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Possible Consequences of Nutritional Improvements for the Economic Development

by Hans-Rimbert Hemmer, Gießen*

Studies of the relationship of nutrition and economic development have hitherto largely focused on the question how the state of nutrition has changed in consequence of economic developments. The analysis concentrated on the "passive role of nutrition". In the following article the question is reversed: what possibilities exist for influencing the development process by measures of nutrition policy?

The disastrous drought that afflicted the Sahel zone in the early seventies and caused an acute food shortage in this region brought home the unsatisfactory state of nutrition in many developing countries to the politicians who are concerned with development problems. The state of nutrition in a country is essentially identical with the food consumption of the population in that country. Its scale is normally quantified by measurement of the calories and nutrients (such as protein, vitamins and minerals) contained in the consumed food.

A juxtaposition of the information on the nutritional situation gleaned by such quantification with corresponding data on nutritional needs provides evidence of the extent of malnutrition in the developing countries. There can be quantitative as well as qualitative malnutrition. Quantitative malnutrition is a state in which the available food does not meet the indispensable energy requirements. Qualitative malnutrition is a situation in which the amount of food measures up to the indispensable energy requirements but does not correspond in composition, and especially in its content of protein, vitamins and minerals, to the physiological needs.

It was indicated by estimates in the early sixties already that about 20 % of the population in the developing countries was suffering from quantitative malnutrition, 33 % went short of protein and 50 %

showed general signs of nutritional deficiencies. At the present time it is thought that the food supply of 1-1.5 billion people is inadequate; over 82 % of the undernourished population lives in Asia or Africa. Among children malnutrition is so common that, according to World Health Organization (WHO) estimates, it affects every other child under five years of age in the developing countries¹.

Concept of Economic Development

A definition of the concept of economic development is offered here first to facilitate the examination of the effects of nutritional improvements on economic development². Cardinal to the concept of economic development is the ability of individual members of the community to dispose of goods and services which have an influence on the standard of living which in turn depends upon the extent to which certain needs can be satisfied. Relevant needs are in the view of the UN: Health, food and nutrition, instruction and education, employment and working conditions, housing conditions, social security, clothing, recreation and entertainment, and human liberties. Within these categories of needs a special priority is given to health, food and nutrition, housing conditions and clothing; they are considered "basic needs"³.

The accessibility of goods and services to the population at large is usually measured by the per-

*Justus Liebig University. — The present article is a short version of: H.-R. Hemmer, *Der Einfluß der Ernährung auf die wirtschaftliche Entwicklung der Dritten Welt* (The influence of nutrition on the economic development of the Third World), in: Zentrum für regionale Entwicklungsforschung der Justus-Liebig-Universität Gießen (ed.), *Fehlernährung und ihre Folgen für die regionale Entwicklung* (Malnutrition and its consequences for regional development), Saarbrücken 1979.

¹ Cf. H.-R. Hemmer, *Der Einfluß der Ernährung* . . . , *ibid.*

² On the following cf. H.-R. Hemmer, *Wirtschaftsprobleme der Entwicklungsländer. Eine Einführung* (Economic problems of the developing countries. An introduction), Munich 1978, Chapter A.

³ Various authors still include education/instruction and employment in the basic human needs. Cf., e. g., D. Schwefel, *Grundbedürfnisse und Entwicklungspolitik* (Basic needs and development policy), Baden-Baden 1978.

capita income while the distribution of this per-capita income among the individual members of the community is expressed in terms of the Gini coefficient. The concept of economic development is thus capable of precise definition as a time sequence in which the per-capita income of a country rises while the interpersonal income distribution does not "worsen". In view of the very marked inequality of the income distribution in almost all developing countries it may be furthermore assumed that a "worsening" of the income distribution involves an intensification of the income concentration (that means: a higher Gini coefficient). It follows therefrom that the concept of economic development involves a process in which the rise of the per-capita income is attended by at least a constant but as far as possible a decreasing Gini coefficient.

The relative income concentration as reflected by the Gini coefficient has to be taken into account for a consideration of the distribution aspect but does not cover it adequately by itself, for the comprehensive analyses of interpersonal income distribution carried out since the beginning of the seventies have revealed absolute poverty in many developing countries of a sometimes horrifying extent. This absolute poverty is marked by the existence of degrading living conditions including disease, illiteracy, demoralization and also malnutrition; often the victims of this poverty are not even able to satisfy their basic needs.

Seeing that the problem of absolute poverty cannot be gauged adequately by means of the Gini coefficient, the demand for the elimination of absolute poverty must be included in the list of development policy objectives, at least as a complement to the demand for more even interpersonal income distribution. The concept of economic development may thus be defined as follows:

Economic development is a process in which the rise of the per-capita income is attended by an attenuation of absolute poverty; the relative income concentration

must not become more acute at the same time. The rise of the per-capita income is to be defined in this context as the growth objective and the attenuation of absolute poverty and the "improvement" of the interpersonal income distribution as the distribution objective. The growth and distribution objectives together present the economic development objective⁴.

Primary Versus Secondary Effects of Improved Nutrition

When analyzing the relationship between nutrition and economic development, economists have mostly focused on the question how the state of nutrition has changed in consequence of economic development: Nutrition was taken to be the dependent, economic development the independent variable. Outlays on nutritional improvements were according to this concept a reaction to the economic development process and not designed to speed up the development. The economic analysis thus concentrated on the "passive role of nutrition"; little thought was given to the question of the "active role of nutrition", i.e. to possibilities of influencing the development process by measures of nutrition policy⁵.

The available results of empirical inquiries reveal however a large measure of malnutrition in the countries of the Third World, and as adequate nutrition merits a very high priority among the basic needs, the state authorities are faced with the task of taking measures for an improvement of the state of nutrition so as to raise the standard of living of the inadequately fed populations directly. This objective of nutrition policy is according to Mellor from an ethical-humanitarian point of view of such relevance that all other considerations must be subordinated to it⁶.

⁴ Cf. H.-R. H e m m e r, Zur Problematik der gesamtwirtschaftlichen Zielfunktion in Entwicklungsländern (On the problems of the general economic objective function in developing countries), 2nd edition, Saarbrücken 1978.

⁵ Cf. K.-H. L e m n i t z e r, Ernährungssituation und wirtschaftliche Entwicklung (State of nutrition and economic development), Saarbrücken 1977, p.14ff.

⁶ Cf. J.W. M e l l o r, Nutrition and Economic Growth, in: A. B e r g, N.S. S c r i m s h a w, D.L. C a l l (eds.), Nutrition, National Development, and Planning, Cambridge (Mass.) and London 1973, p.70.

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This line of argument however ignores the fact that nutrition is *one* basic human need but not the *only* one. The situation in regard to the other basic needs — health, housing conditions and clothing — deserves equal consideration. Measures to improve nutrition may possibly have negative effects on the satisfaction of other basic needs, with the result that a conflict situation may arise between individual basic needs.

There is also the possibility of an improvement of the state of nutrition in the initial period being detrimental to an improvement in later periods. Measures for an improvement of the food situation are definitely consumption-promoting measures. If the financing of such measures handicaps investive measures which would raise the standard of living in subsequent periods, such an intertemporal conflict of objectives may well arise.

The potential conflicts between these objectives cannot be indicated and possibly eliminated, by reference only to the primary effects of improved nutrition. The secondary effects of such measures on the economic development which may contribute indirectly to changes in living standards must also be explored.

For the comprehension of these secondary effects it should be pointed out once more that the availability of goods and services is cardinal to the concept of economic development. These goods and services are the result of productive activities⁷: Productively applicable resources are brought together in production processes taking place in the country concerned, and the goods and services becoming available are the result of these production processes.

Labour, natural resources and capital are regarded as the major groups of production factors. The stocks of natural resources being essentially constant, any changes in factor stocks of relevance to development are normally limited to the labour and capital factors. Economic development thus presupposes an increase in the availability of productively deployable labour and capital. The term capital stands in this context for that portion of the production of previous periods which contributes to the attainment of production in the period under review. It consists of real capital (such as buildings, mechanical equipment, infrastructure) as well as of human capital, in which term are subsumed all the human capabilities generated in the course of production — the “produced capabilities” which include

in particular the education and training acquired by the workforce and the level of technical knowledge prevailing in a country.

To determine the influence of nutrition on economic development the question has to be asked what effect an improved state of nutrition has on the availability and input of the three factor complexes which have been distinguished here — labour, human capital and real capital. The answer to this question will show which secondary growth and distribution effects arise as a result of measures of nutrition policy.

Effects on the Manpower Potential

To begin with, the effects of an improved state of nutrition on the quantitative aspects of the workforce, i.e. the manpower potential, will be analyzed⁸. If the available manpower potential is measured in work-hours, a change of the available labour can take the form of a change in the number of persons able to work or of their average productive capabilities per hour.

To go by the hitherto available empirical inquiries it may be assumed that an improvement of the state of nutrition tends to lower the birth rate but the average life span may be expected to increase because the improved nutrition leads to a substantial decline especially of infant mortality; this second effect is definitely more potent than the first one so that despite falling birth rates more children will live to working age. The average working life is lengthened at the same time. The numbers of those fit for work will therefore rise persistently owing to nutritional factors.

An improvement of the state of nutrition will furthermore have the effect of increasing the average capacity of the population of working age to perform productive work — measured in working hours per person — for the physical capacity for work and the working morale depend in great measure upon the state of nutrition; a certain minimum calorie intake is indispensable for 100 % efficiency, and if this requirement is not met, the worker is incapable of persistent activity — there will be major interruptions. It follows that a larger calorie intake reduces the number of required breaks and thereby increases the number of potential working hours.

Not only the amount of available calories but the qualitative composition of the food intake, especially the supply of protein, vitamins and minerals, is of considerable importance for physical fitness: A

⁷ Cf. H.-R. Hemmer, *Wirtschaftsprobleme der Entwicklungsländer* . . . , *ibid.*, p.112ff.

⁸ This aspect has been discussed extensively in the literature. Cf. the comprehensive survey in K.-H. Lemnitzer, *Ernährungssituation und wirtschaftliche Entwicklung*, *ibid.*, p.169ff., and A. Berg, *The Nutrition Factor*, Washington 1973, p.9ff.

deficiency of these nutrients often leads to illness which sometimes results in considerable loss of working time which can be curtailed by minimization of the qualitative malnutrition. A consistent nutrition policy has indeed often resulted in more persistent improvements of the state of health than have traditional measures of health policy (such as provision of more physicians or hospitals) as improved nutrition is a protection against many diseases or speeds recuperation. In either case is the potential labour supply increased.

The development effects of this nutrition-related increase of the potential labour supply to the economy depend essentially on the possibilities for its productive deployment. In the case of a production function with limited substitutional factors, which corresponds largely to the production-technical reality in the developing countries, such productive labour deployment depends upon adequate availability of the required complementary factors — human capital, real capital and natural resources.

The unemployment prevailing in many countries suggests that this factor conjuncture obtains only very rarely. It is easily forgotten however that unemployment in one sector may coincide with an at least temporary scarcity of labour in another sector (e.g. in agriculture during harvest time); in such a situation the partial labour market imbalances cannot cancel out because of the dualistic structure of the countries concerned and in particular because of intersectoral immobilities. It has also to be borne in mind that a large part of the overt unemployment in developing countries concerns school-leavers who have certain ideas about their careers which cannot (yet) be realized in these countries and refuse to enter supposedly inferior occupations⁹. Unemployed of this type do not normally compete with the labour of the groups affected by undernourishment and malnutrition: The so far available results of empirical inquiries seem to prove on the contrary that the employment problem in the developing countries, like the problem of absolute poverty, is by and large a rural problem. The covert unemployed in the rural areas in particular are likely to benefit from measures of nutrition policy. Nutritional improvements may be counted upon to have positive effects on employment because the thesis relating to the (in most developing countries dominant) covert unemployment calls for qualification under the described aspects of quantitative and

qualitative malnutrition: The physical condition of the workers is often such that they cannot work effectively for more than a relatively short time each day; a greater working effort is made impossible by their inadequate nutritional state. Such people have often full-time jobs but do in fact little work¹⁰. An improvement of the state of nutrition of these full-time workers could increase their work potential correspondingly and thus increase the total production of the country's economy.

Finally it may be pointed out that an improvement of the nutritional situation may have an impact not only on the potential labour supply but on the human and real capital resources of the country concerned. The repercussions of nutritional improvements on the capital resources must therefore be considered before definitive statements can be made concerning the employment prospects for the additional labour becoming available due to nutritional factors.

Consequences for Human Capital Resources

Inadequate equipment with human capital is regarded by several authors as the crucial reason for the underdevelopment of the developing countries. Human capital is in the main created in two ways — by educational and training measures and by the assimilation of experience in the course of productive activities ("learning by doing"). An improved nutritional situation can have positive effects on both these forms of human capital generation and thus help to overcome a cardinal bottleneck in the development process.

Improved nutrition is known to increase the capacity for mental work markedly¹¹. The efficiency of investments in education and training can be enhanced by it: The impairment of the intelligence, receptivity and application of individuals as a result of malnutrition and the effects of illness-induced absenteeism lead to suboptimal use of the capital which has been invested in the education sector because the training results attainable under such conditions compare unfavourably with those which could be obtained under better nutritional conditions. Malnutrition is also partly responsible for the sometimes extremely high failure rates; courses have to be taken a second time and other applicants have to be disappointed. Illness and infant mortality due to malnutrition are also reflected by a high non-completion rate, and even if the stage of education is successfully completed, it may have been in vain because of high mortality rates; as far as the

⁹ R.A. Berry for instance estimates the proportion of such unemployed in the statistically recorded overt unemployment in Colombia at 50-60 %. Cf. R. A. Berry, *Open Unemployment as a Social Problem in Urban Colombia: Myth and Reality*, in: *Economic Development and Cultural Change*, Vol.23 (1974/75).

¹⁰ "To call them underemployed does not seem pertinent" - T.W. Schultz, *Investment in Human Capital*, in: *American Economic Review*, Vol.51 (1961), p.5.

¹¹ Cf. P. Belli, *The Economic Implications of Malnutrition: The Dismal Science Revisited*, in: *Economic Development and Cultural Change*, Vol. 20 (1971/72); M. Selowsky, L. Taylor, *The Economics of Malnourished Children: An Example of Disinvestment in Human Capital*, in: *Economic Development and Cultural Change*, Vol.22 (1973/74).

economy is concerned, the investment may have to be written off as a "preproduction loss". This is why in many developing countries investments in education do not become fully effective until adequate nutritional conditions have been created. Measures to improve the state of nutrition may thus have a positive effect on the accumulation of human capital in the countries concerned by inducing productivity gains in the sphere of education and training.

They may also be expected to speed the accumulation of human capital through their effect on the ability to learn. The greater average life expectancy has the result of longer average stays in the production process while temporary working-time losses due to illness are reduced. The workers thus acquire more experience and more human capital is accumulated than would be the case were the state of nutrition not improved. Moreover, the nutrition-related increase of mental capabilities may be expected to lead to improved learning processes, with additional gains of human capital.

Accumulation of Real Capital

In conclusion the effects on the formation of real capital will be discussed. As pointed out, an improved state of nutrition results in increased productivity of health service investments and of educational and training investments. If the expenditure in these areas is maintained, the effects on the potential labour supply and the accumulation of human capital will be as described. It is however possible that the increased productivity in the health and education/training areas will lead to the diversion to other sectors of part of the resources previously devoted to them. Insofar as this acts as a brake on the increase of the potential labour supply and human capital it will now be possible to step up the formation of real capital. Whether and to what extent an improved state of nutrition will have positive effects on the formation of real capital depends on the attitude of the institutions concerned with development policy. Whether they react to nutrition-related productivity gains in the health, education and training areas by factor diversion can only be established by examination of concrete cases.

To sum up: Economic development can be influenced by nutritional improvements in many ways. These effects on development relate both to growth and to income distribution. Both can be improved by nutritional improvements. The first effect is a higher quantity and quality of available production factors. If this larger or better factor supply is used productively, it will result in production increases leading to faster economic growth. Distributional improvements will

occur at the same time because improvements of the state of nutrition will be felt primarily by the population groups at the lower end of the income scale which are in many cases still in a state of absolute poverty. Improvements in income distribution may also occur if the nutrition-related increase of the potential labour supply results in a higher level of actual employment as work is the only possible source of income available to the bulk of the population in developing countries.

Ideal would be a factor conjuncture in which the effects of nutritional improvements on the human and real capital create those job opportunities which are needed to provide employment for the nutrition-induced increase of the labour supply. A kind of "Say's law of nutrition-related increase in employment" would apply to such a situation. But even if this full compensation is not obtained, an improvement of the state of nutrition still meets by virtue of its positive effects on growth and distribution the criteria which have to be satisfied to qualify a measure as "promoting development".

In the face of these development-promoting results one must not overlook however the social costs involved in nutritional improvements. These costs arise because an improved state of nutrition can normally be attained only through reallocation of the available production factors. The production of other goods and services will decline in this case. It is this decline of production which, measured at economic scarcity prices for the goods and services concerned, constitutes the social cost of the nutritional improvements.

Whether the improvement of the state of nutrition on balance accelerates the economic growth and/or improves the income distribution can in the final analysis only be indicated by a comparison of these costs with the social benefits as described in this article. Empirical inquiries¹² warrant however the conjecture that the internal rate of return of many items of expenditure undertaken in order to improve the nutritional situation is, at least in countries with significant malnutrition, certainly not lower than the rates of return which calculations show to prevail for investments for instance in the education sector. Spending on food – though traditionally treated as consumption – can therefore be in some measure more productive from a national economic point of view than a large variety of investment outlays.

¹² Cf., e.g., H. Correa, G. Cummings, Contribution of Nutrition to Economic Growth, in: *American Journal of Clinical Nutrition*, Vol.23 (1970); H. Correa, Sources of Economic Growth in Latin America, in: *Southern Economic Journal*, Vol.37 (1970/71).