

COMMENTARY

Why lipid-based ready to use foods (RUF) must be key components of strategies to manage acute malnutrition in resource poor settings

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Background

Malnutrition, common in the developing world, is associated with disease and mortality. Malnutrition frequently occurs among children in the community as well as those with acute illness. Despite global improvements, malnutrition still underlies half of the inpatient morbidity and mortality rates among children in resource poor settings. Malnutrition limits development and the capacity to learn and grossly undermines future economic progress of both individuals and states. Food-based approaches have been an integral part in efforts to alleviate the impact of malnutrition.

Traditionally, fortified blended foods such as corn-soy blend (and wheat-soy blend) are given to moderately malnourished children as a dry take-home supplement in the context of supplementary feeding programmes (SFPs). The effectiveness of SFPs has been questioned in both non-emergency [1-3] and emergency settings [4-7]. This is likely due to sub-standard monitoring methods used in such circumstances, but also the poor quality of corn soy blend/wheat soy blend (CSB/WSB). There is increasing evidence that CSB cannot deliver the needs of vulnerable groups (infants, pregnant/lactating women). For this reason, to treat moderate acute malnutrition (MAM), the use of ready of use therapeutic food (RUTF) initially designed for the treatment of severe acute malnutrition (SAM) is now widely advocated and practiced. In a pilot programme in Niger, Medecins Sans Frontieres (MSF) demonstrated that RUTF improves considerably the outcomes including weight gain, duration of treatment and recovery rate; therefore huge amounts of RUTF are requested worldwide [8].

RUTF is very effective for children with severe acute malnutrition in both hospital and community settings. A study in Malawi [9] where children with oedema were exclusively treated with RUTF for 8 weeks reports a high recovery rate (83%). A controlled, comparative, clinical effectiveness trial conducted in southern Malawi [10] concluded that children on home therapy with RUTF recovered better (79% vs 46%) and were less likely to relapse or die (8.7% vs 16.7%) than children on standard therapy based on international guidelines. An operational study [11] in southern Malawi found that home-based therapy with RUTF resulted in acceptable recovery in both severely malnourished (89%) and moderately malnourished (85%) with no requirement for formally trained medical personnel. A meta review [12] of community-based therapeutic care (CTC) with RUTF programmes concluded that such approaches are associated with lower case-fatalities, and increased recovery rates both of which may be attributed to increased access to services, reduced opportunity costs, early presentation and compliance, and increased coverage.

The most widely used RUTF spread is a mixture of milk powder, sugar, vegetable oil, peanut butter, vitamins, and minerals [13] RUTF is available as a commercial product packed in oxygen-free foil sachets. Recently, there has been local production of peanut-based RUTF in several developing countries by private companies including Valid Nutrition, an Irish-based charity with RUTF production facility in Lilongwe, Malawi. In Kenya, Insta Products EPZ Limited based in Athi River is currently

producing RUTF under license from Valid Nutrition. This is a most welcome development that is set to improve access to affordable RUTF in the greater East Africa.

Despite the positive developments in RUTF production and evidence that it works in treatment of SAM, there are issues that need addressing. Firstly, local production of RUTF in any particular setting is mainly limited by ingredient availability hence recent recommendations for ingredient diversification. Further, the intensive use of milk in the formulation of RUTF (25-35% w/w) makes them too expensive for sustainable use in resource-poor settings. There is a lack of evidence on whether non-peanut-based RUTF with none or, minimal amounts of milk powder may have similar nutritional benefits. Initial research into the use of an RUTF formulation based on chickpea, sesame and maize with low milk content has proved effective in addressing acute malnutrition in HIV positive adults [14].

Secondly, the use of RUTF in other populations including HIV-infected adults and moderately malnourished children [15] has gained momentum. A randomized, investigator-blinded effectiveness trial in Malawi among non-pregnant adults starting ART with BMI < 18.5 kg/m² (average 16.57 kg/m²) found greater BMI, greater weight and fat free mass gain with RUTF than with corn soya blend after 3.5 months of intervention [15]. Recent work in Malawi [16] reported good recovery among malnourished, HIV-infected children not receiving antiretroviral chemotherapy. Home-based therapy RUTF was associated with more rapid weight gain and a higher likelihood of reaching 100% weight-for-height compared to corn soya blend.

The use of RUTF as a supplementary food among children at risk of malnutrition has also been reported [17]. In this study, children were given either RUTF or micronutrient-fortified corn-soya blend for up to 8 weeks. Children receiving RUTF had greater recovery (58% vs 22%), and greater rates of weight gain (3.1 g/kg/d vs 1.4 g/kg/d) than children receiving the corn-soya blend.

However, the use of RUTF among children with MAM may not be safe given the high concentration of nutrients in the formulation. More recently it has been shown that fortified spreads with milder nutrient concentration compared to RUTF are more effective in treating MAM compared to CSB [18]. Additionally, there are new recommendations for the level of micronutrients for use in fortifying supplementary foods.

Recent evidence shows that lipid-based ready to use foods other than RUTF may be used in the prevention/ treatment of MAM with positive effect on growth among infants. A Ghanaian study [19] compared the growth of infants given complementary foods fortified with either micronutrient sprinkles or crushable micronutrient tablets on one hand, or fat-based peanut butter paste on the other. Infants given the fat-based peanut butter paste had greater weight-for-age and length-for-age at 12 months compared to those in the other two groups. A recent study [20] in Malawi compared the effect of using peanut-/soy-based fortified spread and corn porridge fortified with

fish powder as complementary foods on growth in rural Malawian children. Children who received peanut-soy spread gained 110 g more from 6–12 months of age than children receiving the fish-fortified maize porridge. The positive effects of this 12-month intervention have been observed to be sustained even after 2 years without intervention [21].

The continued use of RUTF in treatment of SAM among children under 5 years of age is strongly recommended as there is solid evidence to demonstrate that it works. More work is needed to find appropriate ready to use foods for HIV-infected adults, and moderately malnourished children. Additionally, cheaper RUTF based on diversified ingredients and local production is needed to enhance affordability and access. A lot of research work is currently underway to test the efficacy of non-peanut RUTF in the treatment of SAM among children. Additionally, there is a large amount of research on the efficacy of ready to use supplementary (RUSF) and complementary (RUCF) foods for prevention and treatment of moderate acute malnutrition. For example, Valid Nutrition, has since 2008, with funding from the Irish Aid, developed and is currently testing the efficacy of four maize-soya-sorghum ready to use recipes including: 1) ready to use therapeutic food with no milk powder; 2) ready to use complementary food (RUCF) with small amount of milk powder; 3) ready to use supplementary food (RUSF) with small amount of milk powder; and 4) ready to use therapeutic food for HIV-infected adults. All four formulations have proved acceptable among target populations and results of efficacy trials are awaited in a few months. Valid Nutrition has previously tested the efficacy of a chickpea-sesame RUTF among HIV-infected adults in Malawi [14].

Compared to powdered food blends such as CSB/WSB, ready to use foods offer several advantages. Typical ready to use foods will be solid, energy-dense lipid pastes that resist bacterial contamination because of low water content. The fact that RUFs can be consumed without cooking may enhance hygiene, and minimise opportunity costs for caregivers.

There is great potential in the use of ready to use foods including RUTF, RUSF, and RUCF in management of acute malnutrition in resource poor settings in the most hygienic, cost-effective and sustainable ways. In the meantime, new RUF formulations must be tested for acceptability and efficacy among target groups. The different categories of RUFs need to be appropriately used within specific population to avoid potential safety issues.

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