

Institute of Biological Chemistry and Nutrition  
**UNIVERSITY OF HOHENHEIM**  
Prof. Dr. med. Hans Konrad Biesalski



**Improving the management of  
malnourished children during the  
rehabilitation phase –  
admitted in the Nutrition Unit of  
Kumi Hospital:  
Introduction of a  
Ready-To-Use-Therapeutic Food (RUTF)**

Faculty I  
General and Applied Natural Sciences  
of the University of Hohenheim

Diploma Thesis submitted by  
Kristina Krumbein

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# 1 SUMMARY

## 1.1 Introduction

Different forms of Protein-Energy-Malnutrition (PEM), are still a major concern in Uganda, especially in children. The prevalence of wasting (W/H z-score  $< -2$ ) in children under 5 years of age is 4%, of underweight (W/A z-score  $< -2$ ) 23% and of stunting (H/A z-score  $< -2$ ) still 39% (Unicef 2005).

Current recommendations for the management of severe malnutrition are mainly based on WHO guidelines (WHO, 1999). Following these 10-step-guidelines can lead to successful treatment of severely malnourished children. These recommendations include a low-protein milk-based therapeutic diet (F-75) for the first phase of treatment (stabilisation phase) and also a milk-based therapeutic diet (F-100) to achieve catch-up growth during the second phase of treatment, the rehabilitation phase. In 1997, a new therapeutic diet was developed and co-patented by Nutriset and the Institut de Recherche pour le Development (IRD). This solid Ready-to-Use-Therapeutic Food (RUTF) can be eaten directly, without adding water or cooking before use. It is based on peanut paste and has a similar nutritional value as F-100. It can therefore be offered as an alternative to F-100 during the rehabilitation phase. This food, called Plumpy`nut®, is commercially produced by Nutriset in France. It was developed keeping the possibility of a local production in developing countries in mind. Up to now major experiences in large scale local production have been gained in Malawi. One advantage of this RUTF is that it can be eaten and stored even at the home of the child as it has a long shelf-life and a minimal water content (humidity  $< 5\%$ ). Plumpy`nut® became the first RUTF used in a Community-based therapeutic care (CTC) program. Such a CTC program is an approach to treat severely malnourished people mainly in the community. It was developed to complement traditional TFCs. Within this new intervention, malnourished children without complications are treated in their homes, not in a feeding centre (see classification of malnutrition page 21), they receive a RUTF and simple medical care. Members from the community are included and work as volunteers. Only malnourished children with complications or severe oedema are admitted to an inpatient care in a stabilisation centre. The advantage of these programs should be that the number of patients in the centres is reduced and the more complicated cases could be focused. Furthermore mothers don't have to leave their homes for several weeks while during admission of their child and the children are not at risk of cross-infections because of their suppressed immunity.

## 1.2 Aim of the study

The aim of this study was to introduce a locally produced RUTF (a peanut-paste solid food called Plumpy`nut®) in the Nutrition Unit of Kumi Hospital. Until the onset of this study the management of severely malnourished children admitted in the Unit or another ward of the hospital was mainly based on the WHO guidelines (1999) using therapeutic milks such as F-75 and F-100.

## 1.3 Methods

This study took place in the Nutrition Unit of Kumi Hospital and was carried out from September to December 2005. The Unit was founded in 1998 and has now a capacity of 16 beds where malnourished children can be admitted with their caretakers. Malnourished children admitted in other wards of the hospital are also supported with food by the NU. The current staff consists of 5 native members, 4 nurses and 1 social worker, and one nutritionist from Germany. A medical doctor is responsible for the medical treatment of the children.

The local production of the RUTF took place in the kitchen of the NU and a procedure for production was developed during August/September 2005. In addition local prices and availability of ingredients of F-100 and Plumpy`nut® were assessed and a price calculation for both therapeutic diets was carried out.

All admitted children were treated almost accordingly to the 10-step-guidelines of the WHO (1999). The majority of children were weighed daily and weight gain/kg bw and day was calculated from children included into the study.

During the first weeks of the study, children entering the rehabilitation phase (after their appetite returned) were randomly divided into two groups, one group receiving F-100 and the other group was assigned to receive Plumpy`nut®. But not all children accepted the taste of RUTF during this early stage of rehabilitation. Therefore, further feeding options like offering Plumpy`nut® in addition to NU-diet or to children who receive a Rice-Soya-Porridge were tried out. In the ongoing study further children were offered Plumpy`nut® who had improved appetite and who liked the taste of Plumpy`nut®. These children (n=10) were then compared to those receiving only F-100 during the early rehabilitation phase. Recommendations for local RUTF production and further feeding options in the NU were developed.

## 1.4 Results

### 1.4.1 Local production of Plumpy`nut®

Local production of Plumpy`nut® in the NU is possible and could be successfully introduced. All main ingredients like groundnuts, milkpowder, sugar and oil are available in the study area throughout the year. The means for production (spoon, cups, boxes, a fridge) were already available in the Unit and an electric mixer was not necessary. Only small amounts were produced, therefore the caster sugar, which was used instead of icing sugar, could be grinded before use. This could become more difficult when bigger amounts of Plumpy`nut® have to be produced locally.

The prices for F-100 and Plumpy`nut®, which were both locally prepared, were calculated and compared. The price for the amount of F-100 that contains 1000 kcal (1000 ml of F-100) is 698 USh (32 cent). The price for the amount of locally produced Plumpy`nut® which contains the same energy (190 g Plumpy`nut®) is 920 USh (42 cent). The main reason for the higher price of Plumpy`nut® is the milk powder, which is relatively expensive in Uganda. Currently the price is within the means of the NU but could be a problem in other settings without availability of external funding.

### 1.4.2 Comparison of F-100 and Plumpy`nut®

Although the total number of patients were only little, a comparison of two groups was carried out. One group of children who received F-100 was compared with another group who received Plumpy`nut® during rehabilitation phase. Children in both groups ate NU-diet in addition very soon after entering the rehabilitation phase. The number of patients in the F-100-group was 5 (2 male and 3 female), the number of children in the Plumpy`nut®-group was 10 (5 male and 5 female). Kwashiorkor cases were 2 in the F-100-group and 1 in the Plumpy`nut®-group. Children in the F-100-group were on average 30 months old, children in the Plumpy`nut®-group were on average younger (22.5 months). Despite the fact that they were younger, the acceptance for Plumpy`nut® in those children was generally good. It was expected that younger children might be more likely to prefer milk-based diets.

The main outcome measure was weight gain in g/kg bw and day. Children in the F-100 group gained 9.74 g/kg bw and day on average, children in the Plumpy`nut®-group slightly less, 7.3 g/kg bw and day. Both results can be considered as good. The average duration of stay in the hospital was 32.6 days in the F-100-group and 28.5 days in the Plumpy`nut®-group. The average duration of rehabilitation phase was 24.2 days and 17.3 days respectively. Both durations were shorter in the Plumpy`nut®-group. It will be of further interest whether duration of stay in the hospital is shorter for children receiving Plumpy`nut® when more children are observed. This would be of advantage for most families. W/H and W/A z-scores were calculated for all children except for oedematous forms of malnutrition on admission. On the beginning of rehabilitation phase and on discharge they were calculated for all children. The H/A z-score was only calculated once on admission, because height was considered to be constant during the few weeks of admission. On admission 100% of the children in the F-100-group were severely wasted, 100% severely underweight and 60% severely stunted. In the Plumpy`nut®-group 22% were severely wasted, 100% severely underweight and 80% severely stunted. The improvements of W/H and W/A z-scores were on average better in the F-100-group (+1.6 and +1.06 points compared to +1.01 and +0.66 points in the Plumpy`nut®-group). Calculating these improvements per day the results are as following: W/H improvement per day was +0.066 in the F-100- and +0.0584 in the Plumpy`nut®-group, W/A improvement per day was +0.044 compared to +0.038 (duration of stay was shorter in the Plumpy`nut®-group). One interesting result is that W/H z-score improved faster than W/A z-score in all children. The current discharge criteria, reaching a W/H z-score of -1, must therefore be seen with caution because children may have already reached their „target weight“ for a W/H of -1, but still be severely underweight as it was seen in many cases of this study (e.g. Case 4 in the F-100-group with a W/H z-score of -1.3 and W/A z-score of -3.7 or case 2 in the Plumpy`nut®-group with a W/H z-score of -1.2 and a W/A z-score of -4.5 ). The average W/H z-score on discharge in both groups has almost reached „target weight“ (F-100: -1.76; Plumpy`nut®: -1.35) but W/A z-score was still very low (F-100: -3.14; Plumpy`nut®: -3.54 on average on discharge). **Catching up with regard to underweight and stunting takes longer and would need a longer time of admission of the patients or an ongoing supplementation with the RUTF at home after discharge from the NU (see CTC-concept following the NU-admission).**

### **1.4.3 Feeding options for Plumpy`nut®**

According to the observations and experiences with local production and feeding of Plumpy`nut®, following feeding recommendations can be given. They should be seen as especially relevant for the NU in Kumi Hospital.

Plumpy`nut® can be used for different children, in different situations, combined with different foods, in the hospital, NU or at home:

Option 1 is to combine F-100 with Plumpy`nut® in the early stage of the rehabilitation phase (this is only applicable under supervised feeding in a hospital or NU). Option 2 is to feed Plumpy`nut® exclusively in the early stage of the rehabilitation phase, as an alternative to F-100, in children who don't like to drink therapeutic milk, but like the taste of Plumpy`nut®. Option 3 is to combine Plumpy`nut® with NU/family-diet, as a supplement to achieve better weight gain (this is usually possible during a later stage of the rehabilitation phase and can be applied in the Hospital/NU or at home).