Protein-Energy Malnutrition Intervention Strategies – Dr M Bac, Prof I I Glatthaar

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Curriculum vitae

Martin Bac qualified as "Arts" in Holland in 1975 and after a few years of hospital experience in his home country, he came to the Gelukspan Community Hospital (Bophuthatswana) in 1977 as Medical Superintendent. During his time at Gelukspan he obtained a M Prax Med, as well as a MD from Medunsa. In 1988 he moved to Pretoria and became the Director of the Nutrition Institute at Medunsa. Martin's main interests are primary health care and nutrition and he has published scientific articles in this field. He is married to Mies and they have 4 sons.

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Curriculum vitae

Ingrid I Glatthaar obtained a BSc at the Medical School of the University of the Witwatersrand in 1963, and later went on to obtain a post-graduate Diploma in Therapeutic Dietetics at the University of Cape Town. After working for several years as a Dietitian at the Groote Schuur Hospital and then as a consultant to the food industry, she joined Medunsa as a lecturer in the Department of Human Nutrition in 1978. In 1983 she became Head of the Department and was subsequently promoted to the rank of Associate Professor. Her research has focussed mainly on protein-energy malnutrition and she obtained a PhD on this topic in 1985. Subsequently Ingrid has become interested in diseases associated with over-nutrition in blacks, in particular obesity and cardio-vascular diseases.

Summary

The authors look at the vast, far-reaching problem of Protein-Energy Malnutrition in Southern Africa, analyse and evaluate the different aspects, and then show and explain in a practical, step-by-step way, that intervention strategies are indeed available. It is a complex, sensitive problem which needs a multi-sectorial ecological approach and should be the concern of top political bodies to co-ordinate all the various government, private and foreign help, so that it becomes a well-organised, co-ordinated and comprehensive programme.

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KEYWORDS:
Protein-calorie Malnutrition; Health Education; Delivery of Health Care; Developing Countries.

The eradication of protein-energy malnutrition (PEM) poses a complex challenge which requires a multi-sectorial ecological approach.

"Malnutrition, however, is a systemic phenomenon and care must be exercised that a piecemeal approach does not supplant this vision. Concern must be strong enough at the highest political and planning levels to ensure that nutrition efforts within sectors are not neglected or diluted and that efforts of various government, private, and foreign assistance organisations are co-ordinated."[1]

This proposal focusses primarily on direct health and nutrition intervention strategies, but emphasises that these must be implemented within the framework of a comprehensive programme including socio-economic and political reforms as well as agricultural and technological interventions.

1. Health and Nutrition Interventions

The Health Service Facilities Plan of the Department of Health & Welfare[2] makes provision for various levels of health care:

1.1 *Level I: Provision for Basic Needs: Adequate Food*

While the production of food is primarily the responsibility of the agricultural and private sectors, the provision of food supplements to alleviate protein and micronutrient deficiencies is identified as the responsibility of the health authorities. Energy deficiency, often a major problem, has been overlooked by the Plan.

1.2 *Level II: Education, including health and nutrition education*

This is the responsibility of the education departments, health departments and services, the private sector, the community and the media.

1.3 *Level III: Primary Health Care (PHC)*

There is a critical need for PHC, especially in rural and peri-urban areas, ie basic health care available to the whole population rather than sophisticated high technology medicine. Nutritional aspects should

form an integral part of PHC programmes.

Attention should focus on intervention strategies which have the following characteristics:[3,4,11]

- affordable
- available
- appropriate
- acceptable to the community
- cost-effective
- demonstrable impact on child health, eg mortality and morbidity rates, nutritional status.

1.3.1 The *GOBI-FFF* strategy, promoted by UNICEF[3,4] has been shown to be a combination of cost-effective measures and is an appropriate, multipronged or factorial approach towards breaking the cycle of frequent infectious diseases, malnutrition and high child mortality in developing communities.[5,12]

GOBI-FFF is the mnemonic for:

G = Growth monitoring countrywide. *This is top priority*! Each child in the country should have a growth chart. All clinics and hospitals should introduce facilities for growth monitoring.

The measures below aim to *promote* and *protect* growth.

O = Oral Rehydration Therapy (ORT)

Diarrhoeal diseases (DD) are probably the commonest cause of failure to thrive. There is evidence that ORT reduces weight loss, anorexia and mortality due to DD. Children who receive enough fluids catch up more quickly after an episode of diarrhoea.

B = Breastfeeding promotion, for well-known and obvious advantages, especially in developing communities, eg

— Protection against infections

- Vitamin A supply
- Child-spacing effect
- Economic aspect: 1 million births/year, if all mothers breastfeed for 1 year:

750,000 litres x 365 days = 274 million litres of human milk with a value of about R300 million/year. This represents 6% of South Africa's total milk production.

I = Immunization against the common childhood diseases such as TB, polio, measles, whooping cough, tetanus, diphtheria. The development of PEM after an episode of measles and whooping cough is common. Prevention and effective treatment of infections are essential to break the vicious cycle of infections and PEM.

F = Food supplementation and feeding. The most successful programmes are an appropriate mix of supplementary feeding, nutrition education and health interventions. To be cost-effective and affordable, food supplementation and relief feeding programmes should be targeted because the best results are obtained in children who are acutely and/or severely malnourished. There are several types of targeting:[1,7]

a) Rehabilitative eg the child which has already developed PEM.

b) Probabilistic, eg based on social class, location, age group, income, infant mortality rates, prevalence of PEM.

c) Preventive oriented: this means that growth failure is identified *early* through large scale weighing programmes. All children with signs of growth failure are examined and assessed and, where appropriate, food supplements are issued while the cause of the failure to thrive is treated.

This is the ideal way to use food supplements, but it needs skilled health or nutrition workers. The provision of food supplements to preschool children (especially age group 6-36 months) should be the priority because of the devastating effects of PEM in this age group. These supplements should provide an additional 1 000 - 1 300 kJ and 10 grams protein per day and should be given for a minimum period of three months or longer (up to one year) depending on the response to supplementation and the availability of food (household food security).

The success of feeding programmes depends on:[1,7]

- Amount of food supplied
- Food quality and type
- Duration of feeding
- Timing of supplementation

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- Nutritional status of entrants
- Entry and exit criteria based on the degree of PEM and the response to feeding
- Degree of targeting of the programme
- Provision of health care at the same time
- Degree of supervision
- Evaluation on an on-going basis

Each child in the country should have a growth chart

The major effect of supplementary feeding is usually seen in the first six months of feeding. If there is no response, the child should be re-assessed and a cause should be sought, eg infections, child neglect, inappropriate use of supplements.

Long-term prognosis is good, especially if the causes of the protein-energy malnutrition can be alleviated or eliminated, eg poverty, ignorance, social problems.

Food supplements which are used for supplementary feeding should comply with the following criteria:[8]

- Easily available
- Culturally acceptable
- Locally produced and known
- Can be given together with the staple food
- Should significantly increase protein and energy content of the food but not the volume
- Provide about 1 000 - 1 300 extra kJ and 10g protein per day.

At present skimmed milk powder and PVM are available from the health services. However, this scheme lacks effective monitoring and evaluation.

Enough fluids help a child to catch-up more quickly after diarrhoea

F = Female or Family education. The mother is "the most important health care worker", so her education is essential. She is usually the person who decides about timing of pregnancies, breastfeeding, weaning, whether the child will go to the clinic for weighing and immunizations, what the family eats, how food is prepared, etc. From the health

Examples of recommended supplements:

	Monthly Supply	Per Day		
		kJ	Protein (g)	Cost (cents)
Full cream milk powder	1,5 kg	1040	13	23
Skimmed milk powder	1,5 kg	760	16	16
Sunflower oil	1 litre	1220	-	10
Skimmed milk	1,0 kg +			
+ Sunflower oil	0,5 litre	1300	11	16
Peanut butter	1,25 kg	1040	12	21
Pea flour	2,5 kg	1050	17	17
PVM*	1,0 kg	550	13	30
Funa soup with barley	2,25 kg	1100	13	12

*PVM provides minderals and vitamins as well but is low in energy. It is not a food known to mothers and is not available in shops.

service standpoint, antenatal, family planning and baby clinics all provide opportunities for teaching mothers.

F = Family or child spacing. The birth interval is directly related to infant and child morbidity and mortality in developing communities. From a nutritional, health and demographic point of view, long birth intervals (3-4 years) are recommended.[3,12]

1.3.2 *Antenatal Care*

Though this is not specifically mentioned in the GOBI-FFF strategy, the latter should not only be targeted at the mothers of young children, but at expectant mothers as well. Measures should aim to prevent low birth weight and educate mothers regarding child care.[5]

1.3.3 *Specific Nutrient Supplements*

1.3.3.1 *Vitamin A*

Recently, Unicef and WHO have recommended the inclusion of vitamin A supplementation in GOBI-FFF intervention programmes.

Growth monitoring countrywide is the top priority

Recent reports have shown that mild vitamin A deficiency is associated with increased child mortality from respiratory disease, diarrhoea and measles.[17,18,19] High dosage vitamin A supplementation leads to a substantial reduction in mortality from these diseases.[19,20] WHO and UNICEF have produced a joint statement outlining the ways in which countries can reduce the impact of infectious diseases by giving high doses of vitamin A to young children.[21]

It is recommended to give lactating mothers one dose of 200 000 iu after delivery, and children between 6 months and 5 years regular megadoses of vitamin A (100 000 - 200 000 iu) at intervals of 4-6 months. The prevalence of vitamin A deficiency in South Africa is not known, and needs to be defined.

1.3.3.2 *Iron*

Iron deficiency anaemia is extremely common in children with PEM. Targeted iron supplementation for high-risk children should be considered.

(a) That all Low Birthweight (LBW) babies (<2500g) receive intramuscular iron (*Iron Dextran*) at discharge from the maternity clinic or hospital.

Dosage: *Iron Dextran* 75mg x (2,5 kg minus birthweight kg)

(b) That all infant clinics and hospitals provide prophylactic medicinal iron to all low birthweight infants from the age of 1 to 12 months.

Dosage: 1-2 mg elemental iron/kg/day.

(c) That consideration be given to supplementing all infants between the ages of 3-12 months with oral iron. (At this time the iron supply from the milk feeds, as sole source, becomes inadequate).

1.3.4 *Cost estimate of various intervention programmes for PEM*

1.3.4.1 *GOBI programme, including stationary, vaccines, transport and staff:*

- 3 million children aged 0-36 months
- R1/visit/child
- 6 visits per child per year

R18 million/year

The birth interval is directly related to infant morbidity and mortality in developing countries

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1.3.4.2 *Food supplementation programme at clinics and day care centres*

- Number of children with mild malnutrition (0-36 months) - 500 000.
- Cost per month per child, including 1-2 weekly visits to the clinic for weighing, education and food supplements - R10.
- Enrolment for 3 month period

R15 million/year

1.3.4.3 *Nutrition rehabilitation at a nutrition rehabilitation unit for children with moderate PEM*

- Number of children with moderate PEM - 100 000
- Average stay - 10 days
- Cost per child per day - R20

R20 million/year

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1.3.4.4 *Cost of treatment of moderate to severe PEM in a hospital paediatric ward*

- No. of cases admitted per year for moderate to severe PEM - 15,000
- Average duration of stay - 20 days
- Cost per child per day - R50-R150 (depends on the hospital)

>R30 million/year

1.3.4.5 *Vitamin A supplementation*

Vitamin A capsules 200 000 IU @ R0,15

2 per child per annum x 1,000,000 children aged 1-4 years

R300 000/year

1.3.4.6 *Iron supplementation programme*[15]

(a) *Iron Dextran* to correct deficit in low birthweight infants:

Estimated LBW infants 208,500 (based on 1985 census)

Iron Dextran 75 mg per infant @ R0,66

R137 615/year

(b) *Oral iron* to provide 8 mg elemental iron per day to all LBW infants from 1-12 months

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The prevalence of Vit A deficiency in South Africa is not yet known

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Ferrous gluconate
R983 948/year

The above is the least expensive

of all available iron salts (based on current COMED tender prices).

(c) *Oral iron* to provide 8 mg elemental iron per day to all fulltime infants from 3-12 months

Ferrous gluconate
R4 749 987/year

Case fatality rates for moderate to severe PEM are high in young children (10-20% or more) and this has not been included in the above cost estimates.

2. Agricultural Interventions

The role of the agricultural sector is to ensure an adequate supply of food. Production should not only be guided by economic incentives, but also by the nutritional needs of the population ("maximise the nutritional benefits").[9,10,13]

The following aspects need emphasis:

- Agricultural strategies to encourage farmers to produce economical, nutrient-rich foods like legumes and peanuts.
- Programmes to promote food production at community level, eg communal, school and home gardens. Training as well as material assistance to small farmers should be provided.
- Shortening of the agri-food chain to reduce food prices eg farmers co-operatives could sell produce direct to the public.
- Targeted distribution of food surpluses to those in need of food aid.
- Tree planting schemes to increase wood production for fuel.

3. Food Industries/ Technology

- Relevant companies should sign and adhere to the SA Code of Ethics for the Marketing of Breast-milk Substitutes.
- Food companies may be encouraged to produce nutritious weaning mixes at reasonable prices.
- Nutrient enrichment of foods should be considered when a deficiency of a nutrient is widespread eg vitamin enrichment of maize-meal, iron fortification of curry powder.
- Measures should be introduced to minimise post-harvest waste.

4. Nutrition Education

- Nutrition education should be included in the curriculum of all primary and secondary schools in the form of lectures, demonstrations and practicals along the model developed by Fedfood in Soweto and van den Bergh & Jurgens in KwaZulu.
- Teaching of nutrition at training colleges for teachers and nurses as well as at universities, particularly medical schools.[14]

5. Socio-economic and Political Interventions[12]

The following measures need to be implemented and monitored:

- Increasing the earning capacity of the poor, eg creation of jobs, training for semi-skilled jobs, minimum wages, subsidising of labour intensive projects, unemployment relief schemes
- Promotion of the informal sector eg small businesses, hawkers
- Promotion of household food security. A *food stamp* programme for low income households might be an effective way of sharply targeting aid to nutritionally at-risk groups. A number of recent reports discuss this strategy.[22,23,24] Alternatively, a general consumer subsidy or price control on basic commodities could be considered
- Development of social support systems in the community, eg the family, childminding facilities, crèche facilities at the work place

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Go for the mother - she is the most important health care worker!

- Increasing the duration of paid maternity leave to at least three months postpartum
- Provision of adequate community services for health protection, eg sanitation, especially clean water supply
- Expansion of population development to cover the most needy areas, ie communities with a high infant mortality rate and high prevalence of PEM
- Free (or low cost) compulsory education for all children
- Abolition of restrictive and discriminatory legislation
- Commitment to the eradication of PEM in the country as a priority and appropriate allocation of resources for this purpose.
- Co-ordination and integration of programmes run by private welfare organisations, eg World Vision,

Operation Hunger, African Childrens' Feeding Scheme, Women for Peace, Food Gardens Unlimited, Van den Bergh & Jurgens Nutrition Education Programme. These programmes should complement each other and those of the health services. Particular attention should be given to cost-effective targeting, selection of appropriate, scientifically-based strategies and evaluation of impact.

6. Nutrition Surveillance Programme

Food and nutrition surveillance is the regular provision of information and its use for decision-making on policies and programmes which directly or indirectly affect nutrition. The World Food Conference of 1974 recommended the establishment of a global surveillance system by FAO/WHO/Unicef: "to monitor the food and nutrition conditions of the disadvantaged groups of the population at risk and to provide a method of rapid and permanent assessment of all factors which influence food consumption patterns and nutrition status."[6,16]

Suggested indicators for a Food and Nutrition Programme

6.1 *Economic indicators*

- Gross National Product (GNP)
- Debt and debt ratio
- Exchange rate

6.2 *Food indicators*

- Food Production Index (FPI)
- Consumption of basic foods
- Availability of cereal, energy, protein per capita
- Unfavourable crop conditions
- Consumer Price Index (CPI)
- FPI/CPI
- Food aid programmes (numbers, costs, food distributed)
- Food fortification programmes

6.3 *Nutrition of pre-school children*

- percentage of low birth weight babies
- breastfeeding and weaning practices
- prevalence of PEM, eg

  underweight
  marasmus
  kwashiorkor
  wasting
  stunting

Food supplements should be locally produced, easily available and culturally acceptable

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6.4 *Health indicators*

- birth rate
- infant mortality rate
- child mortality rate
- under five mortality rate
- child survival index

6.5 *Social indicators*

- literacy of adults
- unemployment rate

These will help to identify the target groups within which a high prevalence of PEM can be expected and also to monitor any impact of intervention programmes.

7. Conclusion

Protein-energy malnutrition is a common problem in the developing communities of Southern Africa and it causes much suffering, illhealth and death. At the same time, there are effective intervention strategies available.

The two most promising short-term strategies are:

- Consumer food subsidies targeted at the people who need it most.
- Health and nutrition intervention programmes in developing communities according to Unicef's GOBI-FFF strategy.

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