%
<b>Total</b>	<b>2,498</b>	<b>100%</b>	<b>925</b>	<b>100%</b>	<b>1,573</b>	<b>100%</b>

\* 307 clinical record card missing

\*\* Non-recovered were those children who failed to achieve discharge criteria after 4 months in the programme. Initially these children were discharged to SFP when that programme was still in operation. Later when the SFP ended these children were discharged back to home. Before being discharged as a non-responder children were tested in hospital for chronic treatable conditions such as TB and home visits were conducted.

**Table 5 Outcomes from severely malnourished children presenting to the Dowa district CTC programme, June 2003 - March 2005; N = 3,584**

	SC		OTP		Overall outcome from SC and OTP	
Recovered	1695	84.1%	2714	80.8%	2714	75.7%
Died	148	7.3%	65	1.9%	213	5.9%
Default	52	2.6%	484	14.4%	536	15.0%
Transfers	121	6.0%	90	2.7%	121	3.4%
Non-recovered			4	0.1%	4	0.1%
<b>Total</b>	<b>2,016</b>		<b>3,357</b>		<b>3,584</b>	<b>100%</b>

CTC is a new technique and there has been little time to look at the transition of these programmes into complete MoH control. Further data collection and analysis of the factors that facilitate integration of CTC into primary health care delivery is required. However, initial impressions from CTC programmes operating since 2002/3 that are now transitioning into MoH control have highlighted several factors that facilitate these programmes being run as an element of standard health care delivery. The simplicity of the OTP protocols and the ease with which they can be taught to local clinic staff and the ease with which they can be implemented is important. It is vital to keep these protocols as simple and as fast to implement as possible if busy clinic staff are to adopt them. Integrating the provision of CTC into annual "District Implementation Plans" with sufficient budgets for the logistics of RUTF transport, supervision, refresher training and monitoring is also important if local health systems are to manage these programmes. Building understanding and participation amongst local people is also vital and has a range of important benefits. Improved passive case finding with more appropriate and earlier presentation at clinics occurs when people understand what acute malnutrition is and understand when and where to seek help. Early and appropriate presentation decreases staff time spent on screening and improves the clinical effectiveness of the OTP protocols thereby increasing the impact of the programme. Improved results at clinics in turn lead to better staff morale and further improvements. Decentralisation fostering easier access and earlier presentation also reduces the numbers of cases with complications and has a similar positive effect on impact and morale. Facilitation of community-based screening and the use of MUAC for both screening and admission decreases the number of people who are wrongly referred from village level screening. This reduces the negative feedback from those who have wasted their time and efforts attending a clinic after being inappropriately referred, thereby by improving programme acceptability and the appropriate presentation and uptake of services.

### ***The cost of CTC programmes***

To date, cost data is available for the first 3 CTC programmes implemented by Concern worldwide. All were emergency programmes, set up rapidly by an international NGO in response to a nutritional crisis. Comparisons of the cost of these programmes with the costs for Therapeutic Feeding Centre programmes operated by International NGOs indicated that for each admission the costs to the agency were similar for the two approaches but the cost to the malnourished patients family were substantially less for CTC [24,25]. After three years of transition towards local MoH control, the costs of two of these programmes, those in Malawi and in Ethiopia, have now been analysed. Preliminary analysis of this cost data indicates that the cost-effectiveness of emergency/transition CTC programmes is comparable to other mainstream child survival interventions such as vitamin A provision, oral rehydration therapy for diarrhoeal disease and treatment of acute respiratory tract infection. The cost for each year of life gained in two established CTC programmes varied between \$12 and \$132. This depended on the density and prevalence of severe acute malnutrition, the numbers of acutely malnourished treated, the infrastructure present, accessibility and the maturity of the emergency intervention [37]. The development of local production of Ready to Use Therapeutic Food, using new cheaper recipes based upon locally available grains and pulses should further reduce costs.

To our knowledge, the only other cost data comparing community-based treatment of severe malnutrition with centre-based care was undertaken in Bangladesh in the mid 90s. In these programmes, the cost of community-based rehabilitation was approximately 25% of the cost of inpatient care (Tk6363 inpatient

compared to Tk1552 for community-based care) [38]. In this study however, the community-based programmes did not provide any nutritional supplements for those treated in the community. With the addition of the cost of 10-15Kg of RUTF the average amount require to obtain a cure in OTP, at a current cost of approximately \$35 – \$52.5; community-based programmes would still have been under 50% of the inpatient costs. With the move to local production of RUTF using local crops (see below) these RUTF costs will be reduced substantially.

## **Community engagement**

The quality of engagement with target communities is a vital determinant of the success of a community-based programme. Community mobilisation is crucial for effective early case-finding and early case finding and the quality of OTP service provision are the two most important determinants of case fatality rates, programme coverage and the impact of the programme.

We use the term ‘community mobilisation’ to refer to a range of activities that help implementers understand the affected communities, build relationships with them and foster their participation in programme activities. The objective is to enhance the immediate programme impact whilst creating a platform for comprehensive community mobilisation over the longer term. Fostering community participation at the beginning of the programme also facilitates integration with other longer-term programmes in other sectors such as health, food security etc.

Although community mobilisation is a continuous process, it is usefully conceptualised as being divided into 5 areas. These are presented in Figure 2.



Visual aids and “fliers” posted in key places and disseminated to key stakeholders (traditional leaders, teachers, CHW etc) can enhance the effectiveness of this process.

The messages should be disseminated through the channels of communication that the community usually uses. These might be formal or informal, traditional or modern. Our experiences are that informal channels tend to be particularly useful. It is also important to consult and involve key community figures, community organisations and groups such as volunteer networks and women’s associations. In particular, our experiences indicate that it is crucial to involve traditional health practitioners. These practitioners are often the first tier in health seeking behaviour so can therefore help identify cases at an early stage. They are also recognised in their communities and can potentially help facilitate dissemination of information thereby improving programme uptake. Conversely, excluding them from the process can lead to resentment and negative feedback. There is however, a risk associated with involving traditional health practitioners: some traditional practices can have a negative impact and there is a danger that, by association with a CTC programme, such practices could be acknowledged and validated. Decisions on the channels of communication and on engagement with different actors can therefore, only be made based upon an understanding on the local community dynamics.

Our experiences indicate strongly that it is inadvisable to use financial rewards to motivate community sensitisation. People who are paid for delivering messages may not necessarily be convinced of the message or convincing whilst communicating it. If material benefits are offered, communities often put forward the more powerful and privileged to do the work and more motivated, interested and credible people may be excluded.

Community sensitisation is an ongoing process. Much of the activity takes place early in the programme but it should be continually reinforced throughout the programme in order to be effective. The process should be seen as a constant dialogue in which communities can periodically voice their views and suggest alternative courses of action. There must be channels of communication set up through which feedback from the target population can influence programme design and implementation. There are many examples where such feedback has proved essential in increasing coverage & compliance in CTC programmes.

### **Case finding - The identification of severely malnourished children in the community**

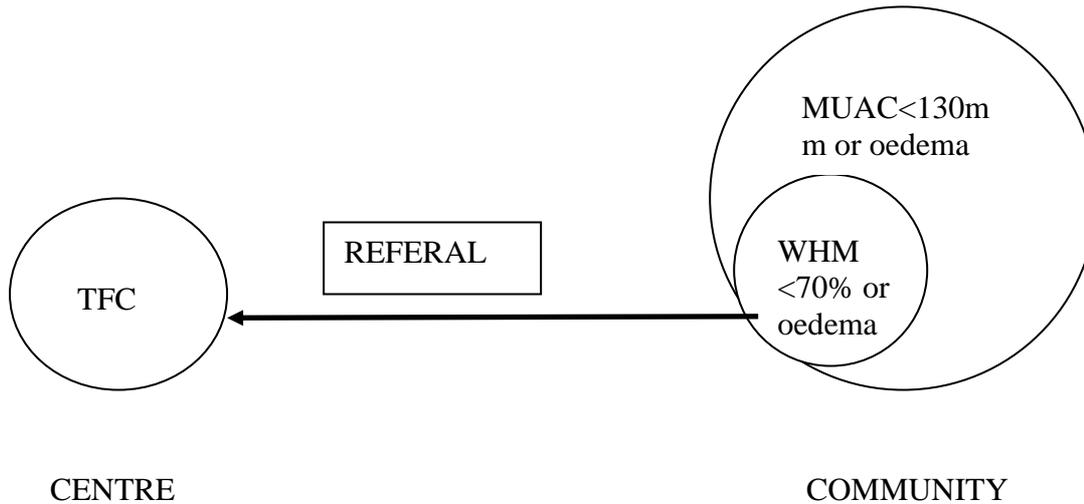
In order to be able to provide the largest possible proportion of the acutely malnourished population with access to care, a programme needs to be very effective at identifying people who need care and admitting them to the programme. To reduce the barriers to access, screening must take place in the community using a simple, low cost method that is easy for community-based volunteers to use and is accepted as fair and transparent by the population.

Traditionally, therapeutic feeding programmes use weight-for-height percentage of median (WHM) and/or the presence of bilateral pitting oedema as admission criteria whilst at the same time screening in the community using Middle Upper Arm Circumference (MUAC) and WHM measurements.<sup>4</sup>

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<sup>4</sup> First, potential cases are identified using a sensitive MUAC threshold (e.g. 130 mm) or by the presence of bilateral pitting oedema; second, children with a MUAC below the threshold are weighed and measured and their WHM calculated. Children with a WHM

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**Figure 3 Screening and admission in a traditional therapeutic programme**

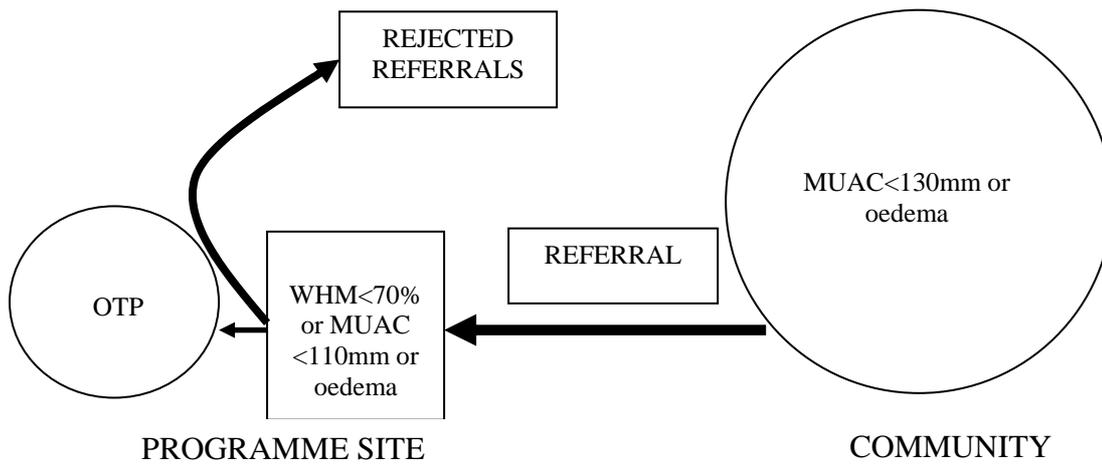
This two-stage community screening can be a lengthy and resource-intensive process. Normally it requires three people to perform and record the necessary measurements accurately. They need to be literate and numerate, equipped with scales, height boards, electronic calculators and WHM tables and must be skilled in using WHM. The team often needs a vehicle to transport them and the equipment to screening sites. In some cases it may be possible to store equipment locally, but skilled staff still need transport of some kind to reach screening areas (car, donkey, bicycle etc). These requirements tend to limit screening activity to particular areas and reduce the frequency of screening activities and therefore coverage and referral numbers.

In early CTC programmes, a two-stage screening method involving WHM and MUAC was used. Outreach workers and volunteers referred children with a MUAC below a sensitive threshold or with bilateral pitting oedema, to the distribution points. Children who were referred and arrived at a distribution point were weighed and measured and their WHM calculated. Children with a WHM below the admission threshold or with bilateral pitting oedema were admitted into the programme. Children with a WHM above the admission thresholds and without bilateral pitting oedema were rejected.

In practice, this scheme resulted in a large number of children being referred by MUAC only to be rejected at the distribution site by WHM. This caused problems in the community. The carers of rejected children were dissatisfied with having to walk up to three hours to the site only to be told that their child would not be admitted. As a result, they were unwilling to return to the programme even when their children's condition deteriorated. In some cases they actively disparaged the programme reducing presentation and programme uptake. Local leaders who had supported the programme also became disillusioned. Taken together, this dissatisfaction amongst the local community eroded the prestige and devalued the work of the community volunteers and outreach workers. Morale and performance amongst outreach workers and community volunteers declined and there was a negative effect on the number of admissions, frequency of early presentation, programme coverage and impact.

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below an admission threshold (usually 70% WHM) and those with bilateral pitting oedema are referred for admission. In this scheme, all children who are referred and arrive at a centre are admitted.



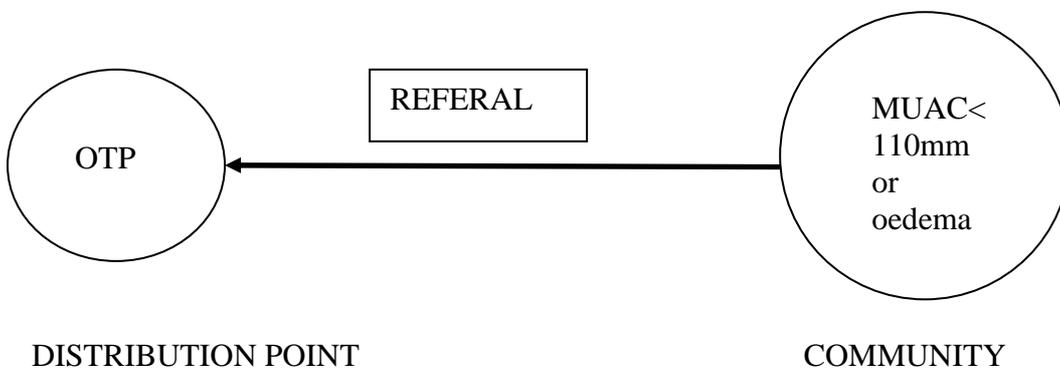
**Figure 4 Two-stage screening using WHM, MUAC and oedema**

We have also see the WHM admission criteria cause problems for CTC programmes operating in non-emergency contexts. Frequently, ongoing programmes such as growth monitoring, maternal and child health and other community nutrition programmes use a different indicator of malnutrition that includes a weight but not a height component. Maternal and child health programmes, for instance, tend to use a weight-for-age indicator. This can create confusion amongst programme staff and amongst programme clients over the significance of the different nutritional indices. This again creates resentment and hinders sectoral linkages

CTC programmes now recommend the use of MUAC only criteria for referral and admission to OTP. This helps ensure that all children who are referred by outreach workers or volunteers and arrive at a distribution point are admitted (see Myatt et a. in this edition of FNB).

The criteria for children >65cm height and/or age >6 months are:

MUAC < 110 mm and / or oedema: refer / admit to OTP



**Figure 5 Recommended screening and admission method for OTP**

The change from using WHM to MUAC for screening and admission has many practical benefits that allow programmes to achieve high coverage and treat many more patients:

- It strengthens the interface between the programme and the beneficiary community. MUAC is simple to measure and allows community volunteers to refer children for admission directly to the programme. Many more people are directly exposed to the activity of curing malnourished children and this is a powerful and effective motivational motor.
- It is a one-stage process in which referral entitles admission. This avoids the reduced coverage caused by confusion and disillusionment that result from a two-stage process when children are referred but not admitted.
- It is a simple, low-cost method so other service providers can also screen and refer using MUAC without greatly increasing their workload. Linkages between the CTC programme and other sectors and services are therefore facilitated. Confusion caused by using different weight-based indicators that select completely different children (e.g. weight-for-age and weight-for-height in growth monitoring and MCH programmes) is avoided.
- Distribution points function more efficiently. Delays and crowding are reduced because people do not need to be re-screened for admission.
- Comparative studies have shown that, when used by community health workers who have little training, MUAC is subject to fewer errors than weight-for-height.
- Last but not least, MUAC is a more sensitive indicator of mortality risk associated with malnutrition than WHM. It is therefore a better measure for the identification of children most in need of treatment.

There are situations where WHM should still be used for admission to programmes. They include places where national strategy dictates and where other agencies working in the area are using it and programme linkages need to be fostered. In these cases, compensation should be offered to those turned away in order to minimise the negative effects on programme coverage described above.

The rationale for the use of MUAC in CTC programmes is explored in other background papers for this consultation.

### ***Active case finding***

If sufficient initial resources are put into sensitisation, self-referrals from the community will provide the mainstay of case-finding. However, in order to maximise coverage, we have found it important to supplement self-referral with continual active case-finding. The case-finding process should be adapted to the programme context. In a development context, programme sustainability is more important than

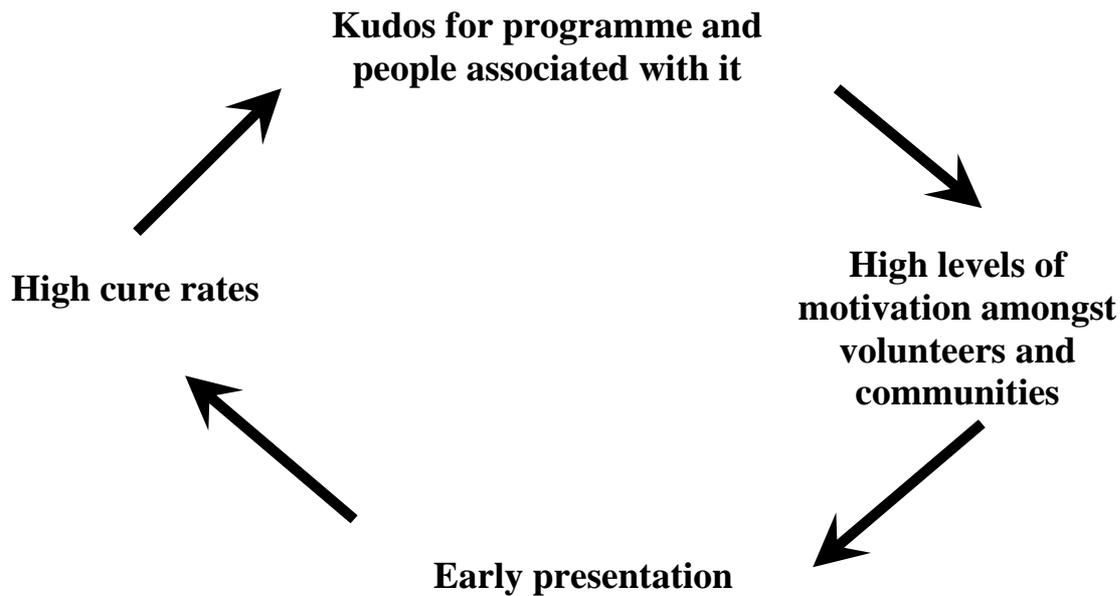
attaining immediate high coverage and a volunteer-based system is usually more appropriate. In an emergency response, rapid high coverage is the priority and paid outreach workers are often employed to work with volunteers. Two approaches to active case-finding can be used: periodic screening and focal points.

## **Volunteers**

There are two major challenges facing volunteer-based case finding systems. These are choosing volunteers who are representative of their communities and secondly motivating volunteers to perform their roles without financial incentives. Developing effective methods to achieve this has been central to the past 4 years of CTC research and development.

A unique strength of CTC programmes is their high potential to motivate mothers, volunteers and health care workers. In centre-based approaches to the treatment of acute malnutrition, responsibility for care and therefore the kudos associated with cure, is placed with health professionals; families and carers rarely understand the techniques used and rarely feel part of the process. By contrast, in CTC programmes the vast majority of cases of severe acute malnutrition are treated by simple understandable care delivered by the carers themselves. Treatment rapidly creates marked changes in the mood, appearance and activity of the malnourished child and these positive changes are obvious to parents, health care workers and the wider communities alike. This provides extremely positive feedback to carers and anybody who has felt or who has been seen to be associated with that cure. This ability to engage and motivate people is absolutely crucial and, in the authors' opinions, is probably the most important feature that has underlain the success of CTC to date.

The positive feedback associated with a community-based cure of severe acute malnutrition is an extremely powerful motivating force that both stimulates demand and uptake of CTC and motivates volunteers to support the programmes. If nurtured and used appropriately, this motivation can encourage mothers and traditional practitioners to refer children to CTC and motivate volunteers to case find and monitor problematic cases. In addition, linking local health care workers to the successful treatment of individuals motivates these workers and enhances their credibility amongst the local people. The sustained high coverage and early presentation seen in the first Malawian and Ethiopian CTC programmes indicates that it is positive to set up a positive self-sustaining cycle, whereby people and communities are motivated to present early for treatment; this promotes high cure rates; this enhances the credibility of the programme and anybody associated with it; this promotes further early presentation (see Figure 6).



**Figure 6 Positive cycle promoting sustainable case-finding**

Active case-finding by volunteers has several advantages. Volunteers are usually local and therefore familiar with the area, its population and customs and known by the community members. Crucially, designing outreach strategies around volunteers motivated by the positive reinforcement associated with a successful programme, requires fewer financial resources. This means that over the long-term, procurement and delivery of RUTF and basic oral medications are the only additional resources required to implement OTP through MoH clinics. In Malawi and Ethiopia where the first CTC programmes have now been operating since 2002/3 purchase and transport of RUTF are the only substantive elements of external support still provided by Concern Worldwide.

There are several generic techniques that aid successful volunteer-based systems. These are to ensure that volunteers feel connected to and gain Kudos and recognition from successful treatments in OTP; to identify members of the community who are already motivated and engaged in community activities and to find ways other than financial or material incentives of recognising volunteer contribution (e.g. offering refresher training, organising social gatherings with food, certificates etc). It is also vital not to expect too much from individual volunteers, all of whom must make their living at the same time and therefore have little time to devote to unpaid community activities. In practice this often means having large numbers of volunteers each of whom only cover a small area. This takes some initial investment in selection and training but thereafter, the system can become to a large extent sustainable with only small investment on maintaining motivation and organisation.

### **Selection of volunteers**

Facilitating the community to select volunteers is a more participatory approach. However this can have drawbacks. The most common problem is the tendency for communities to select young, literate men and people related to community leaders. Alternatively the programme implementer, be they MoH or NGO, can identify and recruit volunteers. For this to work it is important that unnecessary or

inappropriate criteria such as “literacy”, that separate volunteers from the programme’s target population are avoided [25]. In practice, we have found that a compromise wherein the community selects the volunteers with the implementer monitoring the process and encouraging the active participation of groups, particularly women who may otherwise be excluded, is usually the most appropriate method.

### **Positive carers**

It is important to complement this approach by identifying ‘positive carers’ from within the programme clients. In most CTC programmes the energy and commitment of these mothers has proved invaluable in assisting with active case-finding and on occasion with following-up and supporting other carers. Using a technique similar to the positive deviance approach and the Hearth model, we have found that staff can easily identify ‘successful’ mothers/carers. However, as most ‘positive carers’ are mothers with household responsibilities, their range of activity is usually limited to their own village.

### **Existing MoH health volunteers**

It has also proved possible to integrate MoH health volunteers (for example Growth Monitoring Volunteers, Community Health Volunteers, Village Health Committees) in CTC case-finding if they are familiar with the area, people and customs. These pre-existing volunteers have knowledge of health issues and usually have standing in the community with villagers willing and accustomed to seek their assistance. However, health volunteers are often fully occupied with their MoH work and case-finding for the CTC programme may be an unrealistic additional burden. It is important to maintain realistic expectation from volunteers.

### **Outreach workers**

Outreach workers are paid to perform community outreach activities. Literacy is not a requirement but it can facilitate the referral process. The advantage of employing outreach workers is that case-finding tends to be more organised. The salary may be the primary income source for the worker and his/her household and it encourages focus. In humanitarian operations paid outreach workers are a feasible and affordable option, however, employing outreach workers is relatively costly and, in long-term programmes, this cost is usually unsustainable. For that reason, most non-emergency CTC programmes employ few if any paid outreach workers.

During the development of CTC even for emergency programmes, our focus has progressively moved away from paid outreach workers towards a more volunteer orientated system. Finding and treating cases of acute malnutrition is usually a traditional function of informal community support mechanisms and, the introduction of a paid system can undermine this, creating problems over the longer term. We have found in several emergency programmes that a volunteer system can produce rapid coverage without eroding vital informal support mechanisms.

### **Combining outreach workers and volunteers**

There are some potential drawbacks to working exclusively through volunteers. The volunteer’s agricultural or other income-generating activities often limit the extent of their involvement and they may be less accountable to the programme because they are not on the payroll. In practice, combining volunteers with a very few paid outreach workers is often an appropriate solution, particularly at the start of programmes. In humanitarian responses this combination usually facilitates a more rapid expansion of

the programme and its coverage. In larger developmental programmes, mobile outreach workers can be responsible for a large catchment area while volunteers cover smaller areas and communities. For example, it is often more feasible to engage women as volunteers at a village level, while paid outreach workers cover larger areas, facilitating coordination and providing volunteers with a focal person with whom to discuss issues arising from their work or the community. In other situation such as urban settings, where volunteers and paid outreach workers potentially come from the same communities, a combination of the two might be more difficult and may have the potential to promote conflict. In these settings a volunteer only model or an extension worker model might be more appropriate. Context specific sociological enquiry will be needed to make appropriate decisions.

Our experiences suggest that even if paid outreach workers are used in larger numbers at the start, the programme should move towards community volunteers as the mainstay of case-finding as soon as possible. In longer-term programming a primarily volunteer system is often feasible from the outset.

The system for active case-finding through outreach workers and/or volunteers can also serve to follow up absentees and defaulters from OTP and SFP programmes. This strategy has been tried successfully in several CTC programmes.

### **Case finding using focal points**

Individuals in each village or cluster of villages can function as focal points to identify cases and be a link between the community and the programme. Working with village focal points is a particularly useful approach in situations where the mobility of outreach workers and volunteers is limited, for instance by insecurity, geography or logistical constraints. Contact between the programme and a focal point in an isolated community can be maintained by exchange of messages in circumstances when outreach workers and volunteers would have little or no access. When identifying people as focal points, consideration should be given to existing community members and structures and for dealing with health (e.g. traditional practitioners and village health committees etc) and the possible social implications of adding additional people to this system.

### **General considerations**

Certain challenges are common in case-finding; the most important are:

#### **Confusion about entry criteria**

MUAC is often used to screen people for referral to OTP access points, where they are screened again for admission using Weight for Height. In such cases, it is possible that people referred to OTP are not admitted because they do not meet the WHM criteria. This can cause hostility towards outreach workers and volunteers and refusal by mothers to comply with future referrals. To date, this has been the most common source of friction between CTC programmes and beneficiary communities. In a system that uses both WHM and MUAC, case-finders (outreach workers or volunteers) should be trained to explain to carers that referral does not guarantee entry into the programme. Our experience is that it is helpful to provide some form of compensation to the carers of children who are not admitted. This should be appropriate to the context and practical for the implementer - a bar of soap, for example.

CTC programmes are now moving towards MUAC criteria for both referral and admission in part to avoid this problem (see above).

### **Travel requirement**

In widely dispersed communities, volunteers and outreach workers may have to travel long distances on foot each week to visit villages and individual houses. This needs careful consideration when the case-finding strategy is developed. Various factors have to be taken into account: the size of the area and nature of the terrain, the number of case-finders involved, and the capacity of the implementing agency to reward them. In general volunteer systems work best if volunteers are not asked to travel outside of their villages. It maybe possible to combine existing mobile health workers, such as MCH coordinators, with outreach workers.

### **Coordination**

In situations where many NGOs are working in an area, volunteers may be working alongside other volunteers who are supported by a different agency. This is particularly common in large emergency responses. Approaches to active case-finding should be coordinated to avoid counter-productive activity and conflicting messages. For example, a strategy based on unpaid volunteer case-finders can be threatened if a neighbouring agency introduces payment as unpaid volunteers are likely to be discouraged and de-motivated.

### **Communities during humanitarian interventions**

The concept of “community” in CTC is that of people that identify themselves with common ideas, beliefs and practices. In practice, the sense of community is more based upon internal factors such as shared ideas and relationships than it is about external manifestation such as home villages, landmarks, cultural sites etc. The evidence for Darfur clearly demonstrates that communities, in this broad sense, can endure social disruption and if appropriately approached, they can potentially be incorporated into community-based responses[39].

## Protocols & Procedures

### Selection of patients for outpatient therapeutic care

#### ***Outpatient care for severe acute malnutrition***

There is now good evidence that severely malnourished children who are not suffering from additional serious medical complications can be successfully treated with outpatient therapeutic care alone.

Monitoring data presented in Table 2 demonstrates that 76% of cases of severely malnourished children (defined according to criteria of <70% WHM [7] or a MUAC < 110mm [40]), presenting to the first 21 CTC programmes operating in Malawi, Ethiopia, Sudan and Niger received only outpatient care. Overall outcomes from these programmes exceed all international standards, and are better than those obtained in the only comparable series of severely malnourished children treated by more conventional Therapeutic Feeding Centres (TFC) [30].

More detailed data is now available from an analysis of the clinical record cards of the first 1,400 severely malnourished children admitted into the CTC programme in Dowa district Malawi. The Dowa programme was set up in June 2002, as a humanitarian programme implemented by Concern Worldwide and the MoH. Initially the programme tried to follow the Malawi national protocols that stipulated inpatient care for all severely malnourished children. At the same time, the programme implemented a policy of early discharge and outpatient treatment in the recovery phase. However, the inputs into community mobilisation soon increased programme coverage to over 70% and this high coverage resulted in many more severely malnourished children presenting to the programme than could be treated by the inpatient capacity available in Dowa. Therefore the programme was forced to treat a substantial number of severely malnourished children solely as outpatients. In addition, many carers aware that there was outpatient treatment available, refused admission into the inpatient centres.

Table 6 presents the outcomes of children suffering from severe malnutrition, disaggregated by whether they received only outpatient treatment or a combination of initial inpatient treatment followed by early discharge into outpatient treatment. A direct comparison between these two groups is inappropriate as the children admitted into inpatient care were usually those whom the staff considered to be most sick. However, Table 6 clearly demonstrates that severely malnourished children including those with grades one or two oedema, who are not suffering from additional serious medical complications, can be treated successfully with outpatient treatment alone.

**Table 6 Outcomes from clinical cards - first 1,400 severely malnourished children treated in Dowa CTC**

**N = 1,400.**

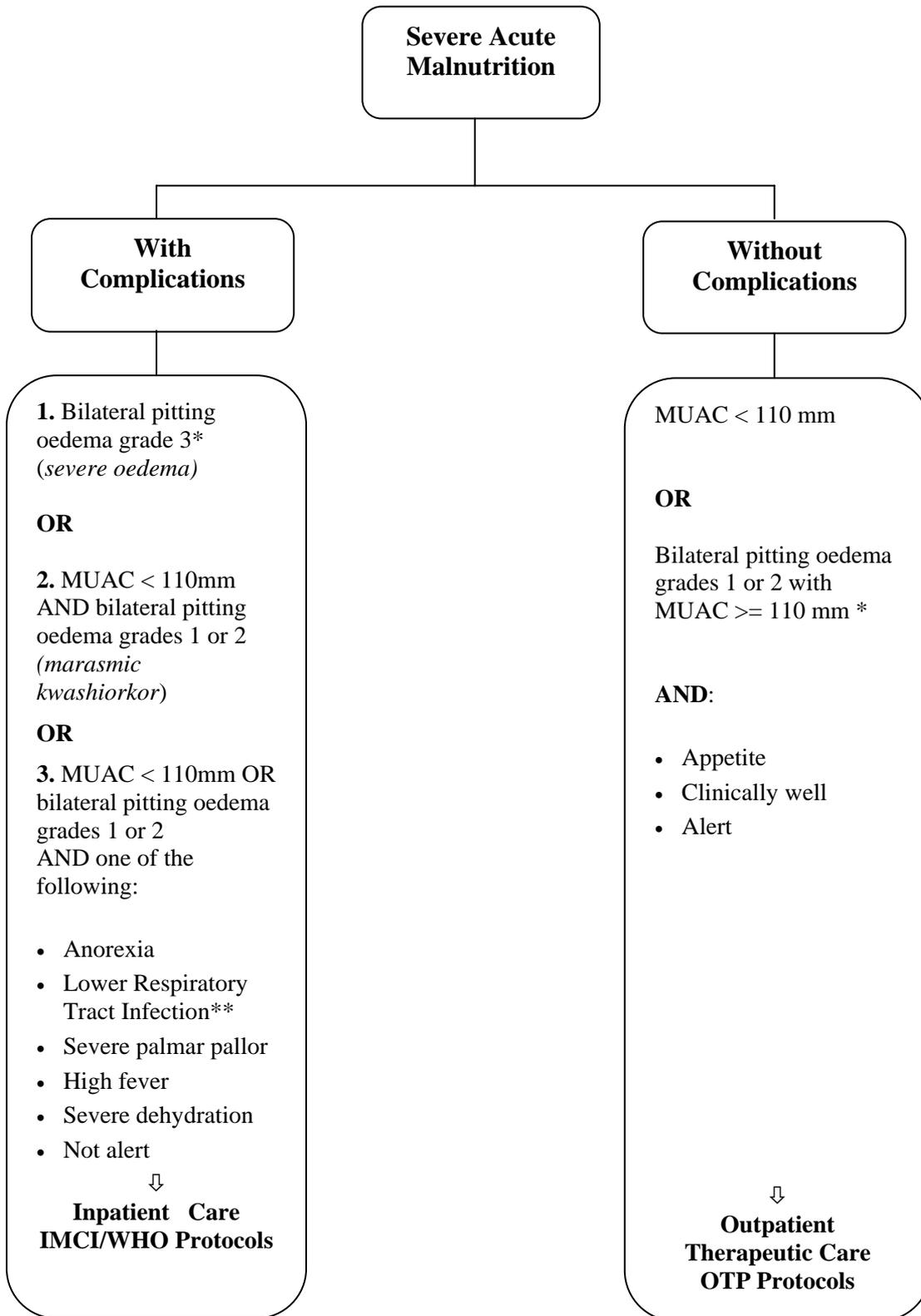
%	All*		Oedema +		Oedema ++		Oedema +++		Non-oedematous	
	Direct n=347	Indirect n=1,053	Direct n=138	Indirect n=94	Direct n=31	Indirect n=335	Direct n=0	Indirect n=258	Direct n=19	Indirect n=69
<b>Recovered</b>	85.3	84.0	83.3	81.9	90.3	86.3		82.6	68.4	82.6
<b>Default</b>	12.7	8.4	15.2	10.6	6.5	8.7		7.4	21.1	4.3
<b>Died</b>	2.0	7.7	1.4	7.4	3.2	5.1		10.1	10.5	13.0

\* includes children diagnosed as having oedema but where grade of oedema was not specified

**Classification of acute malnutrition**

The addition into international protocols of the outpatient treatment for severe acute malnutrition without an inpatient initial phase for stabilisation requires a change to the existing WHO classification of wasting and oedema. The existing WHO classification has only two categories for acute malnutrition: severe malnutrition and moderate malnutrition, defined according to anthropometry and the presence of bilateral pitting oedema. This classification was operationally useful when there were only two modes of treatment available; inpatient therapeutic care for people with severe acute malnutrition and outpatient supplementary feeding for those with moderate acute malnutrition. However, the addition of a new mode of outpatient treatment for the severely malnourished requires the division of the severe acute malnutrition category into either “severe acute malnutrition *without* complications” for severely malnourished patients who can be treated successfully using outpatient treatment alone, or “severe acute malnutrition *with* complications” for those who require inpatient treatment [41]. The moderate classification remains the same. This revised classification as it applies to severe acute malnutrition is presented in Figure 7.

In community-based programmes, this division of severe acute malnutrition is important to provide a basis for patient flows through the system and guiding staff in their decision on whether people needs inpatient or outpatient treatment. The additional “severe acute malnutrition *without* complications” category, combined with direct admission into outpatient therapeutic programmes, avoids many possible negative consequences for patients and the programme. If patients with “severe acute malnutrition *without* complications” are admitted into inpatient centres, they are exposed unnecessarily to additional risk of infections. The carer, usually the mother, has to spend a substantial period away from her family including other children. This may result in increased malnutrition in the other children and undermine the economic activity and food security of the household. It is also usually unpopular with people and discourages early presentation and encourages default. The inappropriate use of inpatient care also has important resource implications with space and resources in resource-intensive inpatient centres allocated to patients who do not need inpatient care, thereby reducing the programme’s impact and increasing its costs. On the other hand, if cases of severe acute malnutrition *with* complications are not admitted into inpatient care, morbidity and mortality will increase.



\* Oedema grades are: Grade 1 is mild oedema on both feet/ankles; grade 2 is moderate oedema on both feet, plus lower legs, hands, or lower arms and grade three is severe oedema generalized oedema including both feet, legs, hands, arms and face  
 \*\* IMCI criteria for the diagnosis of LRTI are given in Table 10

**Figure 7 Classification of severe acute malnutrition used in CTC programmes for children between 6-59 months or 65-110 cm as a proxy of age**

This classification will help harmonise the criteria for severe acute malnutrition used in humanitarian therapeutic feeding programmes with those included in the IMCI guidelines for more stable situations. At present, there are marked discrepancies between humanitarian practice as recommended by the WHO and the IMCI guidelines. Humanitarian guidelines use WHM (or z scores) and presence of oedema as criteria for admission into therapeutic feeding. By contrast, WHM has never been recommended by the WHO for community screening. Instead, the IMCI assess weight for age but bases admission into hospitals upon the presence of “visible severe wasting”, severe palmar pallor or oedema of both feet. Attempts have been made to introduce WHM into community screening [42], but these have never been widely accepted. The classification in Figure 7 will not only improve the sensitivity and specificity with which those requiring specialised support are chosen, it will also simplify the interface between humanitarian and developmental programmes, decrease confusion between WHM and WFA amongst primary health care workers and the people they serve. This will help reduce barriers to the integration of humanitarian programmes with ongoing primary health care, and should improve continuity between humanitarian responses and ongoing MoH services. Replacing “visible severe wasting” with a more quantifiable MUAC <110mm criteria, will also improve discriminatory power and decrease subjectivity in the referral of severely malnourished into treatment programmes. Oedema occurs in both this classification and the IMCI criteria. The only change is to include moderate oedema (grades one and two) as criteria for outpatient programmes and only severe oedema (grade three) as a criterion for inpatient admission.

### **Protocol and procedures for OTP**

The Outpatient Therapeutic Programme (OTP) provides treatment and rehabilitation for children with severe malnutrition with no additional serious medical complications (see Figure 7). Depending on the effectiveness of the community mobilisation, active case finding and the public health environment where the programme is operating, the proportion of childhood cases of severe acute malnutrition who present at a stage when they require inpatient care is only 10-15%. This means that in a well designed programme, approximately 85-90% of severely malnourished children presenting for treatment can be admitted directly into the OTP and treated solely on an outpatient basis. The other 10-15% requires initial inpatient care before being discharged into the OTP during the recovery phase (see below). Our experiences indicate that the proportion of cases that can be successfully treated as outpatients is directly related to the quality of mobilisation and active case finding.

Patients in the OTP receive routine medicines for severe malnutrition (oral antibiotics, folic acid, anti-helminth drugs and if appropriate anti-malarials (see annex 3)) and 200Kcal/kg/day of RUTF to eat at home. They attend the OTP every week or fortnightly to have a medical check up, receive additional medical treatments if required, and to be given a supply of RUTF sufficient until their next appointment.

### **Planning**

An OTP is implemented through multiple decentralised access points. Existing health structures are appropriate and are used wherever possible. If these do not exist, an OTP can be run from a temporary shelter under a tree or in a community building, potentially in coordination with mobile EPI or MCH clinics.

It is important that the site and timing of OTP clinics should be made in consultation with the target population (see above).

The basic OTP protocols are very simple. They involve basic clinical assessment and the prescription of oral antibiotics and require a clinical staff member, ideally a nurse. Our experience is that most nurses can become proficient in implementing the protocols with one or two days formal training, supplemented by on the job initial support and mentoring. Supervisory visit should be built into the monitoring and management schedules for new districts starting OTP. If numbers are high, in particular during emergencies and at programme start-up, additional support staff will be needed to perform height and weight measurements, treat children and to supervise the programme. This support is most easily provided by a dedicated mobile team that rotate around OTP distribution sites. The move away from the use of WHM towards MUAC only screening and admission criteria, will greatly simplify the implementation of OTP, substantially reducing staffing requirements.

During a nutritional emergency, the OTP should always be run alongside an SFP. The OTP and SFP should be close to each other but separated sufficiently to avoid the OTP being disturbed by crowds attending the SFP.

## ***Treatment protocols***

### **Admission criteria**

The initial CTC programmes used admission criteria based on WHM, MUAC and the presence of bilateral pitting oedema. However, more recently in order to improve the admission and screening procedures and facilitate community mobilisation (see above), we abandoned the use of WHM in favour of the OTP admission criteria presented in Table 7.

**Table 7 OTP admission criteria**

<b>New admissions</b> <i>children 6-59 months or 65-110 cm as a proxy of age</i>	MUAC < 110mm
	Bilateral oedema grade + or ++ <b>AND</b> MUAC > 110mm
	Do not meet SC admission criteria
<b>Other Admissions</b>	Admissions that do not fulfil above criteria (e.g. teenagers, adults) or anthropometrical criteria for admission (e.g. second twin,* clinically very wasted, moderate cases who had complications and need closer monitoring in OTP after stabilisation).
<b>Choice</b>	Carer refuses inpatient care despite advice (though these are treated as a new admission).
<b>Inpatient Discharges</b>	From inpatient care (SC/TFC/ nutrition rehabilitation unit (NRU)/hospital) after 'stabilisation' treatment.**
<b>Readmission / Relapse</b>	Previously discharged cured and again fulfils OTP criteria.
<b>Returned</b>	After defaulting from OTP.***

\* In the case of twins where one is severely acutely malnourished and the other is not, both should be registered and admitted to the OTP. This is because sharing between the twins can be assumed. The non-malnourished twin should be given the RUTF but not the routine medicines.

\*\* In addition, infants less than 6 months who have been discharged from the SC can be admitted to the OTP in this category so that their weight and general medical condition can continue to be monitored. They do not however receive RUTF.

\*\*\* Returned defaulters are admitted back into the programme to complete their treatment if, on return, they have not yet reached the criteria for discharge from the OTP.

Before admission, all patients are assessed by a clinically trained health worker. This assessment includes a history of the presenting condition taken from the mother/carer and a medical examination to rule out complications that require inpatient care. The examination includes checks for oedema, appetite, vomiting, temperature, respiration rate, anaemia, superficial infections, alertness and hydration status. The appetite is assessed by giving the child some RUTF to try and seeing whether they eat it freely. Care should be taken to provide sufficient time and a calm environment to allow the child to try the RUTF in its own time. This may take some time, but is a vital step in the process of deciding whether the child is suitable for direct admission into outpatient care. The health worker must observe the child eating the RUTF before he/she can be accepted for outpatient treatment. A child who continues to refuse to eat is referred for inpatient care until appetite returns. The child's appetite should be tested at all subsequent OTP appointments.

All information from the medical check is recorded on the child's OTP Card (an example is given in Annex 1). Children that have no major medical complications and are able to eat the RUTF are admitted directly into the OTP.

### **Nutritional treatment**

OTP provides 200Kcal/kg/day of Ready to Use Therapeutic Food to each patient. The carer is taught to give RUTF to the child in small amounts frequently (up to 8 times a day). Health workers emphasise the need for the child to consume the entire RUTF ration before eating other foods. If the mother is still breastfeeding, she is advised to give the RUTF after breast milk. Health workers emphasise that the RUTF is both a medicine and a food that is vital for the recovery of the child. They also explain that water must be given to a child eating RUTF to keep them adequately hydrated (see Annex 2 Key Education Messages for the OTP).

In humanitarian programmes, a ration of CSB/UNIMIX is also given to the carer. This is not for the severely malnourished child but is provided for the other children in the family to minimise any sharing of the RUTF. It is given every two weeks as part of the supplementary feeding programme and may vary between 1000 and 1200 kcal per beneficiary.

Evidence is now emerging that in stable situations this supplementary ration is not necessary. The Malawi and Ethiopian CTC programmes were both started as emergency programmes combined with a SFP and a CSB/UNIMIX ration for the carers; however, during the transition to longer-term programmes as part of the primary health care infrastructure, these supplementary rations have been stopped. Table 4 and Table 5 indicate that both programmes have maintained their recovery rates after the end of this ration and coverage rates have also remained high. In developmental situations where there are not high levels of food insecurity we now recommend implementing OTP in the absence of supplementary rations. In humanitarian programmes design to serve highly food insecure populations we continue to provide supplementary rations.

### **Medical treatment**

Routine medicines are given to all children admitted to the OTP. Treatment is based on the principles used for inpatient treatment using the drugs available on the Essential Drug List in the country of

operation (see Annex 3 Routine medicines in OTP). The protocol has been adapted so that, where possible, medicines are given as a single dose treatment. This helps to avoid problems with compliance. For drugs such as Amoxicillin or Fansidar that require more than one dose, the first dose is given in front of the health worker and remaining doses given by the mother at home.

### Health education

The OTP provides an opportunity to talk over important health messages with clients. When a child is first admitted to the programme, it is essential to ensure that information about how to give RUTF, how to take the antibiotic at home, and basic hygiene are understood by the main carer. We have developed some key messages and these are presented in annex 2. No other health education messages are given on the first visit to avoid overloading the carer with new information. Where ever possible, soap is given to all OTP carers every two weeks to facilitate hygiene, in particular hand washing before feeding of RUTF.

### Discharge criteria

Previously we based OTP discharge criteria on WHM, the absence of oedema and a good clinical condition. However, the WHM criterion proved problematic for those few children admitted because of a MUAC less than 110mm but who had on admission a WHM of more than 80%. For those children, we used a minimum 2 month length of stay, absence of oedema and being clinically well. The move to MUAC only admission requires that the previous WFM discharge criteria be changed across all CTC programmes. At present, we propose a system based on weight, absence of oedema, the length of stay in the programme and clinical condition. This is presented in Table 8. Using only weight to monitor and discharge patients is easier than including height, less confusing when combined with weight for age indicators and only requires a set of scales.

**Table 8 Current OTP discharge criteria**

<b>Discharged cured</b>	Minimum stay of 2 months in the programme, MUAC >110mm, no oedema for a minimum of 2 weeks, evidence of sustained weight gain* and patient is "clinically well"***
<b>Defaulted</b>	Absent for three consecutive weeks.***
<b>Died</b>	Died during time registered in OTP.
<b>Transferred to inpatient care</b>	Condition has deteriorated and requires inpatient therapeutic (SC/TFC/NRU) or hospital care.
<b>Non-recovered</b>	Has not reached discharge criteria within after a minimum of four months in OTP if weight is stable and all available treatment options (e.g. home visits, inpatient stabilisation, hospitalisation, ART programmes, TB treatment programmes) have been pursued.****

\* Sustained weight gain is a gain in weight every week for three consecutive weeks. Note, in humanitarian programmes, all OTP discharges are sent to the SFP where they stay for a minimum of 2 months (longer if they have not attained the SFP discharge criteria by that time)

\*\* Where a SFP is included, all OTP discharges should be sent to the SFP where they stay for a minimum of two months (longer if they have not attained the SFP discharge criteria by that time).

\*\*\* After the second "no show" potential defaulters should be followed-up by a home visit to ascertain the reasons for the absence

\*\*\*\* Before this time, children must have been followed-up at home and where possible, should have been transferred to SC inpatient care for investigations. An OTP action protocol helps health workers identify reasons for non response (see Annex 4 Action protocols for follow-up). Discharged non-recovered children should be sent to the SFP if this is in operation. Where possible they should be put in contact with community-based support organisations operating in their villages. They can be readmitted to the OTP if they fulfil entry criteria again and are therefore once more at high risk of mortality.

**Percentage weight gain discharge criteria**

An alternative approach that also requires that only weight is monitored would be to use the “percentage weight gain” as a discharge criterion:

$$\frac{\text{Current weight} - \text{Weight at admission}}{\text{Weight at admission}} \times 100$$

With this approach patients would be discharged once their percentage weight gain exceeded a cut-off value based on their weight at admission (or lowest weight after loss of oedema for patients presenting with marasmic kwashiorkor). Preliminary analysis of data from CTC programmes in Malawi and Ethiopia suggests that a cut-off of 15% would result in approximately 50% of discharges meeting or exceeding 80% of the W/H reference median and that a cut-off of 18% would result in approximately 50% of discharges meeting or exceeding 85% of the W/H reference median. Percentage weight gain could be combined with a MUAC cut-off. For example: Discharge as cured if MUAC  $\geq$  115 mm AND percentage weight gain  $\geq$  15%. The calculation of percentage weight gain could be simplified by the use of a look-up table (see article by Myatt et al. in this issue).

**Fixed length of stay discharge criteria**

There are aspects of CTC programmes (e.g. the concentration on maximising programme coverage and community-based delivery of services) that are more typical of “public health” or “mass treatment” interventions than traditional centre-based models of service delivery. In such interventions, adherence to stringent technical standards, service delivery, and the achievement of high coverage takes precedence over individual responses to the delivered intervention. From this perspective it may be reasonable to adopt a fixed length of treatment for CTC programmes. This approach does not differ much from current practice in programmes using W/H or oedema for admission. In such programmes, patients admitted with oedema but with a W/H percentage of median above 80% are, typically, retained in the programme for a fixed period after loss of oedema. Preliminary analysis of data from CTC programmes in Malawi and Ethiopia suggests that an episode length of 60 days would result in approximately 50% of discharges achieving at least a 15% weight gain at discharge.

A comparison of potential discharge criteria is presented in Table 9. As data from CTC programmes becomes available it will be possible to refine discharge criteria. It is likely that a combination of the above will prove suitable for discharge criteria.

**Table 9 Comparison of discharge criteria for MUAC only admission**

	<b>Positive</b>	<b>Negative</b>
<b>Fixed length of stay</b>	<ul style="list-style-type: none"> <li>• Easy to do – no calculation or numeracy required</li> <li>• No equipment needed</li> <li>• Can evolve with CTC into a more public health approach (i.e. community run, flexible where access is poor)</li> </ul>	<ul style="list-style-type: none"> <li>• Need to elaborate for children with HIV who recover slowly</li> <li>• Discharge is not linked to response to the treatment</li> </ul>
<b>% weight gain</b>	<ul style="list-style-type: none"> <li>• Discharge is linked to the response to treatment</li> <li>• Standard for all admissions – no elaboration needed for children with HIV</li> <li>• Weight is being monitored anyway for calc of RUTF, drugs, clinical monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Requires numeracy</li> </ul>
<b>Minimum length of stay with % weight gain and MUAC barrier</b>	<ul style="list-style-type: none"> <li>• Allows sufficient time for immune recovery</li> <li>• Makes sure children are out of the high risk category for MUAC</li> <li>• Acts as an 'alert' for children not discharged at end of minimum LOS period (to trigger further investigations)</li> </ul>	<ul style="list-style-type: none"> <li>• Requires numeracy for the % wt gain part</li> <li>• Requires another MUAC cut-off on bands</li> <li>• Will increase lengths of stay for some children and therefore increase average LOS for the programme.</li> </ul>

### **Follow-up**

Children's progress is monitored on a weekly basis at the distribution site.<sup>5</sup> CTC experience to date has found that routine home follow-up between clinic visits is not required to achieve good programme outcomes. However, in some cases follow-up is necessary. These include:

- Children who are losing weight or whose medical condition is deteriorating.
- Children whose carers have refused admission to the SC
- Children during the first two weeks after admission into the OTP.

The need for follow-up is identified by the health worker after discussion with the carer. The health worker liaises with outreach workers or volunteers (by direct contact or by sending a message) to arrange a home visit to these high risk groups. Action protocols for use in the OTP clinic and by outreach workers, designed to formalise this process, are presented in annex 4.

All absences in OTP should be followed up by outreach teams, volunteers, or key community figures. It is important to gain an understanding of the reason for absence and to encourage return. The absentee should not be reprimanded as this can discourage return.

### **Detection and management of non responders**

The OTP action protocol (see Annex 4 Action protocols for follow-up) is used to help health workers decide action that needs to be taken for those children that are not responding to treatment. Action includes assessment of both the child's medical condition and the child's care environment. Where additional medical investigation and treatment seems necessary children are referred, wherever possible, to a district/tertiary level health facility. Where an adequate social/care environment for recovery is lacking, the CTC approach actively encourages links between the CTC programme and other sectors

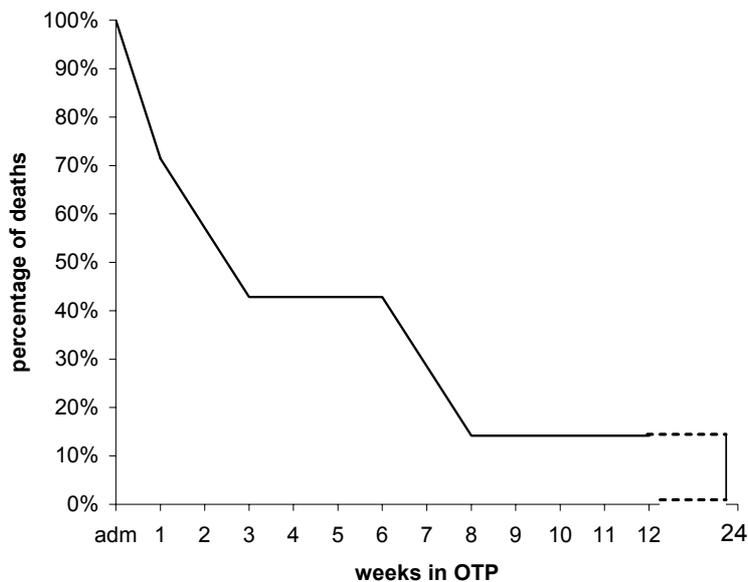
<sup>5</sup> If access is difficult or the capacity of health services is limited, monitoring may be carried out on a fortnightly basis.

such as general food distributions, health education, Home-based for HIV/AIDS, food security and water and sanitation. Advocacy for beneficiaries to be enrolled in general ration programmes for example, can form an important part of ensuring that the social, care and food security environment at home supports nutritional recovery. Information gained through carers in the OTP programme may help those providing social, food and agricultural support to understand the needs of the population in the area.

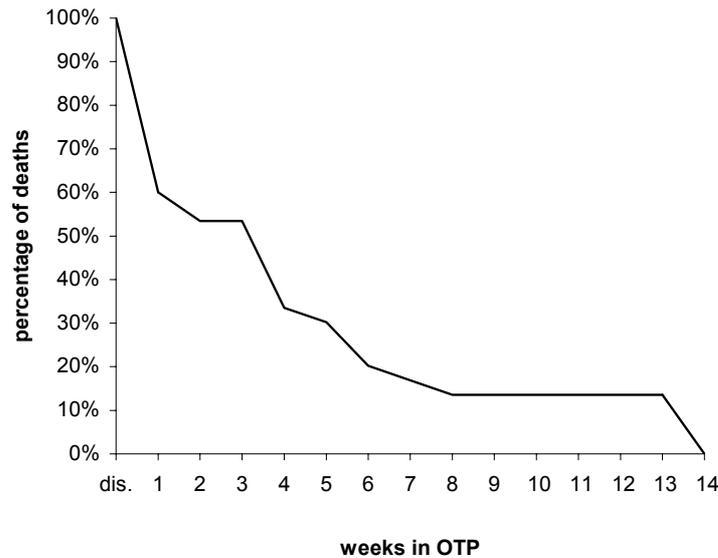
### Children during the first two weeks after admission into the OTP

The monitoring data presented in Table 2 and the OTP outcome data from Malawi, indicate that amongst children under five years of age who were acutely malnourished (using standard WHO criteria) but not suffering from severe complications requiring admission into inpatient care, mortality in OTP is in the region of 2%. In Malawi amongst the first 1900 clinical records analysed to date, 9 out of 409 (2.2%) children directly admitted to OTP died. Approximately half of these deaths occurred in the first two weeks after admission. This data is presented in the Kaplan-Meier plot in

**Figure 8.**



**Figure 8** Timing of deaths after direct admission into OTP in Dowa, Malawi (n = 7)



**Figure 9 Timing of deaths after early discharge from the SC into OTP in Dowa, Malawi (n = 30)**

In Malawi, 30 out of 941 (3.2%) discharge from the SC into the OTP died. 12 (40%) of these deaths occurred in the first week after discharged from the SC. This data is presented in the Kaplan-Meier plot in Figure 9.

These data are difficult to interpret as there are many unknowns. The causes of death in the OTP; the proportion of cases that were voluntary discharges out of the SC when carers took very sick children home to die; the proportion of deaths that could have been avoided with more prolonged inpatient care in the SC, and the proportion of children who would have acquired infections and died had they been kept longer in the SC, are all unknown. It is clear however, that mortality tends to occur in the first four weeks after discharge from the SC to the OTP and thereafter is extremely low. This has implication for follow-up, and the CTC action protocol (Annex 4 Action protocols for follow-up) indicates that all children must be followed up at home during the first two weeks after admission into the OTP. Ideally, CTC programmes should allocate all OTP admissions to the care of named community volunteers/outreach workers and develop a structured plan for their follow up during the first two weeks in the OTP.

### Follow up after discharge

Follow up after discharge from a CTC programme is not routinely done. However, a study in Malawi has indicated that most children discharged from the Dowa CTC programme maintained their nutritional status approximately a year after discharge. In this study, 1490 eligible families were contacted approximately a year after discharge from the programme [43]. The median time between discharge and the invitation to participate in the study was 15.5 months (IQR: 10.5-23.3). At follow-up, 148 of these children did not turn up and 99 refused to participate in the study. 69 children had died (4.6%). Very few of the 1102 HIV negative children re-measured had relapsed into acute malnutrition: 2% had a WFM < 80% NCHS median, 0.6% had oedema and 7.8% a MUAC < 125mm [43]. By contrast a greater proportion of the 28 HIV positive children had relapsed into acute malnutrition; 14% had had a WFM of <80% of the NCHS median, 7.1% had oedema and 32.1% had a MUAC < 125mm [43]. As programmes move towards

routine HIV testing, a system of structured follow-up post discharge should be instituted for all patients who are HIV positive.

### **Protocol and procedures for stabilisation care**

In programmes with effective mobilisation and active case finding around 10-15% of children presenting with severe acute malnutrition require inpatient care. This ability of community-based programmes to reduce the proportion of cases requiring inpatient admission is a major benefit of community-based models. It means that inpatient units can remain small (we try to limit them to a maximum of 30 patients), staff in these units can devote more attention to their patients, the problems of hygiene and cross infection are decreased and the infrastructural and staffing demands are greatly reduced. Avoiding the necessity of inpatient care has also proved to be extremely popular amongst most programme clients[44].

Children admitted into the inpatient element of CTC programmes, called Stabilisation Centres, receive phase 1 inpatient care that follows closely the treatment guidelines laid out by the World Health Organisation [7]. The admission and discharge criteria and transition protocols are the only substantive differences.

### ***Admission and discharge criteria for the inpatient stabilisation phase***

#### **Admission criteria**

Patients are admitted to the inpatient stabilisation phase either directly or, more commonly, by referral from the OTP because of severe malnutrition with complications, or the SFP because of moderate malnutrition with medical complications. As with the admission criteria for OTP, the criteria for Stabilisation Centres are now moving away from WHM in favour of MUAC only. These are presented in Table 10.

**Table 10 SC admission criteria**

<b>SC ADMISSION CRITERIA</b>		
<b>New Admissions</b> <i>Children 6-59 months or 65-110 cm as a proxy of age</i>	<b>Anthropometry/oedema</b>	Bilateral pitting oedema grade 3 ( <i>severe oedema</i> ) Oedema grade + or ++ <b>AND</b> no appetite/severe medical complications (see below).
		MUAC < 110mm AND bilateral pitting oedema grades 1 or 2 ( <i>marasmic kwashiorkor</i> )
		MUAC < 110mm OR bilateral pitting oedema grades 1 or 2* no appetite/severe medical complications (see below).
	<b>Appetite</b>	No appetite or unable to eat test dose of RUTF
	<b>Severe medical complications</b>	Intractable vomiting
		fever > 39°C or hypothermia < 35°C
		lower respiratory tract infection according to IMCI guidelines for age: 60 respirations/minute for under 2-months 50 respirations/minute from 2 to 12 months 40 respirations/minute from 1 to 5 years 30 respirations/minute for over 5 year-olds
		Any chest in-drawing
		Severe anaemia (severe palmar pallor)
		Extensive superficial infection requiring IM treatment
very weak, apathetic, unconscious, convulsions		
Severe dehydration based on history and clinical signs		
<b>Choice</b>	carer refuses outpatient care	
<b>Referral**</b>	from OTP due to: Deterioration in medical condition Increase in oedema Weight loss 3 weeks <i>or</i> static weight 5 weeks Non recovery after 3 months in the OTP programme	
<b>Readmission/Relapse</b>	Previously discharged and again fulfils criteria	

\* When community-based therapeutic care programmes include supplementary feeding for children with moderate acute malnutrition, children with MUAC < 125 mm and medical complications are admitted to inpatient care. Moderately malnourished children admitted because of additional medical complications are treated according to IMCI protocols and do not receive the standard WHO protocols for severe acute malnutrition. They do receive RUTF.

\*\* Transfer is according to the Action Protocol for OTP – see annex 4. Before admission, the reasons for non-recovery in the OTP should be investigated by discussion with the carer at the programme site and home visits by the outreach team.

### Discharge criteria

Appetite is the main indicator that determines when a child is ready to move out of inpatient care. As detailed in the WHO manual, the return of appetite indicates that infections are under control, the liver is able to metabolize the diet, and other metabolic abnormalities are improving. This usually occurs after 2–7 days [45]. Children transition onto RUTF directly from F75 without the use of F100. The process takes approximately 2 days, the first day to get the child used to eating the RUTF the second day to assess and ensure that the child is eating at least 75% of the prescribed quantity of RUTF.

**Table 11 Stabilisation Centre discharge criteria**

<b>SC DISCHARGE CRITERIA</b>	
<b>Appetite*</b>	Good (eats at least 75% of RUTF)
<b>Medical complications**</b>	Controlled
<b>Oedema</b>	Resolving

*\*Appetite is assessed by feeding RUTF to the child over one day. It is considered to be 'good' when the child is eating at least 75% of the prescribed quantity of RUTF for his/her body weight*

*\*\*Where the condition is chronic, the symptoms should be controlled by giving appropriate medical treatment in the outpatient setting.*

At discharge, the child and carer are advised to return to their nearest OTP access point after one week and given a ration of 200Kcals/kg/day to last them until their next OTP appointment. They are also given any remaining medications and instructions on how to use them. Key education messages regarding the correct use of RUTF and basic hygiene are discussed with the carer (see Annex 2 Key Education Messages for the OTP).

## Monitoring and evaluation

CTC programmes collect data to monitor the treatment of individuals, the appropriateness of the programme design, the effectiveness of the programme and its coverage. This data comprises quantitative data on patient outcomes and programme coverage and qualitative data taken from consultation with affected communities and stakeholders at various stages of the programme. The aim of this monitoring is to provide useful information that can form the basis for decisions to adjust programme design to better tailor implementation to the context specific factors. We do not discuss the requirements for monitoring of materials, drugs, staff time etc as these do not differ from standard primary health care programmes.

As CTC integrates with existing health services, most data will be collected by busy front line level health staff and analysed by district health offices before being fed back to the front line clinics. Data requirements must therefore be as simple as possible and be easy to manage if data is to be collected accurately. Systems need to be designed to minimise the demands placed on programme staff whilst providing sufficient information for essential monitoring.

## Monitoring individual treatment

In a CTC programme, children move between the components (SC, OTP, SFP) as their condition improves or deteriorates. They may also move between the decentralised OTP (and SFP) distribution sites if, for example, a new site is opened closer to child's home or if the population is mobile. It is therefore important to be able to track children between the programme components and distribution sites. To allow this, the links between the SC, OTP, SFP and distribution sites have to be well managed.

Once in the programme, health workers monitor individual patient progress including data on clinical examinations, reported illness, medicines received, anthropometric measurements, appetite, attendance and follow-up. In addition, there are action protocols for referral and follow-up visits to ensure that a child's progress is monitored in a structured way and specific problems trigger an appropriate response.

Important elements in the system to track and monitor individual are:

- Clear systematic patient ID numbering
- Simple recording of routine medical, nutritional and follow-up data kept in the OTP clinic filing system
- Mechanisms in place for regular review of clinical record cards
- Effective channels for the exchange of information on individual children between components and between the programme and the community.

### ***Patient monitoring cards***

CTC Clinical Record Cards and Ration Cards are used to monitor individuals within the programme. A sample clinical record card is included in annex 1. The clinical record cards are kept at the OTP site where the child is treated so that they can be referred to if a child returns to the site outside distribution days. The OTP clinics store the cards in the following groups:

- Patients attending the programme
- Transfers awaiting return. (This ensures that transfers are not overlooked and that follow-up takes place if they do not return. On return, monitoring continues on the same card.)
- Defaulter cards awaiting return. (On return, monitoring can continue on the same card.)
- Recovered. (The cards of children who have recovered are usually kept separately because they are so many. It is useful to have these at the site to check the records of any relapses.)
- Deaths.

Health workers should examine the clinical cards at monthly meetings to identify children with static weight, weight loss or those not recovered after three months. In cases of non-responses, they should combine this clinical information with social data obtained from home visits to the patient's house. These meetings should also include a review of deaths occurring in the OTP and SC in order to identify problems in the use of treatment and action protocols. These can be used as teaching examples to improve practice and may also be used to identify the need to modify protocols.

Each carer receives a Ration Card to take home. This contains important information about the child and their progress in the programme (weight, height, ration received). This is the carer's record of the child's progress in the programme. It can be presented at any clinic visit to inform health workers of the child's progress.

### ***Numbering system***

A system to ensure that each patient receives a unique registration number when he/she is first admitted into the SFP, OTP or SC. Each registration number is made up of three parts, for example:

*AAA / ### / BBB*

*AAA:* is a three letter code referring to the name of the OTP site or the health centre/hospital where the patients enter the CTC programme.

**###:** is a three digit number allocated to the child at admission. This follows in sequence from the previous child registered at that site/centre.

**BBB:** refers to the programme component where the child entered the CTC. It can be SC, OTP or SFP depending if they were admitted into a Stabilisation Centre, Outpatient Therapeutic Programme or Supplementary Feeding Programme elements.

To ensure that children at greatest risk (cases of acute malnutrition with complications and severe acute malnutrition) can be tracked, children admitted into the SC and OTP retain their full number as they are transferred between programme elements until they are finally discharged from the CTC programme. The number does not change even when the patient is admitted to SFP during the final stage of their path to recovery or they relapse in OTP and are referred to a SC. By contrast in humanitarian programmes implementing a SFP, a child who enters the programme at the SFP and whose condition deteriorates is allocated a new number when he/she is admitted to the OTP or SC.

To facilitate tracing and follow-up in the community, all access points where patients enter the programme should follow this numbering system. It should be quoted on all records concerning the child, i.e. on SC, OTP and SFP cards and registration books, ration cards, transfer slips and identity bracelets. Returning defaulters retain the same number as they are considered to be still suffering from the same episode of malnutrition. Their treatment continues on the same monitoring card. Readmissions after relapse are given a new number and new card as they are now suffering from another episode of malnutrition and therefore require full treatment again.

### ***Identity bracelets***

On admission to the CTC all children should receive an identity bracelet with their patient number written in indelible ink. The bracelet is cut-off and destroyed upon discharge.

### ***Exchange of information***

It is important that the system can easily exchange information on individual children between the different elements and between the programme and the community.

***Transfers to inpatient care:*** contact between programme components (often managed by different agencies) needs to be established to ensure children are admitted and referred with adequate information to ensure correct medical and nutritional treatment.

***SC deaths and defaulters:*** If a child is transferred from OTP to SC, his/her card remains in the OTP file. If that child does not return to the OTP site after 1-2 weeks, information should be sought from the SC team where possible, or through outreach/volunteers visiting the child's home. If a child dies in the SC or defaults, the SC team should pass this information to the OTP site so that the card can be completed and the case recorded in the Therapeutic Programme Report.

***OTP absences and defaulters:*** Absences and defaulters from the OTP should be followed-up by outreach workers or volunteers and the child and carer encouraged to return to complete treatment. If

they do not return, the reason for defaulting should be recorded on the card to help health workers to understand the family's circumstances and avoid further absences. In some cases, the information can help health workers to modify protocols (e.g. children to be allowed to attend every two weeks rather than weekly).

*Deaths:* If a child dies in SFP, OTP or SC, a record is kept of symptoms, suspected diagnosis (for OTP and SFP this is collected by outreach workers/volunteers) and management. This information should be recorded on the child's card as it can help to identify problems in treatment and action protocols.

*Non-recovered:* Information collected by outreach workers or volunteers during follow-up visits is important for the analysis of underlying causes of non-recovery. Information received by the health worker, along with that reported by the carer, should be recorded as additional information on the card. This is used for further discussion with the carer and to inform decisions about referral for further medical investigations.

### **Monitoring and increasing programme appropriateness**

The target populations and client's perception of the programme should be monitored regularly and programme design and implementation adjusted accordingly. This helps to match programme delivery with consumer demand and concerns and has proved invaluable in many CTC programmes in increasing coverage and decreasing default rates. Regular feedback strengthens the community's sense of ownership of the programme and helps motivate volunteerism.

Two kinds of community-level monitoring can be used: focus group discussions and key informant interviews.

#### ***Focus group discussions***

Focus groups discussions (FGDs) involve small groups of unrelated people who are brought together to discuss specific topics. The interaction between participants is analysed and a record made of individual opinions and collective ideas formed during debate. (FGDs are not designed to be a way of rapidly conducting multiple interviews, developing consensus or making decisions.)

An FGD should have between 5 and 15 participants who have been identified according to the nature of the enquiry. They are selected on the basis of gender, age, ethnicity, religious, political or group affiliation to form a group either with similar positions and experience (e.g. carers of children in the CTC) or with different ones (e.g. mothers in the CTC programme and mothers not included in the programme).

FGDs have a number of benefits. The format allows the direction of discussion to be guided and issues raised by participants to be probed. They provide insight into what people think and why they think it (why mothers find it difficult to access CTC services, for example). They require few resources and are quick and easy to implement.

The method has some drawbacks; the researcher has less control than in individual interviews and the introduction of new topics may distract from the original aims of the FGD. The information may be difficult

to analyse. Samples are small and may not be representative and may lead to incorrect extrapolations. The logistics of gathering all participants in the same place at the same time can be difficult.

Our experience suggests that community-based programmes should consider using FGDs when:

- there is a gap in communication or understanding between groups or categories of people, or between programme staff and the target community
- issues relating to complex behaviour, motivation or perceptions (e.g. traditional treatments for malnutrition) need to be unravelled and analysed
- ideas emerging from a group or community are needed
- information is needed to prepare for a large-scale study (e.g. a nutrition or coverage survey or a socio-cultural study).

FGDs should be avoided when:

- the situation is emotionally charged and the drawing out of information is likely to cause or intensify conflict (e.g. during inter-group conflict)
- the researcher cannot ensure the confidentiality of sensitive information
- statistical projections or numerical data are needed
- other methodologies can produce better information.

Our experience indicates that FGDs are particularly useful to shed light on:

- *Coverage* - whether there are individuals or groups in the community who could be in the programme but are not, the reasons why and how it could be changed.
- *Access* - whether there are barriers preventing people from accessing the programme and what might be done about them.
- *Recovery* - whether carers perceive changes in children treated in the programme and whether anything can be done to strengthen the recovery process.
- *Service delivery* - whether beneficiaries are happy with the CTC services they receive and the means of delivery, and whether they could be improved.
- *Cultural appropriateness* - whether the programme is culturally sensitive or doing anything inappropriate
- *Lessons learned* - what should be done differently and what should be replicated in future programmes.

### ***Interviews with key community members***

A more comprehensive picture of the community perspective is obtained by also conducting structured or semi-structured interviews with key community members. These key informant interviews can help to explore particular issues, often barriers to access and the ways that community leaders and civil society can help to reach more people.

This combination of FGD and key informant interviews can establish a feedback cycle in which community members can raise issue that are then taken to people in the programme who can make changes. This feedback process helps to tailor the programme to the context, strengthens community

ownership and in so doing help maintain the positive feedback to communities that is necessary if a volunteer-based mobilisation strategy is to become truly sustainable.

## **Monitoring and increasing programme effectiveness**

### ***Routine programme data***

CTC programmes monitor effectiveness through the collection, analysis and presentation of quantitative process indicators on four areas of programme activities:

- Number of admissions disaggregated by type of presentation (marasmus, kwashiorkor etc).
- Number of exits disaggregated by outcome.
- Total number of people in the programme.
- Average weight gain and length of stay.

It is important to keep data collection as simple as possible in order to allow busy primary health care staff to implement the system. In our opinion, the above data represent the minimum information needed for effective programme monitoring. However, in some circumstances, particularly humanitarian operations, it may be necessary to collect additional information on the gender or age distribution, place of origin, displaced/resident status, whether household is receiving general food distribution etc. according to reporting needs and the context of the programme.

This routine data is collected on a weekly basis and aggregated together in simple tally-sheets that are compiled into weekly and monthly reports. During compilation, data is reorganised so that new therapeutic admissions can be separated out to avoid double counting. Humanitarian programmes tend to compile the tally-sheets in a computerised database and this has been extremely useful in the collection of the current evidence base on CTC. However, in developmental settings manual compilations and basic graphs are as functional and more appropriate.

### ***Categories and definitions***

#### **Admissions and exits**

There are two possible arrangements for the collection of data on admissions and exits in a CTC programme. In both, SFP data is collected on a separate tally-sheet.

- **Scenario 1:** The OTP and SC are run by the same district health team or same agency. In this case, data on all children in the OTP and SC is collected on tally-sheets managed at the OTP sites for the 'therapeutic programme. Referrals to the SC (either immediately or after some time in OTP) are not recorded as exits. They remain in the therapeutic programme record until they are finally discharged from OTP. The SC does not produce a separate report but has an internal system (a register book) to monitor its activity.
- **Scenario 2:** the OTP and SC are run by different district health teams or different agencies. In this case, each OTP site collects information on the children it is treating. OTP sites register children who arrive at the site but need to be referred to the SC, but they also record them as exits on the same day. When the child returns from the SC, he/she is recorded in the OTP as 'transferred from SC/TFC', not as new admissions. Children arriving from the SC who were not

previously in OTP are also counted as ‘transferred from SC/TFC’ in order to avoid double counting of new admissions between agencies. In this scenario, to ensure that new cases of malnutrition are reported coherently, it is important that other agencies do not record children who are referred from OTP to their SC or TFC from the OTP as new admissions.

Admission and exit categories and definitions for the two scenarios are given in the tables and notes below (table 12 and 13).

**Table 12 Admission and exit categories - Scenario 1 (OTP and SC together)**

Category	Definition
<b>ADMISSIONS</b>	
New admissions*	New cases that comply with admission criteria.
Other new admissions	Admissions who do not fulfil age criteria (e.g. infants, teenagers, adults) or anthropometrical criteria for admission (e.g. second twin, baggy pants, moderate cases who had complications and need closer monitoring in OTP after stabilisation).
Moved in - returned after default	Returned defaulters who on return have not yet reached programme discharge criteria.
Moved in – from other OTP site	Children moved from another OTP site to continue their treatment.
<b>EXITS**</b>	
Discharged cured	Cases meeting programme discharge criteria.
Death	Cases who die while registered in the programme (including those referred to a health facility for medical treatment).
Defaulter	Cases are classified as defaulter on their third absence. This gives time for follow-up after the first absence to encourage return.
Non-recovered	Cases who do not meet discharge criteria after 4 months where all investigation and transfer options have been carried out.
Moved out – to other OTP site***	Children moved to another OTP site to continue their treatment.

**\* New Admissions**

- Includes all children presenting to the OTP site who are transferred immediately to the SC.
- Includes all children refusing transfer to the SC on presentation.
- Includes children transferred from SFP due to deterioration in their condition.
- Direct admissions to the SC are recorded as new admissions on reaching OTP according to the criteria with which they entered the SC.
- Readmissions following discharge (i.e. relapses) are recorded as new admissions because they are suffering from a new episode of malnutrition. This avoids the risk of losing information on their status if it is recorded in a separate admissions category. Their status as a readmission is noted under ‘Additional Information’ in the tally-sheet and database.

**\*\* Exits**

- Transfers from OTP to SC are not recorded as exits because they are staying within the therapeutic programme. A child remains registered in the programme until the child returns to OTP and completes treatment, or until a report is received from the SC that the child has defaulted or died. This is then marked on the card and tally-sheet.
- Medical referrals from OTP to a hospital or medical facility other than the SC for medical treatment or investigation are not recorded as exits. However if they fail to return to the OTP, they are recorded as ‘non-recovered’.

**\*\*\* Moved In / Moved Out**

- These are not completely new admissions or full exits. They are, however, recorded in tally-sheets and databases to help sites keep track of their numbers, ensure an accurate reflection of programme activity and improve tracking of cases across different sites.

### Direct Stabilisation Centre admissions

Normally very few cases are admitted directly into the Stabilisation Centre (i.e. not referred from the OTP) but information on these children must be included in reporting. If possible, an OTP card should be filled on entry to the Stabilisation Centre and passed to the relevant OTP site. There the admission can be

recorded and child can be expected to return following stabilisation (unless notification is received that the child has died or defaulted). If communication between programme components is poor, admissions can be recorded in the therapeutic programme when the child reaches the OTP with their referral slip. Direct Stabilisation Centre admissions who die or default before reaching the OTP are recorded in a separate report and the information is added to therapeutic programme data during compilation. Apart from this case, the Stabilisation Centre does not produce separate data but has an internal system (register book) to monitor its activity.

**Table 13 Admission and exit categories - Scenario 2 (OTP and SC run independently)**

Category	Definition
<b>ADMISSIONS</b>	
New admissions*	New cases that comply with admission criteria.
Other new admissions	Admissions who do not fulfil age criteria (e.g. infants, teenagers, adults) or anthropometrical criteria for admission (e.g. second twin, baggy pants, moderate cases who had complications and need closer monitoring in OTP after stabilisation, new cases transferred from SC or a TFC that have not already been in OTP).
Moved in – returned	Returned defaulters who, on return, have not yet reached programme discharge criteria. Returned from SC/TFC - cases that were transferred to the SC/TFC, were stabilised, and are returning to continue their treatment.
Moved in – from other OTP site	Children moved from another OTP site to continue their treatment.
<b>EXITS**</b>	
Discharged cured	Cases meeting programme discharge criteria.
Death	Cases who die while registered in the programme (including those referred to a health facility for medical treatment while remaining registered in OTP).
Defaulter	Cases are classified as defaulter on their third absence. This provides time for follow-up after the first absence to encourage return.
Transfer to SC	This is used for children who deteriorate in the OTP and need to be transferred to the SC, or for those who are registered in the OTP but are immediately transferred to the SC on admission.
Non-recovered	Cases who do not meet discharge criteria after 4 months when all investigation and transfer options have been carried out. Or medical referrals who do not return.
Moved out – to other OTP site***	Children moved to another OTP site to continue their treatment.

**\* New Admissions**

- Includes all children presenting to the OTP site who are transferred immediately to the SC.
- Includes all children refusing transfer to the SC on presentation.
- Includes all children transferred from SFP to OTP due to deterioration in their condition.
- Direct admissions to the SC are recorded as 'other' when they arrive in the OTP because they will already have been recorded as new cases of malnutrition by the agency that is managing the SC/TFC.

**\*\*Exits**

- Transfers from OTP to SC are recorded as exits (transfers).
- Medical referrals from OTP to a hospital or medical facility other than the SC for medical treatment or investigation are not recorded as exits. However if they fail to return, they are recorded as non-recovered.

**\*\*\* Moved In / Moved Out**

- These are not completely new admissions or full exits. They are, however, recorded in tally-sheets and databases to help sites keep track of their numbers, ensure an accurate reflection of programme activity and improve tracking of cases across different sites.

### **Additional information**

Other information is collected routinely to complement the data on admissions and exits and allow deeper analysis. Some of this can be included at the end of tally-sheets. We recommend the following information.

### **Cause of death**

When a child dies in the SFP, OTP or SC, a record is kept of symptoms, suspected diagnosis and management. (In the OTP and SFP, this is collected where possible by outreach workers/volunteers.) All this information should be recorded on the child's card. Compilation of this information routinely at office level (using a simple report form or spreadsheet) can help to identify problems with treatment and action protocols and show where training and supervision are needed.

### **Reasons for default**

This information is collected either by outreach workers/volunteers and recorded on the child's card (or on a paper kept with the card), or through FGDs in the community. It can help identify trends in defaulting and identify adjustments to the programme that should be considered (e.g. the need to open new sites to facilitate access).

### **Reasons for non-recovery (non-cured)**

Routine review of this information can help to identify common problems of non-recovery such as TB, sharing food in the household, poor access to clean water. It can indicate the need for stronger sectoral links and advocacy for general ration distributions, DOTS TB programmes, water and sanitation interventions etc.

Other information may be required (for instance by donors) and can be included at the end of tally-sheets:

- gender
- age
- displaced/resident/returnee status.

### **Weight gain and length of stay**

The weight gained and length of stay of each child should be calculated monthly for new admissions to OTP who are discharged recovered. If a large number of children are discharged as recovered (over 30), a sample of cards can be taken.

### **Relapses (readmissions after discharge)**

A record of the number of readmissions helps programme managers to understand the situation outside the programme (interventions at the household level may be needed to address high readmission levels). It can also indicate that children are being discharged from the programme too early. The identification of relapses can never be exact as it relies on staff recognising a child who returns. However, the decentralised nature of OTP means that usually there are relatively few OTP cases at each site and this help staff to recognise children even after several months. In addition, carers retain their OTP card on discharge and can use this to identify their child in the event of relapse.

### Number of children transferred from OTP to SC/TFC (Scenario 1 only)

This data is collected separately in scenario 1 as a record of the proportion of children requiring stabilisation care.

### Monitoring programme coverage

Until recently, coverage was estimated using an adaptation of the WHO Expanded Programme on Immunisation (EPI) coverage survey method [46,47]. This method uses a two-stage cluster sampling approach and a sampling procedure, called probability proportional to size (PPS). Sample size restrictions imposed by the fact that severe malnutrition is a relatively rare condition means that such survey estimates tend to lack useful precision. In addition, PPS sampling locates the bulk of data-collection in the most populous communities. This may leave areas of low population density, often those communities that are likely to be distant from health facilities, feeding centres, and distribution points, un-sampled. It is these areas where coverage is likely to be lowest with a result that PPS surveys may evaluate coverage as being adequate even when coverage is poor or non-existent in many areas outside of urban centres [48]. As part of the CTC programme we have developed a new direct method of assessing coverage [49]. This method is simple and rapid to implement, provides a useful level of precision and allows examination of the geographical distribution of coverage. It also provides an estimation of prevalence.

This survey method involves dividing the survey area into non-overlapping squares of equal area (quadrats) and sampling the community or communities located closest to the centre of each quadrat. During sampling, the method uses an active case-finding approach to find cases of acute malnutrition. This involves the surveyor asking community health workers, traditional birth attendants, traditional healers and other key informants to take them to see 'children who are sick, thin, have swollen legs or feet, or attending a feeding programme' and then asking the mothers of confirmed cases to help identify other cases. It is important to use the local terms for thin, wasted, oedema, kwashiorkor, baggy-pants, sickness, feeding programme, wrist-band etc. These local terms should have been ascertained during the social enquiry that preceded the start of the programme. It is important that the case-finding method used finds all, or nearly all, cases in the sampled communities and in previous surveys and we have performed "capture ; re-capture" methods using different case finding approaches to verify that this was the case [31].

We calculate two estimates of coverage from the data: the *point coverage* estimate and the *period coverage* estimate. The period coverage estimate is equivalent to the coverage estimation traditionally used by international agencies to estimate coverage in humanitarian operations [47] and is the measure quoted in this paper.

Period coverage calculation uses the following formula:

$$\frac{\text{number of respondents attending OTP}}{\text{number of cases not attending the OTP} + \text{number of respondents attending the OTP}} \times 100$$

Point coverage calculation uses the following formula:

$$\frac{\text{number of children in OTP with MUAC still } < 110\text{mm}}{\text{total number of children with MUAC } < 110\text{mm}} \times 100$$

These are calculated for each quadrat as well as for all quadrats together.

The use of both period and point coverage estimations minimises bias associated with programme effectiveness and mortality, and a comparison of the two provides a useful perspective on programme effectiveness. The period coverage estimate shows how well the programme has been doing in the recent past whilst the point coverage estimate tells you how well the programme is doing at the time of the survey. The difference between the two measures is that numerator in the period coverage calculation includes children who were admitted into the programme as severely malnourished but at the time of the survey, although not recovered sufficiently to meet discharge criteria, no longer had a WHM of <70% or a MUAC < 110mm. The numerator in the point coverage only includes those children who are still severely malnourished at the time of survey. Increasing the rate at which children recover tends to reduce the point coverage estimation, because, as oedema resolves quicker and WHM remains below 70% for a shorter period the numerator is decreased compared to a less effective programme where children remain severely malnourished for longer. The extreme scenario is of a hypothetical programme providing an instantaneous cure that would always have a point coverage of zero. The period coverage is less affected by rate of recovery, but tends to overestimate coverage because it excludes from the denominator severely malnourished outside of the programme who had died during the recent past whilst including children who were severely malnourished in the recent past in the numerator.

Coverage data is plotted as a mesh map and as a histogram. Figure 10 presents an example of a coverage survey mesh map, taken from Dowa district in 2003. Full grey squares represent 100% coverage, whilst an empty/white square represents 0% coverage. The approximate locations of the nutritional rehabilitation units in the district are marked and thin black lines indicate the approximate location of major roads. Figure 11 presents the same data as a histogram.

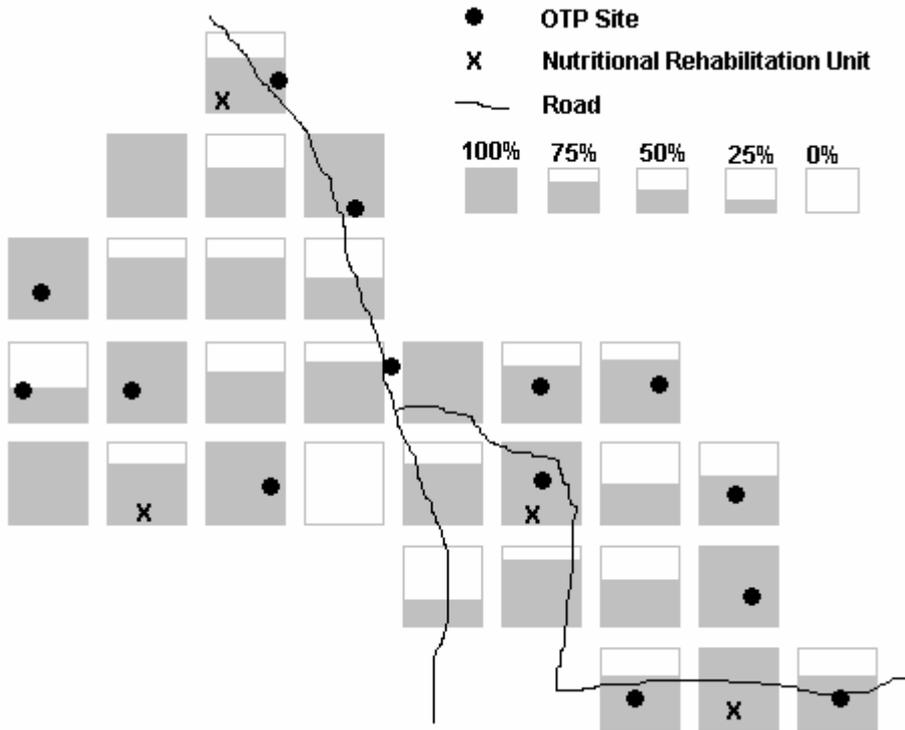


Figure 10 Spatial distribution of per-quadrat period coverage in Dowa CTC programme

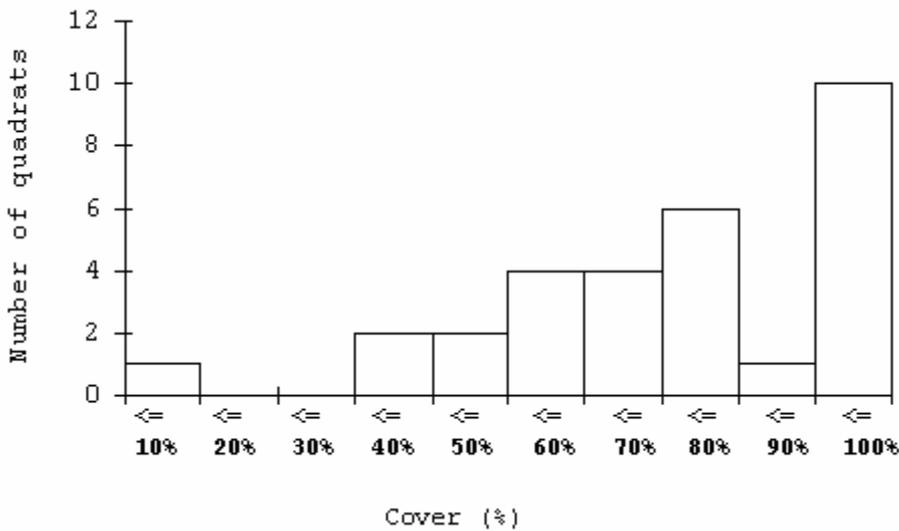


Figure 11 Distribution of per-quadrat period coverage in the Dowa CTC programme

The specific details of this method have been published elsewhere [31,25]

**Interpreting coverage survey results**

There are three components to evaluating coverage:

- *Overall coverage* - the coverage estimate calculated for all squares together. To date the average coverage rate for CTC programmes operating in rural areas has been approximately 70% [24,50].

- *Coverage in each square* - coverage should be similar in each square and is an indicator of how equitable the programme is. A programme should aim for even and high coverage across the entire programme area. If there are squares with low or zero coverage, it may be necessary to modify the programme to avoid excluding children in these areas, e.g. by increasing outreach activities and/or opening new distribution points in low or zero coverage squares.
- *Difference between the period and point estimations.* Differences between these two estimates may have more than one explanation and can be difficult to interpret. A period coverage estimate that is considerably higher than the point coverage estimate could be caused by premature relaxation of outreach activities; alternatively it may be because the uncovered cases are difficult to recruit or retain in the programme. An important advantage of implementing coverage surveys is the contact that it brings between programme staff and people who for one reason or another, are not accessing the programme. Asking the mothers of uncovered cases why their children are not in the programme may help explain a difference between the point and period coverage estimates and can provide important information on how the programme can be adapted to improve coverage. We are currently developing methods to better link this social enquiry with the coverage survey method.

### **MUAC based coverage surveys**

A major advantage of the move towards MUAC only screening and admission criteria is that it will allow us to move towards MUAC only surveys that do not assess WHM. This will simplify the mechanics of implementing surveys, speed up the process, reduce the transport needs and costs.

### **Therapeutic products for use in community-based programmes**

Since the 1960s, the high cost and poor success rates of hospital inpatient treatment has prompted much debate over whether hospitals were the best place to treat such patients [51,52]. Back in the 1970s, these concerns prompted moves to demedicalise the treatment of severe acute malnutrition and movement the locus of treatment away from hospitals towards the community, either into simpler Nutrition Rehabilitation Centres (NRC), the existing Primary Health Care Clinics or into the homes of those affected. These programmes either treated early discharges from hospitals or admitted children directly from the community and aimed to increase the likelihood of successful long-term rehabilitation by providing care that is more appropriate and understandable to the local people [53]. The results from these early outpatient treatment programmes have been variable. Some NRCs achieved low mortality and positive impacts on the growth while children were attending centres each day, but usually these benefits were not maintained after they were discharged [54,55,56]. The requirement for children to attend each day and eat in the NRC also often proved unpopular with mothers resulting in high default rates [57] and limited the capacity for NRCs to meet all needs resulting in low programme coverage [58]. In other outpatient programmes, mortality and relapse rates both during treatment and post discharge have been high [59,60] and rates of weight gain lower than in hospitalised patients [61,62]. In 2001, Ashworth reviewed studies of 27 such programmes conducted during the 1980s and 1990s [63]. Only 6 out of the 27 studies achieved CFRs of <5%, average weight gains of >5g/kg/day and relapse/readmission rates of <10%, taken as criteria of success. The most common shortcoming was an inadequate appreciation of the specific nutritional needs of malnourished children, in particular the need

to provide energy and nutrient dense food during rehabilitation to allow for catch-up growth and recovery [63]. An important priority is for research to assess the efficacy, effectiveness and cost effectiveness of diets based on a mix of nutrient rich locally available foods with added micro nutrients, especially zinc for the recovery of severely malnourished children.

The recent development of Ready to Use Therapeutic Food (RUTF) a safe, energy dense, mineral and vitamin-enriched food, broadly equivalent in formulation to F100 [64], has greatly eased the difficulties associated with providing a suitable high energy, nutrient dense food that is safe to use in outpatient programmes. To date, the commercial forms of RUTF are either BP100, a compressed biscuit, or Plumpynut, an oil based-paste or spread, developed in France[64,65]. Technology to make compressed biscuits is complicated and expensive and not transferable to small scale manufacturers in developing countries. By contrast, the production process for spreads is simple and they can be made easily using basic technology that is readily available in developing countries [66,67,68]. For that reason CTC research has focused on the use of RUTF spreads. These are oil-based pastes with an extremely low water activity [69]. As a result, bacteria do not grow in RUTF if accidentally contaminated [65] and this allows it to be kept un-refrigerated in simple packaging for several months. As RUTF is eaten uncooked, heat labile vitamins are not destroyed during preparation and the labour fuel and water demands on poor households are minimised. In a clinical trial in severely malnourished children undertaken in Senegal, energy intakes (808 Vs 573 kJ/kg/day  $P < 0.001$ ), rates of weight gain (15.6 Vs 10.1 g/kg/day  $P < 0.001$ ) and time to recovery (17.3 Vs 13.4 days  $P < 0.001$ ) were all significantly greater in those receiving RUTF than in those receiving F100 (139).

Hitherto, RUTF has been made from peanuts, milk powder, sugar, oil and a mineral/vitamin mix, according to the Plumpynut® recipe developed by Nutriset. Until 2002, the only source of Plumpynut was Nutriset's factory in France, at a cost of approximately \$3,500 a ton, plus the cost of transport from Europe. This cost has been an important barrier to the wide-scale uptake of CTC. However, more recently, the local manufacture of the Plumpynut recipe RUTF has started in several countries in Africa and this has often reduced the price by about 1,000 USD / MT. This milk powder based recipe produces a product that is very well suited to the treatment of acute malnutrition, however there are several features that decrease its suitability as a candidate for widespread local production and extensive use in community-based programmes. Milk powder is expensive and often must be imported; in the local production of RUTF in Malawi, the cost of milk powder represents over half the cost of the final product. Peanuts are also notorious for being contaminated with aflatoxin and this greatly complicates the quality control of small scale production. In some populations there is also considerable concern about allergic reaction to peanuts.

Alternative recipes produced from locally-available grains and legumes containing a greatly reduced content, or even absence of milk powder, and without peanuts have been developed [70], and are currently being field tested. These recipes should greatly decrease the cost of RUTF and ultimately should make local production at district level a more viable option. At present in Malawi, a local hospital is producing RUTF in sufficient quantities to supply their own and a neighbouring district. This arrangement maximises the cost efficiency with which any funding put into the system is converted into

benefit, providing cheaper RUTF, an income source for the hospital and potentially increased income for selected farmers groups, such as farmers associations connected with HIV support groups who produce crops for this production.

Those suffering from acute malnutrition are the poorest people in the world and there will always be a need for external welfare support to provide them with care. However treating acute malnutrition using RUTF made locally from local crops and delivered through community-based programmes offers the potential to maximise the efficiency with which this financial support is used. This is a priority area for research and development.

## Appendices

**Annex 1 OTP Card (front & back)**

**ADMISSION DETAILS: OUTPATIENT THERAPEUTIC PROGRAMME**

<b>Name</b>					<b>Reg. N°</b>				
<b>Kebele</b>					<b>Village</b>				
<b>Age (months)</b>		<b>Sex</b>	<b>M</b>	<b>F</b>	<b>Date of admission</b>				
<b>Admission</b>	direct from community		from SFP	from SC/TFC	readmission (relapse)		TFC/SC refusal		
<b>Total number in household</b>		<b>Twin</b>		yes	no	<b>Distance to home (hrs)</b>			
<b>General food distribution</b>									
<b>General Ration: HH registered?</b>	yes	no	If yes, when last received a ration?						
<b>Admission anthropometry</b>									
<b>Weight (kg)</b>		<b>Height (cm)</b>		<b>W / H %</b>		<b>MUAC (cm)</b>			
<b>Admission criteria</b>	Oedema	<70% W / H	MUAC <11.0cm		Other: specify				
<b>History</b>									
<b>Diarrhoea</b>	yes	no	<b>Stools / day</b>			1-3	4-5	>5	
<b>Vomiting</b>	yes	no				<b>Passing urine</b>		yes	no
<b>Cough</b>	yes	no	<b>If oedema, how long swollen?</b>						
<b>Appetite</b>	good	poor				none	<b>Breastfeeding</b>		yes
<b>Reported problems</b>									
<b>Physical examination</b>									
<b>Respir. rate (# min)</b>	<30	30 - 39	40 - 49	50+	<b>Chest retractions</b>		yes	no	
<b>Temperature °C</b>					<b>Conjunctiva</b>		normal	pale	
<b>Eyes</b>	normal	sunken	discharge		<b>Dehydration</b>		none	moderate	severe
<b>Ears</b>	normal	discharge			<b>Mouth</b>		normal	sores	candida
<b>Lymph nodes</b>	none	neck	axilla	groin	<b>Disability</b>		yes	no	
<b>Skin changes</b>	none	scabies	peeling	ulcers / abscesses	<b>Extremities</b>		normal	cold	
<b>Routine admission medication</b>									
<b>admission:</b>	<b>drug</b>	<b>date</b>	<b>dosage</b>		<b>drug</b>	<b>date</b>	<b>dosage</b>		
	Vitamin A				Anti malarial				
	Amoxicillin				Folic acid				
<b>2nd visit:</b>						<b>date</b>			
	Mebendazole				Measles				
<b>Other medication</b>									
	<b>drug</b>	<b>date</b>	<b>dosage</b>		<b>drug</b>	<b>date</b>	<b>dosage</b>		

## **Annex 2 Key Education Messages for the OTP**

- RUTF is a food and medicine for very thin children only. It should not be shared.
- Sick children often do not like to eat. Give small regular meals of RUTF and encourage the child to eat often (if possible eight meals a day). Your child should have \_\_\_\_\_ packets a day.
- RUTF is the only food sick/thin children need to recover during their time in OTP.
- For young children, continue to put the child to the breast regularly.
- Always offer plenty of clean water to drink while eating RUTF.
- Use soap for child's hands and face before feeding if possible.
- Keep food clean and covered.
- Sick children get cold quickly. Always keep the child covered and warm.
- With diarrhoea, never stop feeding. Give extra food and extra clean water.

### **Notes**

The carer should be asked to repeat back to check the messages have been correctly understood.

These key messages can be supplemented with more detail and more messages if time allows.

## Annex 3 Routine medicines in OTP element of CTC

Name of Product	When	Age / Weight	Prescription	Dose
Vitamin A*	At Admission (EXCEPT children with oedema)	< 6 months	50 000 IU	Single dose on admission
		6 months to < 1 year	100 000 IU	
		≥ 1 year	200 000 IU	
		<b>DO NOT USE WITH OEDEMA</b>		
Amoxicillin	At Admission	All beneficiaries	(see protocol)	3 times a day for 7 days
Anti Malarial (follow National protocol)	At Admission in Malarial Areas	All beneficiaries	(see protocol)	Single dose on admission. (When using ACT treat only Paracheck positive cases)
FOLIC ACID**	First Visit	All beneficiaries	5 mg	Single dose on first visit
MEBENDAZOLE***	Second Visit	< 1 year	<b>DO NOT GIVE</b>	<b>NONE</b>
		12-23 months	250 mg	Single dose on second visit
		≥ 2 years	500 mg	
MEASLES VACCINATION	At Admission & Discharge	From 6 months	(standard)	Once on admission and once on discharge

\* VITAMIN A: Do not give if child has already received in last one month. Do not give to children with oedema until discharge from OTP.

\*\* FOLIC ACID: Give on second visit if Fansidar is used as the antimalarial.

\*\*\* MEBENDAZOLE: or other antihelminth according to national guidelines e.g. ALBENDAZOLE: 12-23 months 200mg, ≥2 years 400mg: both can be re-given after 3 months if signs of re-infection.

FERROUS SULPHATE: not to be given routinely. Where anaemia is identified according to IMCI guidelines treatment with ferrous sulphate should begin in the recovery phase of the programme and not before and given according to WHO guidelines. For severe anaemia refer to inpatient care.

## Annex 4 Action protocols for follow-up

SIGN	REFERRAL to SC / TFC / HOSPITAL	OUTREACH VISIT
OEDEMA	Grade +++ or ++ or with complications Marasmic Kwashiorkor	Oedema persisting
	Increase in oedema	
APPETITE / ANOREXIA	No appetite or unable to eat	Eats < 75% of the RUTF a week by third visit
VOMITING	Intractable	General Medical Deterioration
TEMPERATURE	Fever: >39°C	
	Hypothermia: < 35°C	
RESPIRATION RATE (rr)	> 60 respirations/minute for under 2-months > 50 respirations/minute from 2 to 12 months > 40 respirations/minute from 1 to 5 years > 30 respirations/minute for over 5 year-olds	
	Any chest in-drawing	
ANAEMIA	Severe palmar pallor	General Medical Deterioration
SUPERFICIAL INFECTION	Extensive infection requiring IM treatment	
ALERTNESS	Very weak, apathetic, unconscious Fitting / convulsions	
HYDRATION STATUS*	Severe dehydration based on history & clinical signs	Moderate dehydration based on history & clinical signs
WEIGHT CHANGES		Below admission weight on week 3
	Weight loss for 3 consecutive weighings	Weight loss for 2 consecutive weeks
	Static weight for 5 consecutive weighings	Static weight for 3 consecutive weeks
GENERAL		During first 2 weeks in OTP
		Absent from OTP for 2 weeks
		Refused Transfer to SC
NOT RECOVERING	If not recovered after 3 months, refer to hospital for investigation	

\* Diagnosis of dehydration in severely malnourished can be difficult as many of the usual signs are unreliable. The main diagnosis comes from the History, wherein the most useful features are history of diarrhoea/fluid loss, reduced urine flow and recent change in appearance with sunken eyes are the most reliable[7].

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