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METHODS OF EVALUATION OF THE CONTRIBUTION OF HEALTH PROGRAMS TO ECONOMIC DEVELOPMENT

(Evaluation of the Economic Impact
of Health Activities)

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I. Similarities and Differences in Health and Economics

The relationship between health and economics has always been considered obvious, and it is generally accepted that the objective of economic development is the attainment of the highest and most equitably distributed levels of social welfare for all peoples. That there is considerable discrepancy between this ideal and the reality, is shown by the existence of developed countries with high living standards side-by-side with under-developed countries that barely make contact with the benefits of culture and civilization.

An analysis of the differences between economic development and public health development, even within the same country, brings many factors to light, some of which may be summarized as follows:

1. Lack of coordination between the activities of health and of economics.
2. The inability to express economic and health factors in common values owing to the lack of a common denominator to harmonize the differing value systems.
3. The lack of understanding of the basic fact that man is the common denominator of all human values, by whom not only the order of values but their evaluation is measured. As a complex value, which in itself contains both the specific and the generic and is still governed by the same laws that governed primitive man, modern man cannot dissociate "being" from "having", since the one is determined by stable biological laws of evolution and the other by changing ways of extracting from the environment what he requires for his existence, survival, and progress. That is why health --substantiated in the "being" of biological man-- admits no division between medicine and public health; whereas economics and sociology --substantiated in "social man" -- depend upon historical, political, cultural and other values which give different dimensions in time and space to different communities.
4. The development of the primitive, individual economy toward a social and therefore dehumanized, statistical economy with diversified governmental practices, while medicine and public health (as a condition, not as services) continue to depend technically upon the biological and ecological facts of individual and collective health, which although uniform in essence show variable manifestations.

5. The indirect relationship between the practice of health and economics, when their interaction is regulated through the medium of public administration. As soon as administrative compartments occur there is competition for the funds available to be shared with other activities that promote social welfare and it becomes necessary to justify priorities. Some few countries possess sufficient easily exploitable natural wealth so that there is no problem in satisfying the requirements of public services. But in most Latin American countries, with agricultural economies and little industrialization, income is not sufficient to meet the needs of social and economic development.

6. Although economic principles and objectives have varied little, the means for attaining individual and social welfare have changed radically and unevenly. Since knowledge grows more rapidly than economic capacity, the demand for increased social well-being becomes imperative long before the population is able to satisfy even its most basic needs. This means that the State has to assume direct responsibility for satisfying those needs or else promote effective economic systems to increase the population's power to consume. This amounts to saying that it is not enough to have social improvement alone but that development is also necessary, for the latter always implies true economic growth, with increased production and a multiplicative or at least a cumulative effect. For the attainment of a true state of complete physical, mental, and social well-being (as defined by WHO), there must be a balance between ability to work, economic capacity for production, and social capacity for consumption, and this basically implies health, full employment, equitable distribution of wealth, development and economic growth, social development, individual and collective protection and security, and freedom.

7. Certain economic systems give preferential attention to the productive sector of the population, which receives benefits that are not given to children, housewives, invalids, the unemployed, sick, aged, etc. Even when limited social security is introduced, many persons may remain outside its benefits, such as agricultural workers, students, the disabled, and other needy persons. Under such circumstances the public health services have varying responsibilities, which affect the availability of budgetary funds and the efficiency of the services.

The Economic and Health Situation in Latin America

Recent economic studies by ECLA ^{1/} and ILO ^{2/} and health studies of the Pan American Sanitary Bureau ^{3/} require no recapitulation here and may be summarized briefly as follows:

1. The population of Latin America was 163 million in 1950 and 205 million in 1960, representing 6.52 per cent and 7.04 per cent of world population respectively. This high annual growth of 2.3 per cent would have required intensified economic measures for economic development to have brought about true growth. This was not the case

despite the economic progress occurring in the countries of Latin America; whatever benefits have been observed did not bring about a national per capita income that would provide minimum subsistence requirements and satisfactory levels of social welfare.

2. Population is concentrated in big cities (one-third of the inhabitants of South America live in one-twentieth of the territory). These cities grew 43 per cent from 1945 to 1955 while the rate of growth of many rural areas was below 2 per cent. Without sufficient population density in rural areas there is no justification for installing health services or providing health care, as these measures are not only very costly but on occasions are even impossible to maintain and operate.

3. The increased percentage of nonagricultural workers in the active population would seem to indicate that in the future there will be more manpower available for industry. Yet this is not the case, because public administration—with its tendency to increase non-productive bureaucracy—absorbs a large portion of the available manpower.

4. While the gross national product increased by 50 per cent between 1950 and 1959, national product per capita rose only 21 per cent, and the distribution of income was uneven. (The 50 per cent increase in GNP benefited only 12 per cent of the families in Venezuela; 33 per cent in Chile; and in Colombia 41 per cent of national income went to only 5 per cent of the population.) In a word, the economic systems of the countries failed to provide adequate social welfare, since in 1959 economic growth was only 0.3 per cent while population growth was 2.6 per cent.

5. Finally, mention should be made of the fact that great strides in public health have been made in the Hemisphere, but that they are still far from sufficient, as no "health growth" was achieved. This is largely due to the fact that not even the basic health needs of the population have yet been satisfied, nor have the needs of the health services, which lack the infrastructure without which it is not possible to achieve health progress in a country. Real advance in the development of the Latin American peoples will probably not be possible without first correcting certain social, political, and administrative situations, as outlined in the Act of Bogotá. 4/

Characteristics and Classification of Development

The classification of "developed", "developing", and "underdeveloped" countries is universally accepted. Usually the first are industrialized and flourishing countries, and the last, primitive and agricultural. Agriculture is an important source of economic progress in European countries. In Latin America, however, agricultural areas are those of ignorance, poverty, and disease. The reasons are social and political, reflecting the quasi-feudal organization of rural society. Without

correcting this foundation there may be "improvement" but there will be no true "development" in rural areas.

Between the two extremes lie the "developing" countries, and it is specifically for these that the classification is inadequate, first, because they run the whole gamut of socio-economic conditions, and second, because in some of them social development in certain regions and privileged economic sectors is equal or superior to that of the "developed" countries. To say that they are "developing" countries is vague. It would be more correct to say that they are countries in which levels of development are heterogenous. While the countries known as "developed" and "underdeveloped" are characterized by the homogeneity of their development, be it positive or negative, the other countries are defined by the quantitative and qualitative heterogeneity of the components of economic, social, and health development. This heterogeneity is manifest in every factor --political, demographic, ecologic, administrative, technical-- and cannot be corrected without structural changes in the factors themselves. The experience of the past 20 years has shown that isolated economic development cannot be a solution for countries where traditional conditions, persisting in broad less-developed sectors, cancel out the benefits achieved in other areas, and particularly in industrial development.

Justification of Health and Economic Investment

The modern tendency is to accept the thesis that every economic investment is justified by its anticipated yield. Health has wrongly been considered a non-productive investment because it has been identified with health "services," and the need to justify the economy's financial contribution to health has therefore become traditional. This phenomenon is explained by the dominance of purely economic values, but would not exist if governmental policies were based predominantly on biological or health values.

On the other hand, should not economics be asked to justify what use it has made of the undeniable progress in health achieved in the past ten years? If a sustained health policy has been able to potentiate the biological advantages of the high rate of population growth by preserving this human capital, would it not be appropriate to ask what the governments have done to use it for economic purposes?

There are many examples of inefficient use of health by the economy --unemployment in areas where malaria has been eradicated; consumption of less than 30 grams per day of animal protein in areas where veterinary medicine has helped to improve and increase livestock for human consumption; lack of industrial hygiene and suitable on-the-job facilities for workers who receive excellent medical care away from work under social security schemes. All this would seem to indicate that the economic systems are not making due use of the contributions which public health has made.

Quite as important as noting the facts, however, is finding methods to evaluate them. See the sources cited earlier in this paper on the need for economic and health planning to be undertaken jointly as an integrated whole wherever it is necessary and possible. Not every economic activity needs to be imbued with public health or vice versa, but wherever a relationship between these two fields exists, an attempt should be made to carry out joint and not merely parallel or coordinated planning and evaluation. To accomplish this, the greatest task is to discover and apply a suitable methodology, which does not yet exist. The purpose of the following discussion is to explore this new field, while not neglecting the methods used at present.

II. Statistical Data Needed to Facilitate the Evaluation of the Economic Impact of Health Activities

Evaluation in Public Health

The evaluation of health programs has begun to be incorporated routinely ^{5/} by health administrations in both program planning ^{6/} and operations. Attempts have also been made to introduce more precision in the present ambiguous terminology ^{7/} and in the classification of the various types of health activities that require different forms of evaluation. ^{8/}

The following are required if evaluation is to be possible: (a) a general health plan; (b) a health plan that includes both short- and long-range programs as well as individual programs for specific activities, together with definitions of purposes and objectives, the methods to be used to achieve them, and the areas in which they are to be applied; (c) as thorough as possible a knowledge of the activities performed, results achieved, etc.

The main objective of health evaluation should be to test in positive terms the degree of effective health promotion achieved by the activities undertaken. This chiefly statistical and biometrical approach, ^{9/} however, is strictly limited by the small number of countries which have valid and exact statistics. Thus, evaluation refers either to health "conditions" -- a vague term that has been interpreted in different ways ^{10/} -- to public health programs, and to operations in particular, ^{11/} or to health activities in terms of performance, efficiency, or costs, in relation to financial resources. Lastly, it is a matter of finding "indicators" to measure levels of health in relation to standards of living so that, together with other indicators, ^{12/} they may give a concrete idea of social and economic development.

The evaluation of health as a component of economic and social development is nothing new, and not even a progressive measure of this century. ^{13/} The technical discussions and manuals on evaluation are numerous. ^{14/} Both synthetic and analytic approaches relate to the same kind of planning that is used for drawing up programs. Some of these approaches

have been pointed out elsewhere^{15/} biological approaches, which are closely related to bio-demography^{16/} and take the place of more direct methods of evaluation based on genetics or biometrics; social approaches which make it possible to evaluate adaptation and social development as well as the relationship between health and the community; and economic approaches, which are of different kinds and are often confused with purely financial approaches.

Evaluation implies planning and vice versa. Every organized public health plan involves three main steps: (1) planning, which includes the adoption of principles, purposes, priorities, targets, short- and long-range objectives, and secondary objectives, definition of the program area and selection of operating methods, including methods of evaluation; (2) execution of the plan and concurrent evaluation; and (3) the final evaluation of achievements. The process of planning requires many data (population censuses, surveys of health conditions, lists and descriptions of problems and health needs, and estimates of resources). The techniques of evaluation are many and their application varies with the purpose of the program, including techniques for assigning values to health items, methods of estimation, and evaluation proper.

Many forms of evaluation are mathematical, ranging from simple arithmetical techniques (census, cadaster, inventory, balance sheet) to complex mathematical formulae. Statistical evaluation is a priceless tool, especially demography, but unfortunately cannot be used in most countries because the data available are not accurate. Physical evaluation or measurement depends on the certainty with which the units of measure can be defined. Great scientific advances have been made by the use of measuring scales (nominal, ordinal, interval, and ratio), but these as yet fail to define the most interesting aspects of many qualitative phenomena. Biology has contributed methods of assay and estimation which are highly useful in experimental work. Special mention should be made of certain techniques of social evaluation -- observation, questionnaires, interviews, and projective techniques. Sociometric analysis includes sociograms, indices, matrices, etc. Panel studies, repeated cross-section interviews, self-surveys, surveys of records, etc., are all useful methods for public health.

It is not possible to mention all evaluation procedures in this introduction. Suffice it to say that in many cases evaluation is punctiform or sectional, and that continuous evaluation is the kind which is incorporated in operational routine, that is, auto-evaluation, and that there is also a kind of continued evaluation made in sequence at successively higher administrative levels, which depends chiefly on the recognition and evaluation of the "primary factor" and of the transformations it goes through as it is successively generalized at different levels of the administrative hierarchy. It may be useful to give some idea, even an incomplete one, of some of the estimating and evaluation procedures currently used in public health, rather than to repeat them later on:

- A. Procedures at operational levels which per se include evaluation:
1. Laboratory and clinical experiments, etc.
 2. Field research and experiments (surveys, pilot projects)
- B. Field operational procedures that facilitate evaluation:
1. Inspections, audits, evaluation "in situ," interviews
 2. "Evaluation by Observation" (see below)
 3. Evaluation of performance
 4. Field estimates (inventories, censuses, surveys, cadasters, samples, repeat surveys, etc.)
- C. Evaluation procedures at non-operational levels:
1. Questionnaires
 2. Analyses of reports and records
 3. Analyses of data in relation to norms and standards
 4. Statistical analyses (and statistical evaluation)
- D. Evaluation procedures applicable at all program levels:
1. Analytical comparison between achievements and objectives
 2. The same comparison between original (base) estimates and re-estimates
 3. Performance analyses (in relation to costs, or to a given procedure, such as hospital bed occupancy, length of hospitalization, utilization of equipment, etc.)
 4. Analysis of attitude and behavior
 5. Trend analysis and extrapolation
 6. Forecasts
- E. Evaluation procedures for plans, programs, and evaluation itself as a concept and as an administrative practice:
1. Pre-evaluation and pre-estimate of objectives and methods
 2. Evaluation of evaluation operations
 3. Evaluation of evaluation results (accuracy, coverage, probable errors, obstacles, limitations, confidence, etc.)

Mention should perhaps be made of the fact that criteria for estimates and evaluation, 17/ with as yet limited application, are being developed and have been utilized to evaluate public health in Iran in 1959 and in Paraguay in 1960 so far. The principal criteria are: (1) development; (2) coverage; and (3) the qualities which determine the "importance" of the program, among them permanence, penetration, capacity, efficiency, and sufficiency. An attempt has been made to formulate mathematically the principles on which these criteria are based.

Evaluation of the Economic Impact of Health Activities

Every evaluation in which a factor or value has an "impact" on another factor or value implies either irreversable action of one on the other, or a mutual interaction. In theory, there is no factor that does not have an influence on the economy, since all represent consumption. In this paper we shall refer to the sequence of integrated health and economic activities in which production in one field implies consumption in the other, where it becomes transformed into a new source of production. Such a viewpoint is not compatible with the concept of economic activity having a purely economic purpose, that is to say, that the output of goods and services is either consumed or invested for later consumption so as to produce greater economic yield. Such a concept overlooks the original consumption of human energy that enabled production to begin in the first place and provided the basis for capital formation, and it also overlooks the principle of entropy, which requires the replacement of the energy lost on being transformed into work, that is to say, into production. It is precisely in this sense that public health is an "industry" related to the production of human energy, and this justifies the investments made to increase human capital. In addition, man is the consumer of the output of the economy, which he transforms into survival and progress.

Much has been written about the price of health and the cost of sickness^{18/} but little has been said about the cost of health. If health is considered as defined by the WHO,^{19/} the cost of health can be none other than the total value of the consumption of each human being from birth to death. From the social viewpoint, the most important of this total consumption centers on what is defined as "public health", i.e., the technical and administrative activities organized to restore, promote, and improve health, since the first of all priorities is to live. The term "public health" is equivocal because as a biological condition of the community it is a part of the wealth of the ecology, of its human content, whose economic worth can only be seen --as in all cases of potential wealth-- when it is extracted and utilized. Leaving aside man's other values (cultural, moral, etc.) we may conclude that human life has an economic value only if it is used for economic production, since consumption is nothing but a consequence of production. The multiplying power of the machine and automation increasingly make the original production-consumption relationship represent less work and more well-being.

Unfortunately, in societies without full employment and decent wages, where disease and ignorance prevail, the productive sector of the population is forced to maintain an excessive number of unproductive persons. For the producers, this means greater output of energy, physical deterioration, and premature death. It is therefore the utilization of health, and not health as such, which plays an important role in economics. The relationship between these two fields is thus quite clear, for if it is up to the public health worker to maintain health, it is up to the economist to make suitable use of it.

Many studies have shown that investments in health are limited and are not sufficient to maintain the health of most communities. In England, the increased medical expenses of the Social Security (170 million pounds sterling in 1942 according to the Beveridge Plan; more than 700 million pounds sterling for the present National Health Service) would seem to indicate that health is more costly than had been supposed, even taking into account the general increase of prices. There has been no health budget to date that was able to satisfy simultaneously the need for effective public health growth and to attain the optimum level of health to which every community should aspire.

The number of public health activities that have a direct or indirect impact on the economy is as great as the number of economic factors that have a bearing on health. (*) That is why joint planning and programming is so necessary for activities of common interest. It should

(*) The most important factors (with emphasis on economics) which serve as current objectives of development plans in this field are: (1) increased national per capita income; (2) a high level of employment; (3) stability of production and prices of necessities; (4) less inequality in the distribution of family income; (5) elimination of regional differences in wealth and growth, and of primitive living conditions in rural areas; (6) leveling-up of conditions of work in industry, mining, agriculture, etc.

Among the factors in the field of health which have economic effects, the following may be pointed out:

1. Population problems --uncontrolled fertility; population explosion; change in age structure.
2. Demographic problems --decreasing mortality; reduced morbidity; communicable diseases largely controlled; increased life expectancy.
3. Ecologic problems --urbanization; low-cost and working-class housing; supply of potable water; sewage disposal; malaria eradication; population resettlement; industrial accidents; industrial hygiene; absenteeism.
4. Biological problems --every aspect of food and nutrition; mental backwardness; alcoholism and drug addiction.
5. Politico-administrative problems --social security; occupational medicine; protective legislation for workers, minors, and women.
6. Financial and other problems of curative and preventive medicine.

The above list does not include related social problems such as illiteracy, education and professional training, levels and standards of living, etc.

be emphasized, of course, that without a total change in political values, privileges, inequities, and discrimination, it will be impossible to create the environment necessary for such plans to be fruitful. A government does not fulfill its duty merely by allocating a budget for public health services or by providing capital for industry and economic development. It has the greater obligation of ensuring that such budgets will produce the desired results.

Traditional methods are not enough for proper health-economic planning and it will be necessary to develop a "sanimetric" economic methodology to meet specific needs, particularly in the planning and evaluation of these mutual contributions and their results. In many countries where no statistics exist, coordination of these two fields is still necessary and will have to be accomplished with any data that may be available, for it is precisely in such countries that joint action is most urgently needed.

Classical Health Data

Brief mention should be made of the advisability of continuing to compile --as a matter of public health routine-- health reports and statistics on: demography; public health; services (activities, costs, etc.); surveys; censuses; cadasters; inventories; results of pure and applied research; evaluations; statistical analyses; and in a word, everything that may be of interest to the physician, biologist, public health administrator, and demographer.

Sanimetrics and Economic Health Planning

The urgency with which joint economic and health planning is needed indicates the imperative need for developing still another type of statistical evaluation in order to balance health and socio-economic considerations. This method, which we call sanimetrics, is similar to the techniques used in econometrics and sociometrics.

Sanimetrics is the science intended to measure, assess, and evaluate those public health factors that can be quantified. Depending on its relation to biological, social, or economic factors, it is divided into: biological sanimetrics, which generally pertains to the individual; social sanimetrics which relates to the social and health factors of the community; and economic sanimetrics. All of these may include technical, administrative, financial, and other aspects. They differ from the other specific statistics in their dual objective of providing a basis for joint social and economic action and serving as the tool with which to assess and evaluate this action.

Economic sanimetrics, for example, attempts to measure health-producing capacity, the formation of human capital as biological savings, and the consumption potential of societies and their component sectors, but at the same time to provide an analysis of these factors within the economic "model" adopted by the country. By the same token, by respecting the established priorities and by adhering to the planned development

strategy and defined purposes, economic sanimetrics makes it possible to compare, any changes that may occur with the changes that are anticipated.

Sanimetrics in Primitive Economic Systems

It may be too complicated to apply sanimetric techniques in primitive economic systems that begin without scientific formulation, because statistical data are lacking. It may be possible, however, to apply sanimetrics to specific projects and, in such cases, planning and evaluation should be based on the data of the project itself, bearing in mind that when projects are grouped together in programs, data applicable to individual projects may not be applicable to the program as a whole. Health program evaluation, it should be noted, should be performed by methods approved and used by the World Health Organization. 20/

Health Evaluation in Developing Countries That Have no Valid Health Statistics

21/

The method adopted by the WHO, which was tested in Iran and Paraguay, can be applied by local public health personnel. It consists of measuring the self-sufficiency of the national public health service and its components to cope with the control of health problems in the context of the economic and social framework of the country.

Self-sufficiency depends on the degree to which the health potential has developed within the social potential of the country, and is measured for a given period of time on a base line which is either arbitrarily selected or of some significance in health development. It is understood that social or health potential is the capacity or efficiency attained: (a) in technical and professional knowledge, which makes possible the recognition and inventory of problems, needs, and resources; (b) the institutional framework within which health and other functions are performed according to the structuring of services, and the material facilities, equipment, resources and personnel available; and (c) the capability and efficiency of the health organization. (*) A country is considered self-sufficient when its public health potential has developed to the degree that enables it to face its health problems by itself within the social and economic framework and the limits of its financial resources.

The tool required for this method is evaluation through observation and its function is to "asses" any available statistics as well as the health conditions as such, followed by an analysis of the data, carried out at ascending levels of administrative responsibility. The purpose of the analysis is to generalize all "assessed" national data needed for defining the true development of the health potential.

(*) Organization is considered to be the general health scheme which includes the plans and programs and within which the functional administration established to execute them performs the coordination, surveillance, and evaluation, and when necessary the scientific investigations needed for their definition, guidance, and improvement.

Sanimetrics and Scientific Economic (mathematical) Planning

To be useful, sanimetrics must be applied to health-economic planning by following the scientific principles used by the economist, and an attempt must be made to convert the values by adequate common denominators. In this field everything remains to be done and only a few preliminary ideas will be given here.

1. In the same way that an economist determines the desirable rate of growth on initiating economic development, so the health worker must attempt to determine, as accurately as possible, the rate of health growth. In curative medicine it is possible to ensure a minimum rate of investment that will at least produce the health growth necessary to keep up with the population increase (plus an added rate during the program to make up for the health care that was lacking when the program started. In preventive medicine, particularly environmental sanitation, (drinking water, sewage disposal, housing, industrial safety, inspection of foodstuffs) a maximum investment rate is usually necessary. This involves enormous amounts of capital that exceed the "economic absorption capacity" of the communities, which are unable to save this amount. However, the provision of drinking water is an "industry" since it is self-financing in the long run, although requiring credit to begin with. That is why the policies of PASB, OAS, and the international banks toward the solution of this problem are economically justified. Two additional factors must be borne in mind, however, in the matter of maximum investment rates: the "social absorption capacity" for the services created (*) and the "technical health absorption capacity", particularly in relation to the trained staff operating these services.

2. An important factor of every economic project is the amount produced in relation to investment. It is therefore necessary to determine first the rate of savings (usually below 10 per cent in the less-well-developed countries) and the "capital-output ratio", whether average or marginal. This coefficient relates to the capital needed for a given yearly increase in production. In sanimetrics it is difficult to find an equivalent for this concept. First, because to the health worker national product is not only a linear function of capital but also depends on technical factors and on the quality and quantity of labor. Second, because health is multidimensional and represents "biological savings" or human capital that can be invested for economic purposes; labor and technology are elements of production and, in addition, themselves the product of health work, which justifies the economic investment in terms of life (that is to say, men) or of vital energy (that is, manpower). Thirdly, because this product has reproductive powers (which

(*) In Asunción, Paraguay, for example, collective payments for connections to water mains and public standpipes in urban sections have remained below expectations owing to the excessive cost relative to low family incomes.

the machine does not have, as it is incapable of replacing itself), is able to create savings (i.e., capital), and is the sole and obligatory consumer of all the other types of production. Fourthly, because it is difficult to define health and to express health activities in terms of "production units".(*)

3. The availability of manpower is understandably one of the the most complex problems in the relationship between health and economics. Public health has been accused not only of causing population explosions by decreasing infant mortality and communicable diseases, etc., but also of more directly increasing the healthy and active population, thus creating severe problems of unemployment. Biological growth must be complemented by economic and health growth, but this does not mean merely maintaining those rates without improving either health or living standards. For national per capita income to grow by "x" units, it is necessary for the total national income to grow "x + y" units or percent, "y" representing the economic growth that complements biological growth. The same should occur in the case of effective public health growth, but this is not always the case. In economics, even a small percentage increase in national product requires a considerable increase in the rate of savings, which frequently implies "austerity" measures that are fatal to the health of peoples with low levels of income and employment.

In this framework of financial stringency, public health fulfills functions that have differing health and economic values. Curative medicine (which exerts little influence on community health improvement) produces immediate benefits by restoring health to the population and, owing to its impact on the economically active age groups, exerts an influence on economic production. Preventive medicine produces a few results which are just as spectacular, for example malaria eradication, but generally its effects --even though more stable and permanent-- are long-range and therefore less attractive to the economist than to the sociologist, as for example in the case of maternal and child health. The two medical systems together result in greater continuous availability of manpower, both short-run and long-run, which industry, agriculture, mining, etc., should be in a position to absorb in order to increase production and to maintain the results attained in health improvement.

(*) The health worker obviously must find means of projecting the rate of health growth which influences expected economic growth. The mathematical formula is far too complex to be given here, but a simpler equivalent consists of determining the "average index of labor productivity" by dividing the national product by the number of active workers and comparing the results with similar indexes of planned production, potential total productivity of the active population, and parallel variations of national product per capita. Naturally, specific and sectoral health growth can be calculated independently, provided the defined units or standards are available.

With public health advances, changes in population structure and health problems arise. Low infant mortality and an increase in the age groups above 65, represent the two extremes.

To return to our first thesis, in health investment it is not essential to follow the economic formula in order to obtain increased production, provided existing facilities are sufficient, (which possibly is not the case in the Latin American countries). If such facilities did exist, the added investment necessary would be minimal, for there are a series of human factors in public health that cost relatively little and yet contribute greatly to the attainment of objectives, such as improvement of professional work, health education of the public, and the technical advances arising from scientific research. If the reality seems to contradict these propositions and there is a great increase in the cost of health organizations, it will not be due to the supposed abuses of "gratuitous" benefits provided by the State or by Social Security, but rather because the population never has received sufficient medical care, and because there are still wide areas in the world that totally lack the benefits of medical care.

4. Many other very useful economic techniques which are already well-developed have not yet been applied to joint health and economic planning. For example, it is possible to determine inter-industry relationships by considering input-output relations, or by using the more complex Harrod-Demar economic model, which includes the important element of foreign loans. ^{22/} In the future it may or may not be possible to find methods for "linear programming" to solve these difficulties.

5. The possibilities of economic sanimeetrics indicate the need for collaboration between the health statistician and the econometrician in order to give it useful expression. (*) In the meantime, it is still possible to use a comparison of costs, resources, and rises in living levels which, if not maintained or improved, may lead to the consideration of a new increase in resources together with improved techniques in order to obtain better results. Hence the need, first, for the indicators recommended to measure levels of living ^{24,25/} to be translatable into comparable units that can be readily computed, and, second, that in some way an estimate be made of the resources available for various kinds of investments

(*) In this regard, it should be remembered that "the task of formulating a national social program (and the same applies to health programs) does not consist of solving a system of equations." Mathematical models that describe the effects of social measures on levels of living, the cost of such measurements and the physical inputs involved, have not yet been established. Even if such models were based on uncontrolled hypotheses and estimates they would be useful for establishing "laws" or suppositions in formulating programs. Unfortunately, complex and complete hypotheses, models, or laws describing the inter-actions of demographic, social, and economic factors are rare; the formulation of national social programs can only be based on simple hypotheses, which barely rise above the crudest supposition. ^{23/}

and expenditures in the various public (national or local) and private sectors, the improved expression of which may be found in the Manual for Economic and Functional Classification of Government Transactions. 26/

Mention should be made of the fact that in the public health field, the health indicators proposed by WHO 27/ are not, as has been pointed out, 23/ directly related to health activities because it is not known what specific types of health activity would be necessary to increase life expectancy in a given age group or to diminish general or infant mortality by a given number of units. In other words, the known "health indicators" fail as "operational indicators". However, complete skepticism in this regard is not justified either, because the health program proposed by a group of experts and submitted to the Special Meeting of the Inter-American Economic and Social Council at the Ministerial Level (Uruguay, August 1961) 28/ includes sections on urbanization, housing, drinking water, sewage disposal, medical education, etc., suitable for planning based on economic sanimerics with definable units.

Uses and Limitations of Evaluation

Apart from the current economic and health evaluation already mentioned and the specific results obtained independently, sanimerics should provide a scientific evaluation of the impact of health on the economy. Naturally, this will depend upon the type of plan that is adopted, the integrated projects, the program of greater or lesser scope, and the national plan. It will also depend on whether health development was incorporated as part of the general program or added after the program had started. It will further depend on the economic objective, whether one or several (for example, to increase per capita income, or to increase employment, or to develop agriculture or industry, or general development, including social aspects, etc.). Evaluation is generally simple if the health factor has been included as a specific objective of the economic plan and the goal has been expressed in measurable units such as a 10 per cent reduction of absenteeism in industry, or the eradication of malaria in a given rice-producing region. Economic projects with various objectives and various so-called scarce factors can also be evaluated: they may include shortages of manpower owing to a given disease. However, economic methods are not sufficiently comprehensive for appreciating a series of qualitative health factors, particularly if the impact of health on the economy is small. In that case, health

evaluation may be made in terms of the objectives of the health activity itself, and later translated in terms of decreased costs, discounting the costs of operation. (*)

The evaluation of development plans with numerous economic and health sectors, such as over-all national plans, is extremely difficult and should, in general, depend on the economic-health model adopted for planning the general rate of development, in view of the fact that evaluation will tend to prove whether it has been achieved or not. To base evaluation on econometric models would be equivalent to evaluating the total development of a country from the purely economic point of view so that in the realm of public health it would lead to a separation from every public health doctrine in order to convert the goal of health into a simple economic expression which could never satisfy the multiple ideals or moral, humanitarian, and social principles of the profession. (**)

In conclusion, economic sanimetrics indicates a road by which health is appraised as a function of economics and vice versa, and health must therefore be planned, developed and evaluated jointly with economics in order to obtain more of the limited resources available. It is quite probable that ignorance --the third factor of the well-known vicious circle-- expressed as the reciprocal of culture and education, exerts a greater influence than is supposed in the failure of individual economic plans. If this is so, then the solution to the human problems of progress and welfare must be sought in development plans that take into consideration

(*) For example, in a powerful industrial enterprise frequent accidents of the extremities and poor medical care favored pyogenous infections and excessive amputations, resulting in a very poor reputation for the company. The application of simple therapeutic measures decreased the length of hospitalization, promoted conservative surgery, and diminished the amount paid as compensation for accidents. Economically, the cost reduction represented an insignificant percentage to the enterprise; the possibilities of suitable prosthesis enabled many workers to return to their jobs; preventive measures of industrial hygiene completed the satisfactory results. The total annual savings in medical costs of somewhat over 60 per cent, again represented a negligible amount for the enterprise. However, a few serious accidents could adversely affect the future of a small enterprise. In evaluating the health objective, therefore, its importance in relation to the purely financial objective will depend on factors of variable significance.

(**) In Latin America an increase in national per capita income does not necessarily bring about an increase in social welfare. The author has pointed out the differences between economic and social benefits ^{29/} and the reasons why separately planned economic models may fail in their objectives, as is the case when the scarce factor is not capital but health.

each of the three factors as an inseparable function of the others. Parallel planning, or planning by budgetary adjustment with competing priorities will not solve the problem. Social man, who is developing by giant steps and who multiplies his ambitions, requires these techniques in order to satisfy them in a manner in keeping with his intelligence, even if biological man continues to be bound to the terrestrial ecology and to rigid laws of evolution within which he must anxiously battle to survive and conquer an unknown destiny.

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