

Nutrition and development

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Abstract

Nutrition is discussed as related to development in a pluridisciplinary approach with emphasis on concern for the people, planning from below and involving the community.

The importance of a scientific approach in nutrition underlines the necessity to give the proper identity to nutrition by a small group of 3 to 5 experienced technical men; these must have the full authority to reorient regularly the executed programmes according to local possibilities, constraints or apparent fundamental needs. Essential prerequisites for effective nutrition programmes are given and the relation of a nutrition steering group to the interministerial body is indicated.

Résumé

La Nutrition est entrevue dans la conception pluridisciplinaire du développement, veillant à respecter les populations elles-mêmes, à développer une planification à partir de la base et à susciter la participation de chaque communauté concernée.

Dans ce domaine, l'importance d'une approche scientifique souligne qu'il est indispensable d'accorder à la Nutrition une identité assurée par un groupe directeur restreint composé de 3 à 5 techniciens expérimentés. Ceux-ci doivent pouvoir jouir d'une pleine autorité dans la réorientation régulière des programmes en exécution, en fonction des possibilités et des exigences locales ainsi que des besoins fondamentaux qui se manifestent. Les conditions préalables et essentielles pour l'élaboration de programmes de nutrition valables sont décrites de même que la relation qui doit exister entre le groupe technique de Nutrition et les Instances Interministérielles.

In his food, each man finds various nutrients amongst which, after oxygen and water, calories come well before proteins, minerals and vitamins. The latter are commonly included in the usual food pattern when it has not been transformed by pressure of created demand in food quantity or by overrefinement through industrial processing. Up till the end of the sixties, emphasis has been laid on proteins while medical doctors had been staring blind to the spectacular Protein Malnutrition "Kwashiorkor". In 1968, it was clearly underlined that undernutrition was a much larger problem and that the lack was first in calories, leading eventually to "Marasmus"; the popularized name P.C.M. "Protein Calorie Malnutrition" started to be broken down in "Calorie Deficiencies" and "Protein Deficiencies" (8). Words once they have taken root continue often to state incorrectly what really happens, even when modernized in the form of P.E.M. "Protein Energy Malnutrition". Even the name "Energy Protein Malnutrition" ought to be separated as E.M. and P.M., allowing also place for mixed forms.

In fact, the most difficult point in development is to convince medical nutritionists that their responsibility doesn't lie in the treatment of the individuals, but in earmarking what are the real requirements in food of groups who might be exposed to severe undernutrition or eventually malnutrition.

Before trying to clarify how nutrition problems should be answered by direct interventions on food production or by more global approaches than struggle against poverty or changes in food and Health policies, we will draw the attention on the physiological basis on which

the real food requirements of populations or individuals can be estimated, and how the nutrition problems can be detected and assessed.

1. Nutritional requirements

For men, nutritional requirements considered for different physiological conditions of the organism, have commonly given place to what is called "Recommended Dietary Allowances". This term has brought a lot of confusion as different privileged countries have set different daily allowances. The amount chosen by a group of experts takes in account scientific observations, food habits and marketing influences; their recommended allowances aim at avoiding disease and are therefore calculated with a safety margin valuable for the concerned western country. The recommended dietary allowances represent the average of western consumption for calories (where people have more fat), and for proteins the requirements covering the 97.5th percentile of the population, i.e. including the highest requiring individuals (2). It again underlines the importance given to proteins, and eventually to animal proteins (see Fig. 1). The range between marginal levels of consumption in developing countries and the amount consumed in industrialized ones is very large. If the desire of man to eat meat is spread all over the world, the medical approach to define requirements is very different from that of veterinarians or agronomists who are concerned with quick production at lowest cost. For men, the main concern is absence of disease, longevity and eventually productivity while food habits have also to be taken into account.

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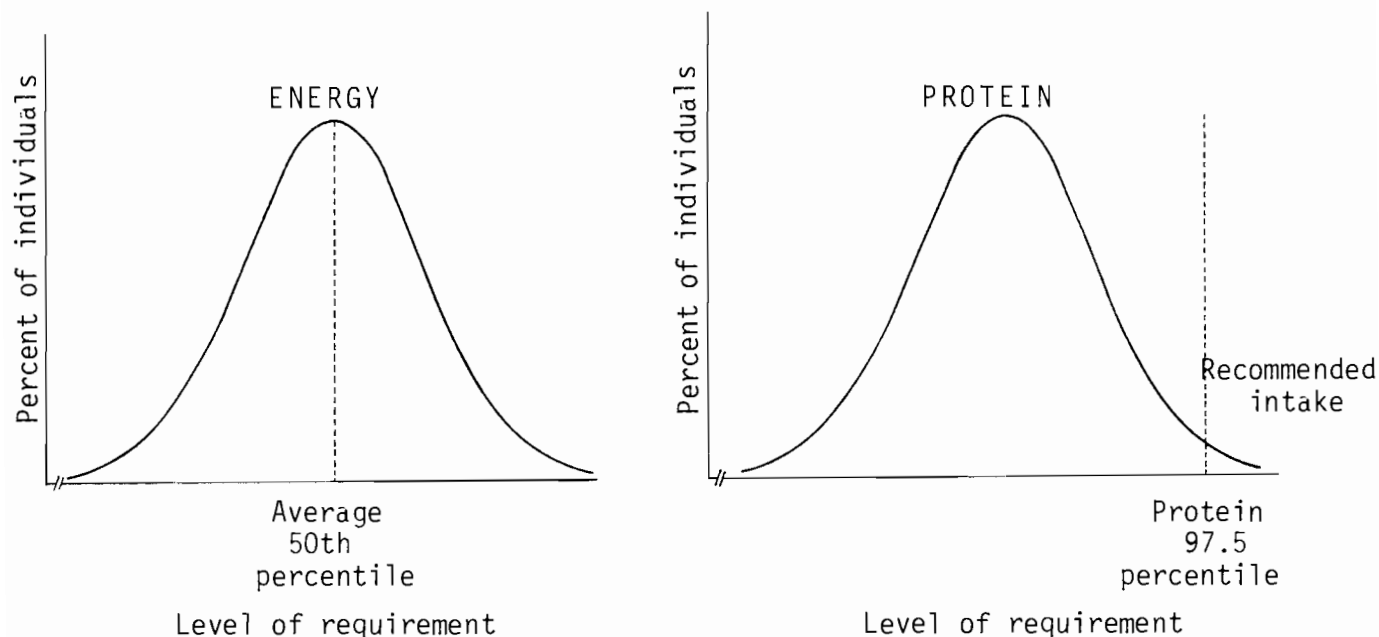


Figure 1 Different levels of recommended intake for energy and protein (adapted from Beaton G.H., Bengoa J.M., see (2))

Productivity and work efficiency are considered in industries and large plantations in developing countries, where the manpower has to produce as much as possible for a low wage: manpower benefits from medical services who reduce diseases and from supply of some basic foods and other goods at cost price in shops accessible only to them and their family, all these fulfilling fundamental needs.

In fact, we don't know exactly how much of each nutrient man requires, nor even how much energy he requires; and we could add that there is no real requirement for animal protein (9)

In this respect, the ideas about essential and non essential amino acids are changing; emphasis is now laid on dietary availability of certain carbon-skeletons that man cannot synthesize, while he can aminate a great number of carbon chains (7).

So the old saying "**look after the calories and the proteins will look after themselves**" appears true in a varied diet. We should only remember that requirements for proteins become lower for a certain amount of available calories.

And **vitamins**? Are there no deficiencies?

With the exception of vitamin A, we could say that all traditional non monotonous feeding patterns cope with the requirements as long as the food is not industrially overrefined.

Only **vitamin A deficiency** is widespread in Far-East countries, Central America and North-East of Brazil. It is certainly a disease of the poor but clear epidemiological mechanisms have not yet been elucidated: bulky stools can however indicate lower absorption of consumed vegetable food and hence carotene.

Only one point needs special attention: **protein depleted children** have special needs for Vit. A as their requirements were not met due to lack of transport protein; once they are in rehabilitation, syntheses occur in all endothelia and epithelia causing a high appeal to vitamin A.

Endemic goitre is linked to water and soils poor in iodine: agents blocking iodine incorporation at the thyroid gland level can play a trigger role.

However the foremost widespread disease due to a mineral deficiency is "**iron deficiency anemia**": iron is not readily absorbable and specially women become depleted after several pregnancies, while their offsprings don't get the stock they require.

It is to note that one improved food (as fortified cereals) is not a good solution to this problem: to put all efforts on that food is to neglect that human beings need a variety of foods while pulses or green leafy vegetables have a fundamental importance in the feeding pattern of most human groups in the world. Exception is made for iodised salt but once more application in developing world is difficult.

But **another factor** appears of great importance: smaller individuals with slower growth have smaller requirements and nevertheless a great efficiency in work, as their weight to be transported is lower in relation to the working muscular mass.

Some think that genetic factors are prominent in the determination of size. But it appears clearer and clearer that the environment pressure plays actually an important role in developing countries to determine the attained size: growth retardation resulting in a certain degree of stunting is a favourable reaction of a biologi-

cal organism living in an environment where food consumption is restricted.

However cereal eaters are slender but taller than the root eaters, the latter presenting also a thicker layer of subcutaneous fat; one could suppose that the cereal eaters become tall according to the available proteins (12), if their amount is not too limited (rice contains about half the amount of protein as compared to sorghum and millets). Zinc content of milk could also play a role in the taller growth of pastoralist group or other micronutrients recently studied (Selenium, Copper, a.o.).

2. Assessment of nutritional condition

Define at what level undernutrition appears is very difficult: a living organism can adapt its metabolism (pathways, turnover, endocrinological reaction) to various situations of stress as for example diminished food supply.

'Reference' values determined for 'healthy' populations in privileged countries can again not be used to determine if individuals or a community in the developing world are undernourished. Nevertheless malnutrition exists and undernutrition is widespread in the world.

Two different approaches exist to assess the nutrition condition:

- One of the main methods is to measure one or better several variables by **anthropometry**. In the latter case, it is possible to determine what the organism has been able to perform with the available resources in amount as well as kind of food, within a given ecology where successive episodes of diarrhoea represent an impairment in growth and development.
- However, it appears more important to assess undernutrition from the angle of **functional capacity of the organism**. Payne states (9) that malnutrition 'is defined as the failure of individuals to sustain levels of performance of such things as physical work, disease resistance, maintaining adequate level of growth, or the processes of pregnancy and lactation'; he adds that it must be 'consistent with the sustainability of the system as a whole including the individuals as well as the households involved'.

So it is clear that growth alone doesn't define properly nutritional deficiencies while it is not the only factor determining the sustainability of the system, in which the household is the first action unit. To devise methods to measure functional performance adequately according to these objectives is however not simple at all.

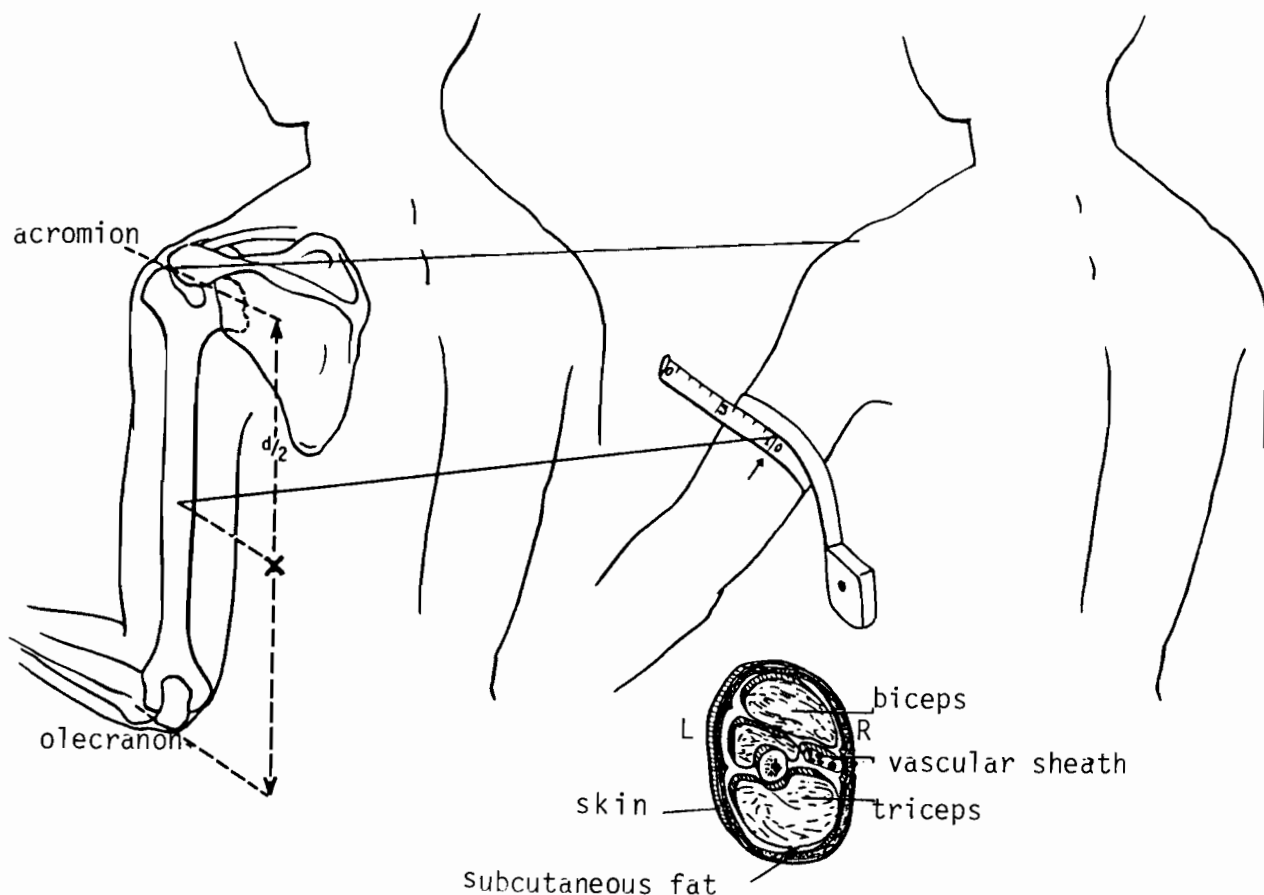


Figure 2 Left: assessing mid point of upper arm. Right: measurement of mid-upper arm circumference; the constant traction is ensured by the weight of the dangling box of rollmeter. Below middle: diagrammatic representation of cross-section.

Ergonomic measurements as walking speed on a rolling carpet with variable slope, give results that are at times in favour of not so well nourished village men. Another interesting observation is that sugar cane cultivators receiving supplements were performing exactly the same daily task as those living on traditional rations, but the latter came back to their homes at slower speed and went to sleep, while the first hurried back singing and, once back, played football...! (13)

Easier to use, let us now examine how *anthropometry* can be utilized as instrument to detect undernutrition for example amongst children, and to detect who is really 'at risk' for higher mortality, increased morbidity or other eventual epidemiological determinant diminishing the sustainability of a system as a whole.

WEIGHT is still widely used compared to weight at the same age of American children, the use of USA references makes little sense and leads to overestimation of undernutrition, particularly when defining a weight for age deficit in percent (80 or 60%) of the

mean American weight for the corresponding age (15). Weight can be composed of more or less fat and muscle and eventually more water.

HEIGHT is mainly reflecting the past nutrition condition, growth retardation is a late observed answer. Furthermore, a child cannot decrease in height (except in rare cases of exceptionally long lasting diseases)

Actually, we decided to use local curves of clinically non malnourished children and we worked out a methodology that consists in measuring HEIGHT as general indicator and, eventually, WEIGHT followed by age, but emphasis is given to following variables:

MID-ARMCIRCUMFERENCE with a standardized method based on a 5 mm large non stretchable flexible meter applied with a standard traction (a weight of 60 g, representing the weight of rolled meter and box Fig. 2) and the

TRICEPS SKINFOLD (Tanner J.M. & Whitehouse R.H.) (10). From both these measurements, we can derive what can be called a valuable approach to **MUSCLE MASS** (6, 10).

It is easy to understand that the mid-arm circumference is a composed indicator wherein the main variables are subcutaneous fat and muscle mass. This in fact corresponds to the way a pediatrician examines a child: he palpates if the arm is firm and if the skin is hanging loose, or if the fat layer is thick or thin and the muscle mass well developed (Fig. 3). It is also what a veterinarian does when he appreciates at a glance or eventually with a grip in the thigh of the animal, what is its condition, particularly its muscular development.

However, it is only by further study of the main variables muscle mass and skinfold thickness that we will be able to detect children 'really at risk' at an early stage. This is possible by calculation of sensitivity, specificity and positive predictive value in prospective studies where morbidity (and duration of each episode) with eventual risk of mortality is followed.

3. Solutions to nutrition problems and place of medical nutrition in development

On medical point of view, it is certain that for children 0-4 years many successive infectious episodes lead habitually to undernutrition (by anorexia, increased catabolism, eventual diarrhoea and often imposed dietary restriction), but it is still not so evident that undernutrition as such (and at which level?) enhances susceptibility to infection by diminished resistance to agents as different as bacteria, viruses, a.o. parasites, what is a common assumption. In malnutrition, non specific immunodefense mechanisms remain unaltered, as far as we know. Vaccinations may be applied even when subsequent skin tests remain negative for a time, while specific reactions appear later, without any booster when the patient has recuperated from malnutrition (5). This means probably that the memory cells have taken up the message at the vac-

Figure 3 Compared palpation of triceps skinfold and muscle mass

Marasmus

Face

thin empty skinfold
wasting of muscle



Protein Malnutrition

nation moment. This purely disease-oriented approach is however not the most important.

The agronomist might appear to be the most important technician who can improve food production. However somebody must draw his attention on the aspect of physiological requirements based on human biology and behavioural sciences in their broad sense.

The economist is certainly necessary to earmark which basic needs must be fulfilled and how marketing or exchanges are a stimulant for production by demand mechanisms but, here again, fundamental biological needs must be outweighed against achievements in other fields which might appear of greater efficiency.

So it will be the **key role** of the **medical nutritionist** to convince all those concerned with nutrition (economists of the basic needs, public works officers in charge of roads and transport, agronomists and planners) of the importance of physiological factors and cultural habits to solve adequately the nutrition problems (1). He might be the secretary of a small pluridisciplinary group as defined in point 3° below.

We believe actually that a new branch of science is now at the start, lying between Health Economics and Medical Nutrition, it is EPIDEMIO-CONOMICS, a mixture of epidemiological analyses of underlying causes and mechanisms of economic science in its sound approach to identify critical factors defining exchange and trade between men in a given society (7)

However we want to insist on the importance to redefine the place of nutrition in a broader context than only Public Health or part of Economic Planning. Health administrators put emphasis on organization, economic planners on income raising. Health managers and the planners are often missing the real development wherein the population should step with confidence, this happens not only because they think in pure Western Economics or Health models (these are as such not relevant), but also because their solutions are one-sided: the plans come from above and are not applicable as such by those who have to execute and realize the development.

If, at the contrary, we start from basic needs and take in consideration local biological facts and behaviour within a cultural pattern, nutrition will bring a real improvement. The population will contribute more easily to a concerned development with technical orientations coming from very qualified experienced technicians who can adapt interventions to local life patterns, possibilities and constraints. Therefore, nutrition activities must include research elements, at the same time as these are translated into modern nutrition education based on communication sciences. However, concerning improvement of knowledge as part of education, the first attitude should be to look at the KNOW-HOW the PEOPLE have in their traditional experience, fruit of centuries of problem solving, and to seek out how we can build on those members of the community who perform best.

In this way, we are designing programmes based on 'most performing or example mothers' and they are not necessarily those of highest social or economical level families nor those of officials.

Personal experience has shown that in any ruling system, advice is always acceptable particularly by the developmental forces within each community, where young generations bring always resources of new enthusiasm. Processes of development evolve continuously, even if sometimes they have to slow down according to changes in policy. The last has always to change and adapt itself to development, even when our world seems to turn in a circle of overconsumption out of which he looks unable to withdraw

While some organizations insist on the formulation of a food and nutrition policy, there is always a great risk that theories and planning from a desk don't provide the improvements expected by each human group. This is especially true when decision makers insist on integrating their plans in the national development plan. The World Health Organization (W H O), in the monograph on Nutrition in Preventive Medicine (1), underlines that the scope of nutrition policy doesn't imply that a nutrition service 'should assume responsibility for generating and coordinating policies in all areas', but the main function is rather 'to ensure that the nutritional implications of policies developed by the various sectors of government, are given appropriate consideration'. This attitude might be too soft inasmuch policies often remain theories without relations to realities.

Nutrition and development will never reach achievements by 'integration' of some concepts of nutrition in an agricultural policy, in an economic model or in Public Health strategies. The approach from above is an approach from outside, because it comes from a desk.

To summarize our position in nutrition development **five points** come out as **essential prerequisites** for the success of nutrition improvement:

- 1° An extensive combined attack in agriculture and transport is essential to make adequate quantity of food available, particularly for those who have least access to it. Even when resources are scarce, a better allocation of investments can ensure a very great efficiency and will make it possible that more food is available at affordable price for the greatest part of the population.
- 2° Common sense shows that an in depth analysis of the nutrition condition must take place before any intervention. Already by 'looking' carefully at children's Health and growth, much can be learned on the existing problems; by tracking down determinant causes and underlying trigger factors, solutions will appear that lie sometimes at hand.
- 3° If it is sure that clear objectives must be kept as ultimate goal, the responsables for execution must have full authority and confidence of the adminis-

tration as well as of the population. To have the necessary flexibility to make readjustments and modifications, a small group of technicians of directly concerned disciplines restricted to 3 to 5 persons must be chosen: this small number is a **must** to ensure complementarity in a pluridisciplinary approach and strengthen decisions leading to practical achievements; this will then occur in full 'concertation', a word evoking harmony as in a musical concert. But, if it is a hard work to put 2 to 3 technical men in agreement, it is even harder to realize it for 4 to 5 and nearly impossible for more.

- 4° Real improvement of nutrition and 'better-being' has to be achieved with the participation of the concerned persons, based on local realities and possibilities. This means that development starting from the bottom implies that the high qualified and experienced technicians must come and help the people at execution level. This will avoid that the communities organize themselves alone, on basis of discontentment and disagreement. It embraces that the small group of pluridisciplinary technicians must be decentralized at local level and nevertheless

have full authority to convince the interministerial decision level during the execution of the programme. Rather than to stick to a predetermined master plan written years before by an international or bilateral agency, continuous readjustments will ensure the greatest efficiency and achievements. It was said 'if the existing framework doesn't work, don't work within the existing framework'. (3)

- 5° When these fundamental points are all really fulfilled, all work done by charitable organizations will have to join the general efforts in order to do more than bring immediate relief by contributing to real development. Otherwise, deep desillusions can appear as well for those who come to bring help as for the communities directly concerned.

If we insist that **nutrition** should not be 'integrated', it is because it has to '**exist**' and have its identity in the set up of the small group of 3 to 5 technicians of concerned disciplines. Only when they get full support from the decision making bodies and confidence of the people, can well-adapted and balanced technology, good organization and not least great concern make from improvement of nutrition and well-being a definite **reality**.

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