Preparation of Suggested Products for Treatment of Pediatric Malnutrition

Dry cereal blend: *Nourimil*

Zanmi Lasante produces its own dry cereal legume blend from locally grown beans and either rice or corn. *Nourimil* is distributed in 2.3 kg heat-sealed bags to mothers/caregivers to prepare with clean water at home.

Ready-to-use therapeutic food (RUTF): *Nourimanba*

Zanmi Lasante also produces *Nourimanba*, its own therapeutic version of a peanut-based ready-to-use therapeutic food. *Nourimanba* is made from peanuts combined with milk powder, vegetable oil, sugar and a specially formulated vitamin mix. Because of its peanut butter base, *Nourimanba* has a low water content, limiting bacterial growth and allowing it to be safely stored for months. No cooking or preparation is required.

Recipe for 5 kg of *Nourimamba*

Ingredient	*Using powdered/dry milk (full cream)*	*Using powdered/dry milk (skim)*
Peanut paste	1250 g	1300 g
Vegetable oil	750 g	1000 g
Milk product	1500 g	1250 g
Granulated sugar	1400 g	1350 g
Formulated vitamin mix	70 g	70 g

Nourimanba is produced at Zanmi Lasante in a hygienic area designated for food production. Staff have been trained in basic food safety, using United States food safety standards. Quantities are produced on demand as *Nourimanba* is prescribed to children with malnutrition at all Zanmi Lasante sites and tracked in PIH's pharmacy tracking system.

The peanuts are roasted in gas stoves, ground in a peanut grinder, and mixed with oil to produce a paste. The other ingredients are weighed on digital scales and all the ingredients are then mixed together in a standard planetary bakery mixer for 15 minutes. The product is then hand-packed into 500 g or 1,000 g plastic containers for distribution to patients.

Planning considerations

- To minimize the risk from aflatoxin, a naturally occurring toxin produced from a fungus that can contaminate peanuts:
    - peanuts should be tested regularly for aflatoxin as well as sorted before production so that damaged, shriveled or stunted peanuts are discarded
    - peanuts should be thoroughly dried before storage

- peanuts should be stored in a dry, well-ventilated area
- Train workers in best practices for hygiene and food safety
- Establish reliable sources for all ingredients, as not all will be available locally. Milk powder, in particular, is the most expensive ingredient in *Nourimamba.*
- While most of these ingredients are not perishable, the vitamin mix does have a relatively shorter shelf life.

ReSoMal (rehydration solution for malnutrition)

ReSoMal is available commercially. It can also be made by diluting one packet of the standard WHO-recommended oral rehydration salts in 2 liters of water, (instead of the standard 1 liter), and adding 50 g of sucrose (25 g/l) and 40 ml (20 ml/l) of mineral mix solution.

Therapeutic milk (F-75 and F-100)

F-75 and F-100 can easily be prepared from basic ingredients. They are also commercially available in powder form.

Preparation of F-75 and F-100 diets *

	F-75	**F-100**
Ingredient	*Amount*	
Dried skim milk	25 g	80 g
Sugar	70 g	50 g
Cereal flour	35 g	0 g
Vegetable oil	27 g	60 g
Mineral mix	20 ml	20 ml
Vitamin mix	140 mg	140 mg
Water	1000 ml	1000 ml

Preparation of F-75: Add the dried skim milk, sugar, cereal flour and oil to some water and mix. Boil for 5-7 minutes. Allow to cool, then add the mineral mix and vitamin mix and mix again. Make up the volume to 1000 ml with water. Notes:

- If dried skim milk is not available, a comparable alternative formula can be made from 35 g of dried whole milk or 300 ml of fresh cow milk. In both alternate recipes, only 17 g of vegetable oil should be used.
- Isotonic versions of F-75 (280 mOsmol/l), which contain maltodextrins instead of cereal flour and some of the sugar and which include all the necessary micronutrients, are available commercially.
- If cereal flour is not available or there are no cooking facilities, a comparable formula can be made by adding 30 g of sugar to the mix (for a total of 100 g of sugar). However, this formula has a high osmolarity (415 mOsmol/l) and may not be well-tolerated by all children, especially those with diarrhea.

Preparation of F-100: Add the dried skimmed milk, sugar and oil to some warm boiled water and mix. Add the mineral mix and vitamin mix and mix again. Make up the volume to 1000 ml with water. Notes:

- If dried skim milk is unavailable, a comparable formula can be made from 110 g of dried whole milk or 880 ml of fresh cow milk. Only 30 g of oil should be used in these recipes.
- If only small amounts of the treatments are being prepared, it will not be feasible to prepare the vitamin mix. In this case, give a proprietary multivitamin supplement.

* Source: World Health Organization. *Management of Severe Malnutrition: A Manual for Physicians and Senior Health Workers.* Geneva: World Health Organization, 1999.