

Economic consequences of malnutrition¹

F. JAMES LEVINSON AND PHILIP C. ABBOTT

Massachusetts Institute of Technology International Nutrition Planning Program

SUMMARY

There has been increasing interest during recent years in the developmental implications of nutrition programs. This article explores some of the hypotheses advanced in this regard.

The economic consequences of improved nutrition appear to include human capital formation, increased effectiveness of government expenditures, and an improved "quality of life" —particularly for lower income groups. The relationships examined suggest the legitimacy of nutrition intervention as an economic investment as well as a means of increasing human welfare.

I. Introduction

Until rather recently malnutrition in both low income and industrialized countries has been conceptualized and approached almost entirely as a humanitarian problem. Combatting malnutrition was considered part of a broader program of welfare for disadvantaged segments of society along with subsidized housing and unemployment compensation. Within this welfare context malnutrition usually was considered part of the health problem and was treated as are most health problems, namely with curative rather than preventative practice. Accordingly, most people involved in nutrition programs were physicians.

The welfare/curative/physician-oriented approach to malnutrition problems was helpful, if not requisite, in identifying the severity and magnitude of the problem. In terms of

1. Paper presented in the symposium on "Effects of Inadequate Nutrition on Human Development" at the Continental Meeting on Science and Man in the Americas, México City, June 25, 1973.

Recibido: 25-7-73.

effectiveness, its results were less notable. Beyond the scale of pediatrics wards and small demonstration projects, the approach resulted in little if any significant impact on the problem. In addition the magnitude of investment elicited by this approach was negligible (1).

It was in part this rather dismal showing that prompted advocates of nutrition to look for a different approach to the problem. In short, this new approach stressed the developmental benefits of combatting malnutrition as well as the humanitarian ones, and sought to apply a broader array of talents to address the problem (2). The new approach was based on the premise that malnutrition is a complex interaction of cultural, economic, and political phenomena and thus requires the skills and experience of economists, political scientists, anthropologists, and social psychologists as well as physicians and nutritionists. The approach also was based on at least the hope that an approach stressing economic benefits as well as welfare might have greater appeal to national planners, most of whom are economists preoccupied with the allocation of resources.

This paper attempts to look more closely at the relationships underlying this broader approach to malnutrition problem-solving. While some of the discussion is applicable to industrialized countries, this presentation will relate more directly to those low income countries, where the magnitude of the malnutrition problem demands explicit and major governmental attention. It looks first at the concept of human capital; i. e., the notion that a country's wealth may be in its people as well as in its physical assets. This is followed by discussions of ways in which nutrition programs can boost existing development programs currently underway in most countries. The presentation concludes with an examination of the recently emerging "quality of life" dimension of national growth - one that examines the very basis of national development.

II. Human Capital Formation

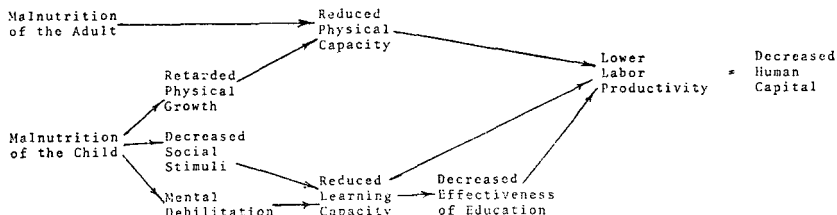
As mentioned, nutrition expenditures until recently were regarded as consumption rather than investment and were so classified in national accounts. This was consistent with

the Harrod-Domar and other traditional development models that attempted to measure the effects of government expenditures on GNP and economic growth (3). According to these models the key to development is growth of the capital stock, suggesting investment-oriented planning and capital goods production. Such models imply that expenditures on nutrition, while increasing well being in the short run, would leave little behind in the way of self-sustained growth. Implicit in the models is the idea that short-run consumption may have to be sacrificed to permit investments, which, over time, will generate employment, raise incomes, and bring about economically viable well being.

In the 1960s this conception of development was at least partially challenged by Theodore Schultz and others who postulated that capital stock has a human as well as physical component (4). According to this view, expenditures on education and health could be viewed as investments in human capital which, by increasing productivity, would add to the wealth or capital stock of the nation.

Figure 1 presents diagrammatically the hypothesized relationships between nutrition and human capital formation. The top part of the diagram suggests that dietary deficiency in the adult decreases his physical capacity and in turn decreases his productivity which, according to Schultz (5), serves as a measure of human capital. Thus, if the adult's diet is lacking in essential nutrients, the quantity and quality of his output will be diminished. This was first suggested, empirically, by Kraut and Mueller in a study attempting to relate nutritional intake to the productivity of German coal miners (6). Several subsequent studies and some now underway have been attempting to isolate better this nutrition factor in labor productivity (7).

FIGURE 1
HUMAN CAPITAL FORMATION



The relationships in the upper part of the diagram relate not only to the physical capacity of adult laborers on the job, but also to the time spent off the job. Some of the aforementioned studies have attempted to identify the effects of ill health and malnutrition on absenteeism and lost work days in addition to their effects on job performance.

The lower part of the diagram is more complex and probably more important. This part of the diagram suggests that malnutrition during the early years of life can affect subsequent productivity and capital formation, both through the resultant physical stunting and through decreased learning capacity. It is well known that malnutrition leads to smaller physical size and limits a child's ability to achieve full physical potential (8). This in turn limits the physical capacity of the child and hence his productive capacity as an adult.

The malnutrition-learning capacity relationship has two dimensions. The first involves the effects of malnutrition on the brain during the period of most rapid brain growth, and may be manifested by smaller brain size, fewer brain cells, or biochemical deficiency of the brain. Thus malnutrition in the critical early years of life may affect, perhaps irreversibly, the mental abilities of the child. The second dimension, equally or more important, involves the ability of the malnourished child to develop his sensory skill through interaction with his family and his environment. Quite clearly the malnourished child interacts less intensively with such stimuli and as a result fails to achieve his mental potential. This mental development determines the child's learning capacity in a direct sense, and also determines, possibly to a major extent, the extent to which he will be able to take advantage of educational facilities. Learning ability in turn will have an important effect on his future productivity (8).

While the relationships suggested in the diagram appear plausible, and may indeed be a reasonable approximation of reality in some situations, they are, for the most part, hypotheses with as yet little firm empirical underpinning. In addition, two important caveats should be considered. The first is relevant to labor surplus economics in which greater productivity among workers may not, at least in the short run,

prove to be an economic asset. If, in a situation of fixed raw materials or a fixed output, the productivity of the work force increases, a portion of that work force will become redundant and will be laid off (unless protected by a strong labor union), thus exacerbating what may already be a serious unemployment problem.

The second caveat relates to the production process itself. Where the physical and/or mental capacity of a labor force represents a limiting factor in a production process, a better nourished population could have an important effect on labor productivity. In most low income countries, however, this situation usually is limited to a relatively small segment of the labor force working on production processes where labor is the primary or sole production input (e.g., physical earth moving or cane cutting). More often in these countries, the limiting factor in a production process is not labor capacity but rather raw materials, spare parts, or management skills in the industrial sector, and the size of land holdings or the availability of agricultural inputs (irrigation, fertilizer, new seed varieties) in the rural sector.

One might conclude, therefore, that the strength of the relationships postulated in the diagram will vary considerably from one situation to another, and that any attempt to hypothesize on the productivity or human capital benefits of improved nutrition would have to take these clearly into account. The discussion also suggests that even where these relationships are strong, investment in nutrition alone is unlikely to produce the desired economic benefits. Nonetheless, well-planned nutrition intervention programs integrated into a broader program of development activities are likely to constitute an important input in accelerating the process of economic growth.

III. Increasing the Effectiveness of Government Expenditures

In addition to its effects on human capital formation, nutrition investment also may have positive effects on economic growth by increasing program effectiveness in other development sectors, particularly education, public health, and fami-

ly planning (1). While these sectors currently command a substantial fraction of the budgets in many developing countries, the effectiveness of these expenditures is often unclear. What is suggested here is that in many instances explicit nutrition investment may significantly increase program effectiveness in these sectors.

a. *Education*

Most governments accept their responsibility for the provision of education and build into their budgets funds for buildings, teachers, and materials. Presumably these same governments justify such expenditure on the basis of expected returns. Most of them probably believe that a better educated populace will facilitate the development process. If so, and if the relationships between malnutrition and learning capacity discussed earlier are valid, there would seem to be a clear rationale for similar government financing of nutrition to utilize more fully a country's educational capacity.

b. *Health*

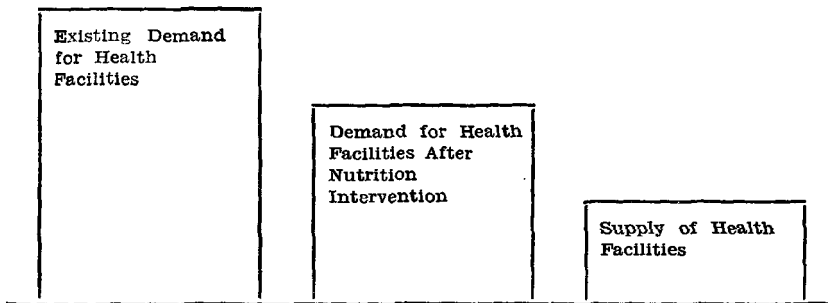
As in the case of education, many low income countries have significant budgetary allowances for health. In the vast majority of cases this health budget is directed toward infectious disease by means of curative medicine. Evidence to date suggests that both health and health care can be positively affected by nutrition intervention.

There is now a large volume of evidence demonstrating the synergistic relationship between malnutrition and infectious disease (9). Simply stated, when malnutrition exists, resistance to infectious disease is reduced; when infectious disease exists, nutritional needs are greater. Quite clearly the severity and consequences of infectious disease in low income countries, particularly among young children, can be reduced significantly if nutritional status is improved. Thus, the demand for expensive treatment of infectious disease would be decreased if, as a preventive measure, malnutrition were reduced.

It should be pointed out that while nutrition investment may well improve the health status of a community and increase the effectiveness of a health system, it is unlikely to

decrease health expenditures per se in most countries. Usually the demand for health services, particularly in low income countries, far exceeds the capacity of the health system. As seen in Figure 2, this need for health services usually will exceed capacity severalfold. Even if a nutrition program could eliminate half of the need for curative treatment, demand would still far exceed existing capacity. Expenditures will be reduced only when the demand for services decreases to a level below existing health care capacity. While possible in industrialized countries, this would be a highly unrealistic expectation in Asia or Latin America.

FIGURE 2
SUPPLY AND DEMAND FOR HEALTH FACILITIES IN LOW
INCOME COUNTRIES



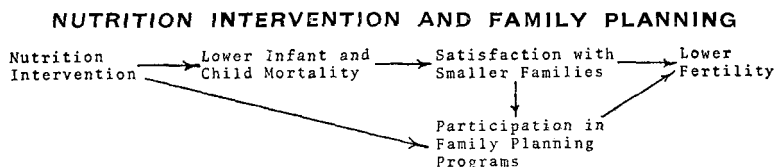
More important, however, investment in nutrition will change the nature of the load on health care by freeing resources now used to treat malnutrition and malnutrition-related disease. As a preventive measure, nutrition intervention represents one effective means of accomplishing basic health objectives in a less expensive way.

c. *Family Planning*

Closely related to education and health objectives in many countries is family planning. The implications of large population increases for national development have motivated many of these countries to allocate major expenditures for family planning programs. Again, the results have not been singularly impressive. Once the already receptive couples

are reached, programs find themselves encountering stiff layers of resistance that they have been unable to penetrate with their existing technological and motivational equipment (10). Here the effects of nutrition intervention, as presented in Figure 3, may be critical (11). One such role involves the relationship between mortality and fertility. High infant and child mortality rates have an adverse effect on the willingness of reproductive age parents to participate in family planning. A couple desiring to have two surviving sons will, on the average, have to have four surviving children. If half of their children die before the age of 5, the couple will have to have 8 children, or perhaps 10 to be on the safe side. If, it is argued, parents can be convinced that their first-born children will survive through effective nutrition programs, they will be more likely to participate in family planning programs.

FIGURE 3



Nutrition inputs can also boost family planning programs operationally by making them more attractive. Many population control programs around the world have run into difficulties because services provided were limited exclusively to loop insertions and vasectomies, sometimes pursued with heavy-handedness in order to meet program quotas. Often the result has been to antagonize potential clients and to decrease the effectiveness and the morale of the workers. A center capable of caring for a young mother's children, it is argued, would be in a far better position to disseminate successfully the family planning message.

IV. *Quality of Life and Distribution of Resources*

So far the discussion of nutrition as an economic investment has been limited to those elements of economic growth that can be measured in monetary or empirical terms. It is

becoming increasingly evident, however, that if the objective of economic development is stated in terms of improved well being of the population, those indices that measure development should include some measure of the "quality of life". Although the term is nebulous, many countries today are giving increased attention to ways in which their expenditures might more adequately address and positively affect the quality of life (10). This relates in part to the nature and quality of services provided and the extent to which these services are meeting priority needs as perceived by the recipients. It would be difficult to think of a more direct means of improving well being than reducing a family's hunger, improving its health, and increasing the likelihood that its children will live.

The quality of life concept also has important distributional implications. It suggests that equitable resource distribution may be as important as increased agricultural production, or that a network of committed health workers in rural areas may be as important as hospital capacity in the cities, even though they add less to the GNP account. These distributional questions become particularly serious in the context of a rapid economic growth, which often results in a further aggravation of already wide differentials in income and well being (12). In this sense, growth measures in and of themselves may be seriously misleading as indices of human welfare.

In conclusion, the relationships discussed above, although often lacking in precision and empiricism, suggest the legitimacy of nutrition intervention as an economic investment as well as means of increasing human welfare. As governments consider ways of pursuing more desirable patterns of economic growth, whether for political purposes or to accelerate meaningful growth per se, it is likely that they will give increasing attention to the combatting of malnutrition as a national priority.

RESUMEN

Las consecuencias económicas de la malnutrición

Ha habido un interés cada día mayor durante los últimos años en las implicaciones sobre el desarrollo de programas de nutrición. En el presente artículo se exploran algunas hipótesis formuladas sobre este tema.

Entre las consecuencias económicas de una nutrición mejorada se pueden incluir la formación de capital humano, mejora en la efectividad de inversiones gubernamentales y una mejora en la "calidad de vida", especialmente para las clases sociales con menores ingresos. Las relaciones examinadas sugieren la justificación de las intervenciones nutricionales como inversión económica y también como instrumento para mejorar el bienestar humano.

BIBLIOGRAPHY

1. Berg, A., *The Nutrition Factor* (Washington, D. C.: Brookings Institution, 1973); and A. Berg, N. S. Scrimshaw, and D. L. Call, *Nutrition, National Development, and Planning*, (Cambridge, Mass.: M.I.T. Press, 1973).
2. Levinson, F. J. and D. L. Call, "Nutrition Intervention in Low Income Countries: A Planning Model and Case Study" (Cornell Agricultural Development Mimeograph 54, Cornell University, Ithaca, New York, 1970); H. Correa and G. Cummings, "Contributions of Nutrition to Economic Growth", *The Amer. J. Clin. Nutr.* 23 (5): 560-565, 1970; and M. Selowsky and L. Taylor, "Malnourished Children in Chile: An Example of Disinvestment in Human Capital" *Economic Development and Cultural Change.* (2261): 17-30, 1973.
3. Domar, E. D., *Essays in the Theory of Economic Growth* (New York: Oxford University Press, 1957).
4. Schultz, T. W. "Investment in Human Capital", *Amer. Econ. Rev.* 51: 1-17, 1961.
5. Schultz, T. W., *Investment in Human Capital* (New York: The Free Press, 1971).
6. Kraut, H. and E. A. Muller, "Calorie Intake and Industrial Output", *Science*, 104: 945, 1946.
7. Food and Agriculture Organization, *Nutrition and Working Efficiency* (Rome: FAO, 1962); and S. M. Weisberg, K. M. Reese, and P. McDonald, *Nutrition and Productivity* (Washington, D. C.: League for International Food Education, 1972).
8. Scrimshaw, N. S. and J. E. Gordon, *Malnutrition, Learning, and Behavior* (Cambridge, Mass.: M.I.T. Press, 1968).
9. Scrimshaw, N. S., C. E. Taylor, and J. E. Gordon, *Interactions of Nutrition and Infection*, WHO Monograph Series, Nº 57 (Geneva: World Health Organization, 1968).
10. Berg, A., *The Nutrition Factor*.
11. Wray, J. D., "Will Better Nutrition Decrease Fertility?" Presented at IXth International Congress of Nutrition, Mexico City, 1972.
12. Adelman, Irma and C. T. Morris, "Who Benefits from Economic Development?" (Unpublished).