

# The Epidemiologist's Place in Planning for Economic Development

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**M**EMBERS of the health professions are showing increasing concern with their contributions to economic development of the less-developed countries. This is easy to understand, if only because it provides arguments that elicit money from development-minded agencies.

The rat-control specialist tells us that he can make ports plague free and thus foster maritime commerce. The malariologist tells us how fertile land can be made livable. The sanitary engineer, the nutritionist, and the medical-care organizer tell us that good water, good food, and good health services will restore vigor, raise the IQ, and increase the job performance of the workers and the scholastic achievements of the young. I suspect, however, that those who justify their works as contributions to economic development are going to be asked to redirect those works to meet development needs and thereby lose some freedom to make decisions as health officials, pure and simple. This holds true even for epidemiologists.

Many of the professionals provide a palpable product: dead rats, water gushing from taps,

or patients discharged as cured. The epidemiologist is different. He provides supporting data, draws the baseline, tells the operators where to direct their effort, and provides indexes to measure the results. This is essentially a planning function, and although epidemiology usually does not contribute to economic development directly, it is an indispensable part of the planning that has to be undertaken if development is to occur. I wish to explore with you why this is so and try to establish what the economic development planner wants of the epidemiologist.

## What Is Economic Development?

Economic development is commonly defined as a process of growth plus structural change. Growth means more production, more income, and, hopefully, higher levels of living. Structural change means changing patterns of investment and employment, new and different kinds of factories, farms, and fisheries, combined in a mix that offers promise of more growth—and still more important, self-sustaining growth.

When economists try to find out how development takes place, they start by studying the past. They dissect the cadavers of 19th century England, Japan, and the United States to determine the gross anatomy. When it comes to studying the living organism, however, they

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labor under certain handicaps. I am grateful to the *Journal of Economic Abstracts* (1) for bringing to my attention a publication of which I had never heard before, the *Yorkshire Bulletin of Economic and Social Research*, in which A. W. Coats put it succinctly: “. . . economics, a discipline in which the central corpus of theory has long historical roots, and in which conclusive empirical tests are exceedingly difficult to devise.” I think “exceedingly difficult” is sheer understatement.

All we know with certainty is that there are countries that have developed. Rostow's stages of economic growth (2) have become a popular framework for analysis, and his concept of the takeoff has earned an assured place in the vocabulary of economic development. When economists have assembled their scanty data to build operating models, however, the facts have not always fitted the theory. Fishlow (3) has recently noted in this connection that it is better to “recognize the important possibilities of takeoff in structuring inquiry than to continue to expound (or to reject out of hand) a grand set of stages that lamentably are sometimes vacant.” Certainly a great deal more factfinding is needed if we are to put development theory to “conclusive empirical tests.”

Even at the present state of the art, however, there is some general agreement about the conditions that permit development. Any freshman economics textbook will tell you about land, capital, and labor, the classic factors of production, and explain how they are supposed to interact. Development theory has usually concentrated on capital, since every country has some sort of endowment of land, which is defined to include natural resources; and the less-developed ones usually have far too generous an endowment of labor.

To get capital—meaning roads, factories, tools, improvements to land, or the money with which to buy them—a country has to save (that is, it has to produce more than it consumes) or else borrow or get an aid grant from a country that does save. There are generally enough “warm bodies” available, but we have learned that they also have to be healthy enough to work and educable enough to acquire the needed skills. Then it turns out that putting land, labor, and capital together to produce things

involves other conditions: Businessmen who want so much to make money that they will risk new investment and apply new technologies and governments that have both the desire and the capacity to foster or direct the process. The environment must be favorable rather than hostile to man and his works and, finally, the factors of production must be so combined that the right things are done in the right amount at the right place at the right time. The last condition requires planning if the job is to be done with minimum delay and minimum risk of avoidable error.

### Planning for Economic Development

Planning for economic development involves the orderly mobilization of the factors of production, referred to as instruments by the planners, to achieve desired results, referred to as targets. The process may be simply indicative, as in France; it may involve hammering out a consensus of interest groups, as in the Netherlands; it may be centrally directed, as in the Soviet Union, or largely decentralized, as in Yugoslavia. It may, as in the United States, be limited to a projection of what will probably happen and a selection of “leverage points,” where a small nudge in the form of a tax incentive or an even smaller nudge in the form of a simple exhortation can influence the working of the economy.

I do not wish to over-idealize the process of development planning. Some of its most eminent practitioners are also its severest critics. Frisch (4) takes economists to task because they rush off to plan before they have decided whether they have a sensible set of targets in the first place. Lewis (5) has observed that a number of countries are not doing well because they do not take their own plans seriously. The U.N. Economic Commission for Latin America (6) reported only 3 years ago that of all the member countries with development plans, only one really had the machinery for translating the plan into concrete investment projects and getting on with the job, though the situation today is somewhat improved. Recently, Waterston (7) argued on the basis of extensive World Bank experience that many of the developing countries have neither the data to serve as a basis for over-

all plans nor the capacity to execute them once they are drawn up. I find myself in complete agreement with his emphasis on good project design and making a modest beginning with limited plans for sectors or subsectors where there is a reasonable chance to solve political and administrative problems and get something done.

Regardless of the theory, ideological content, and working mechanism, however, an economic development plan inevitably involves comparing two main projections: What is likely to happen if things are let alone and what is likely to happen if the chosen instruments are mobilized to reach the chosen targets. The difference between the two projections is the probable benefit of the plan. To make them we need, in the first instance, facts about human and material resources and enough knowledge of functional interrelations to make the forecasts more than an educated guess. The problem is complicated by the size and structure of future population, which is the slipperiest variable of all, and because both targets and instruments interact with each other and change with time. The upshot is that development planning relies heavily on mathematics and statistics.

It might be added that the mathematics sometimes lead to excessive faith in econometric models. Not only are the data often weak, but there are all sorts of contingencies that cannot be built into mathematical models. When the calculations show that factory *X* needs machine *Y* to provide input *Z* to some critical operation, it is hard for the modelmaker to take account of the fact that the import permit will be held up for 18 months for some personal or political reason or unreason.

Some neat mathematics of the linear programming variety can be used in planning the geographic location of activities—taking into account transportation facilities and natural resources and sources of raw materials and markets—but most basic planning studies are necessarily descriptive. The trouble is that sometimes the descriptions are not sufficiently exhaustive. Agricultural schemes have gotten into difficulty because soil and climate were inadequately studied. Water projects have proved more expensive than anticipated be-

cause the need for pumps as compared with gravity feed systems was underestimated or the consumers' ability to pay was overestimated. New industries have encountered bottlenecks such as shortages of raw materials or skilled manpower, which could have been anticipated.

When bottlenecks occur, they often represent a failure to determine what the development planners term "linkages." If you build a cement factory, for example, you create a new demand for power that may require the expansion of electric generating capacity—a backward linkage. On the other side, the output of cement may facilitate housing construction—a forward linkage. If we extend the concept of linkage far enough in both directions, we find backward linkages to the supply of labor, the health of the workers, and investment in health services; and forward linkages through housing to health.

The existence of such linkages ties health as investment and health as consumption into the development process. Since it is one of the responsibilities of the development planner to trace all possible linkages, it is clear that epidemiology has a place in the process.

### **Epidemiology in Development Planning**

Earlier I stated one of the conditions of development: that the environment not be hostile to man. We can point out fertile tropical valleys with deep rich topsoil and good rainfall, but if we add an animal reservoir of hemorrhagic fever or plague or yellow fever or a human reservoir of malaria, plus a suitable vector who finds his ecologic niche just where the planners want to grow rice or cut timber, our development plans may not get very far.

Health officials are properly annoyed if they are not consulted when development plans are drawn up, but when they are consulted it often turns out that comprehensive data on the prevalence of endemic diseases are unfortunately scarce. My personal experience on more than one occasion has been that health officials will talk quite knowledgeably about their problems and assure me that Paraguayan ranchers are losing money because of foot-and-mouth disease, or that the rice growers in Maranhão are losing the crop in the field because they are

down with malaria at harvest time, but these impressions are often based on casual observation or isolated small-scale studies that cannot be extrapolated to the project or planning areas of interest.

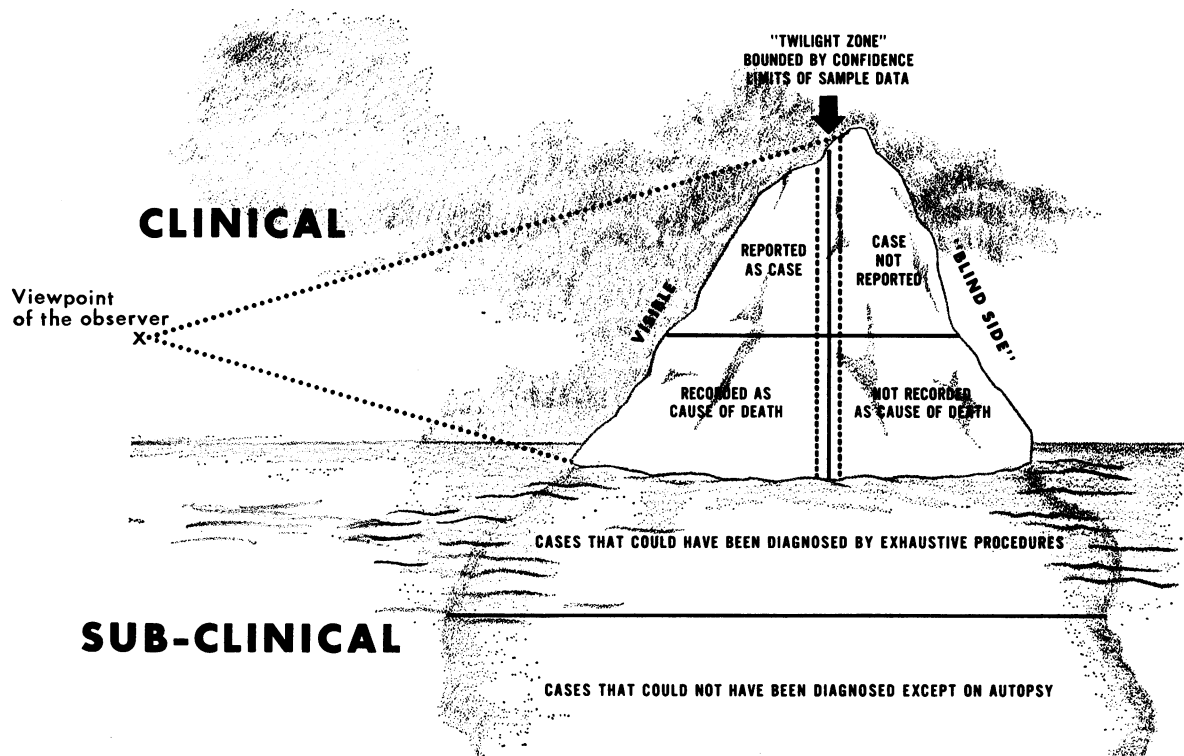
In studies of geographic location, it is fascinating to play with superimposed maps drawn on clear plastic. Here we see the projected road and here the agricultural colonization area; here the new forest industry and here the neat administrative lines of counties or prefectures. But seldom can we add a precise epidemiologic map and see how problem and danger areas affect the location of development projects.

Sometimes the health-planning procedure can supply the needed information (8). Good health plans on the Latin American model begin with a diagnosis of health problems, and the inadequacy of official statistics has led planners to make their own surveys. Even these data are not always complete, however, since the plans are often drawn up for local health serv-

ice areas, and the principal concern is the pattern of disease with which the health services will have to cope.

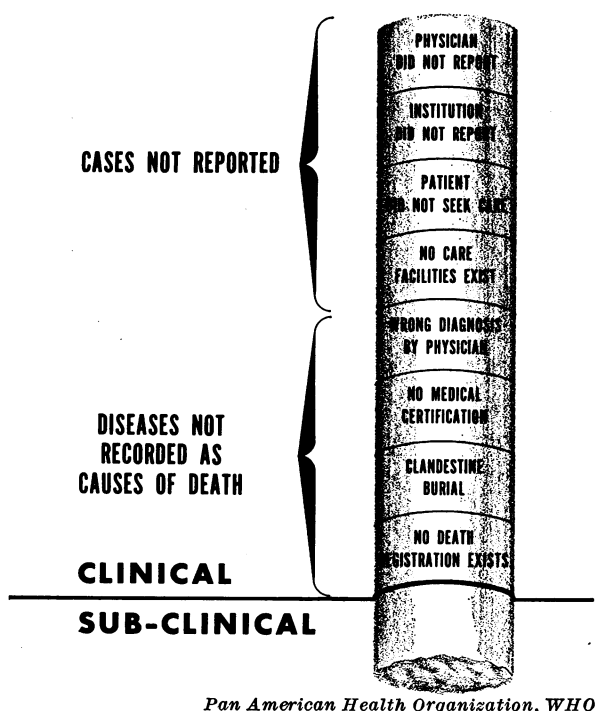
The health service areas do not necessarily correspond with economic planning or project areas, and the least information is available for sparsely populated regions that are precisely where new agriculture and forest industries are likely to be located as projects are developed. In addition, the health planners rely heavily on surveys of health centers and hospitals that provide information on patients admitted or treated, rather than on the prevalence of disease in the population as a whole. The deficiencies of these sources of information are recognized, and by and large it is the epidemiologist who must provide the remedy.

Short of a full-scale survey, no one expects to get much information concerning the part of the clinical iceberg that is "below the water," representing unsuspected subclinical cases. The iceberg (fig. 1) is intended to show that even the clinical cases are not always visible to the



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**Figure 1. Clinical iceberg**



**Figure 2. Core boring from blind side of clinical iceberg**

observer. As the core boring from the blind side (fig. 2) reveals, even after questioning physicians and health center workers and reviewing death certificates, and in general doing everything possible to eliminate error and negligence in reporting, some clinical cases do not come to the attention of the clinicians because the people in question either do not use the health services or simply do not have access to such services. We must call on the epidemiologist to provide the needed information.

You will note my emphasis on the epidemiologist as factfinder. I recognize fully the importance of analysis and scientific inference in the field of epidemiology but feel that the major challenge in the less-developed countries is to get the facts on which analysis and inference can be based. In these countries, statistics of mortality are bad and statistics of morbidity even worse, and desk epidemiology and even the kind of investigation that starts with the reported case are far less important than the field survey.

For a concrete example, the following infor-

mation is available from the national health plan of Nicaragua (9), whose compilers deserve great credit for facing up frankly to the difficulties arising from the lack of a legal death certificate, the fact that about half the deaths (mainly in rural areas) occur without medical attention, and the lack of concern of private practitioners in reporting morbidity, which seems common to so many countries.

The 10 most frequent illnesses were tabulated separately for 1963 by source of information. Malaria was recorded as fourth most important in the data of the Epidemiology Office of the Ministry of Health and eighth most important by the 10 mobile clinics in rural areas, but it did not appear among the 10 most frequent diseases recorded by the 48 health centers. Whooping cough was listed as fifth most frequent by the health centers but did not appear in the lists of the mobile clinics or the epidemiology office. Malnutrition was listed as second most frequent, and goiter as ninth most frequent by the mobile clinics but did not appear in the lists of the epidemiology office or the health centers.

If, for example, I were planning to establish a sawmill in one of the richly forested areas of Nicaragua where there were no health services, what health activities would assure me of a stable and vigorous labor force? If I were to base my plan on the reports of the mobile clinics, probably the most important thing would be a staff canteen where the workers could get balanced meals. On the other hand, if I were to base my plan on the reports of the health centers, I would incline more toward water and excreta-disposal facilities, since their list of the most frequent conditions included gastroenteritis, parasitosis, dysentery, and typhoid. If I did not have the data of the Epidemiology Office of the Ministry of Health, I might ignore the continuing prevalence of malaria instead of spraying the workers' houses and stocking the plant infirmary with chloroquine-primaquine pills. I might well be wrong whatever I did, for 66.58 percent of the information on morbidity, classified by cause, fell into the category of "senility, badly defined, and unknown" or a broad "all other" category.

Do not be misled in how to improve the information because once, in another context, I

advocated the health education of national decisionmakers by the use of small-scale studies at the local level that would provide dramatic case histories for propaganda purposes (10). This was a variation of the classic Chapin approach: "Approve my whole budget or tell me in which ward you want the typhoid deaths to occur." This approach has its uses in the jostling for priority that turns gentle public servants from "weres" to "wolves" when the budget hearings start. It would not be of much use if I were to choose the 11-bed hospital at La Rosita or the mobile clinic based on Waspán as my only guide in planning health services to support a new sawmill in the deep woods.

As governments move from haphazard decisionmaking to orderly planning, health workers must be able to provide more than dramatic illustrations. They must be able to state in precise quantitative terms what health hazards affect society, pinpoint their location, measure their prevalence, and tell us what threat they pose to our development activities and what to do about it. Total coverage is not feasible in most instances, and there is no objection to the smallest of samples if they are representative, but they must be capable of reasonable extrapolation. There is work here for the epidemiologist.

Lest you accuse me of being a bad economist and ignoring the fact that factfinding costs money, I suggest that epidemiologic studies be made part of general feasibility studies when development projects are contemplated; that the international lending agencies explore the health as well as the financial aspects of each loan request; and that national development planning bodies at the highest level of government call on the representatives of health to advise them when they make their plans for the future course of national income and product as well as their more modest sectoral and project programs, and not only when health plans as such are being drawn up. Budgetary provision evidently must be made for the project studies, international loans must build in the financing of the needed epidemiologic work, and

health planning must be adequately financed at all levels.

### A Final Question

It would have been pleasant to end this discussion on a note of challenge and with the assurance that at least this economist is ready to support epidemiologic work and see that it is adequately financed. To be realistic, however, I must ask a final question: Can you deliver the goods? It's like the annual physical checkup that is urged on people so commonly. If 200 million Americans actually had a physical checkup each year and the workup for each took an hour, it would require 100,000 physicians working 40 hours per week to do that and nothing else. While I recognize the importance of epidemiology in development planning and want to see the work done and paid for, I must first ask whether you are equipped to handle a job of this magnitude. Are you?

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