THE MEDICAL SCHOOL AND INTERNATIONAL HEALTH

To honor a great Dean is a privilege and a duty. To honor a personal friend is a pleasure. I was therefore delighted to be invited to contribute to a special medical education issue of the *Yale Journal of Biology and Medicine* to honor Dean Lippard. When I came to consider the implications of the title of the essay allotted to me, I realized that not only was it a key subject in medical education but it was also a crucial one in the World Health Organization's attempts to find a way through the maze of difficulties confronting the world today, the importance of which, directly or indirectly, extends far beyond the conventional boundaries of medicine, and for which I now have some responsibilities.

The subject is so complex that it is difficult to decide how to tackle it. A review of the literature is impossible in a short article. For instance, an annotated bibliography of Medical Education published by the WHO, covering the years 1946-1955, has more than 2,500 references, and during the last decade there must surely have been some 3,000 more. WHO has produced twelve Expert Committee reports since 1962. It has convened three Regional Conferences. There have been three World Conferences in 1953, 1959, and 1966. In the USA there have been annual conferences on International Medical Education since 1964. Foundations such as the Milbank Fund have made major contributions in the field, and this list is far from complete.

One wonders why, out of so many words by many of the world's leading experts, a clear policy has not emerged. I believe that the reason is that there cannot be a single policy. What needs to be done has to be designed for, and adapted to, the country in which it is to be applied, taking into consideration the cultural, social, and economic situation, in addition to the health requirements. The countries arbitrarily grouped as "developing" countries differ very widely in their stage of development, in the legacy which may or may not have been left by the former colonial powers, in the nature of their deficiencies, and in the trends and direction of progress.

*Assistant Director General, World Health Organization, Geneva, Switzerland and Anna M. R. Lauder Professor of Epidemiology and Public Health, Yale University School of Medicine.*
In 1964 there were about 715 medical schools in the world\textsuperscript{5, 6} (not counting mainland China), and many of these were new and only beginning to qualify students. There are still some sixteen countries, each with over two million population, with a combined population of over 60 million, with no medical schools, and there are many smaller countries in this situation. In many countries there is only one physician per 100,000 population. At the other extreme there is the USA with one physician for about 500 to 600 population.

Of course, this method of comparison is highly artificial in that it takes no account of the distribution of the physicians (in developing countries the great majority are to be found in the big cities) nor of the nature of their activities—public health, general practice, specialized practice or research—but it, nevertheless, gives a rough idea of the order of magnitude of the problems in different countries. What it does not do is to relate the “output” of the medical school, i.e. the qualified physician, to his contribution to the health of the country. What does he do; are his services being used in the best way; are indeed, his services being used at all in the health field? The last question may seem surprising but it is highly relevant. In many developing countries there is a grave lack of well-educated people in all fields. The few physicians are among the best educated people in the country, and they are in much demand for important positions that have nothing to do with health. For instance, a significant number of them switch to politics. But even more serious than this is the drain of physicians to other countries where the rewards of the practice of their profession may be much greater than the home country can afford.

Titmus\textsuperscript{7} has pointed out that in the USA “imported” foreign doctors account for about one fifth of the annual additions to the American medical profession. Much the same is true of Britain, which imports large numbers of foreign trained doctors. He estimated that the world provides as much or more medical aid to the USA in terms of the dollar cost of educating these practitioners as the total cost of all American medical aid, private and public, to foreign countries.

I do not have the original figures, but Professor Titmus’ high reputation is a warranty that there is a flaw in international aid which can only be called shocking. In effect, some highly developed countries with good health services are “milking” developing countries with minimal services, and this is happening at two levels. First, the “hand drain” of competent physicians imported to keep the hospitals running, and secondly the “brain drain” of outstanding physicians and research workers who are attracted by the opportunities and facilities for research in the USA, as well as the salaries, with which the home country cannot compete. It can readily be documented
that the gap between the countries which "have" and those which "have-not" is increasing in spite of international aid. Here is one way in which the "have-not" countries are losing the cream of the brains needed to help to close the gap, as well as the hands needed to establish even minimum basic health services.

McDermott in a brilliant paper on the Role of Biomedical Research in International Health,8 pointed out that one of the greatest problems facing developing countries was the accomplishment of what he called "planned modernization." He stressed that this required a research program involving techniques ranging from systems analysis to molecular biology, from economics to the behavioral sciences. His development of this theme should be read in the original, but the inference I wish to draw here is that this research approach, because it asks questions demanding scientifically based answers and not just opinions, immediately frees the planners of the future from the straight-jacket of the past when opinion alone directed action. It also will help to free them from the inappropriate advice so often given by outside experts who do not understand the delicate social and cultural forces that may make the solutions to health problems adopted in highly developed countries inappropriate in developing countries.

The developing countries—and indeed the developed countries, too—should have the phrase "planned modernization" inscribed over the entrance to every medical school. They must not and cannot afford to imitate blindly. They must take biomedical and biosocial knowledge, adapt it and apply it to their own situation. No one can produce a ready-made blueprint for the future, but ways of arriving at a plan applicable in different circumstances have been formulated.4 I will return to this.

The practical difficulties involved in all this are, of course, enormous. In many countries there are insufficient graduates from the equivalent of high school to permit much in the way of selection for quality before entry to medical school. In some countries almost all applicants who have completed high school are accepted. Many fail to complete the course, usually being failed at the preclinical stage. This has serious repercussions for two main reasons. The full potential output of the medical school is not realized, but, perhaps even more important, the students who fail are unwilling to attempt a new university curriculum, even though many of them could probably qualify in less complex subjects than medicine. Often the reason for failure is poor preparation rather than lack of ability, but after failure in medical school many abandon higher education altogether. One solution to this, which should be more widely adopted, is to add additional preparatory courses in the medical school to compensate for the students' deficiencies in preparation. Another solution that has to be serious-
ly considered, no matter how undesirable it may sound to American ears, is the revision of the curriculum to make it more "practical" and less "scientific." In many countries the demand is for "any kind of doctor" since they have hardly any. No one cares whether the doctors have heard of DNA and RNA as long as they know the right treatment to give.

Actually, I do not think this idea is as retrograde as it sounds if one accepts McDermott's concepts of the stages of growth in medicine. He postulates a series of five stages of growth from the primitive or traditional, to the modern.

The first stage in the change from the primitive society—and perhaps the most important—is non-personal, and demands the development of a social and economic structure that makes an organized approach to disease control possible. For instance, news of and access to epidemic outbreaks requires communications, i.e. reporting of epidemic disease and the ability at least to attempt to contain it as soon as possible. The capability of spanning 300 linear miles by telephone, or 2,000 square miles by radio to find out what to do about a local outbreak of disease can make an immense difference to a nation's health.

The second stage is also non-personal and involves what might be called standard public health—water, drains and sewage disposal, to which today must be added vector control.

The third stage introduces certain elements of preventive medicine and thus becomes personal, but the personal relationship is non-continuous. Only transient cooperation is needed for such preventive programs as immunization.

These are, of course, somewhat artificial distinctions. For instance, personal hygiene is almost as important as environmental hygiene. If one knows the dangers, one can boil water and milk and refrain from eating salads, and this does involve continuous "cooperation" which is "built-in" in the course of upbringing; but this does not alter the general validity of McDermott's postulates.

The important point is that the first three stages all consist of programs that are essentially non-personal.

The great step occurs between the third and the fourth stages. To quote McDermott:

In the fourth stage, the society accepts the responsibility for the provision of services on a continuing basis . . . The deliberate entry to this stage represents a crucial step. In terms of a society trying to lift itself up by its bootstraps, this step may not yield nearly as much return as the preceding three steps, yet it is a step that all our humanitarianism and indeed most of our professional attitudes urge us to take.
Once this step is embarked upon, there is no going back. In fact, whether or not a government deliberately embarks upon this step, the people in most countries of the world know that it can be taken and demand it. The rising tide of expectations is as dangerous as the threat of the bomb, and as urgent as the population explosion.

The boundary line between this all important fourth stage, and the fifth stage has merely to do with just how much of science it is possible to bring to bear on the individual’s problem. In essence the fourth stage represents the kind of medicine that can be practiced in rural areas whereas the fifth represents modern metropolitan medicine.

Here I believe we have the best approach to the solutions of the health problems in developing countries. We have to start with stage one. In most countries this is already achieved or could be with the facilities already available.

In stage two we run into difficulties because the capital investment required is so great. However, pilot studies by the Pan-American Health Organization in Latin America have shown how much can be done at low cost by self-help. Also, the international banks have at last recognized that water supplies, essential for economic development, are incidentally important for health.

Although there is a wide theoretical gap between them, stages three and four cannot be separated. For instance, extensive immunization programs must have medical supervision, and morally it is not possible to deny even the elements of medical care to those who come for immunization. Here we have an illustration of the need for different kinds of doctors and other health personnel. Much of this work can be done by nurses or those with similar training. But we need to be able to define how much, how soon, and by whom?

This is a very superficial sketch of the background of the subject. A deep analysis would fill a volume. There are so many factors involved, which differ in every country, that analysis would defy a small computer even if we had the necessary mathematical models based on operations research into the functioning of health services. These have not yet been developed. I have no doubt that the development of such models is well within our technical capabilities, but the data are not there, or if they are, they are not in the right form. It is, however, time that the importance of this is realized, and the essential field work to collect data be designed so as to be appropriate for sophisticated analysis.

The Round Table Conferences on Health Manpower and Medical Education in Latin America, convened jointly by the Pan American Health Organization and the Milbank Memorial Fund in 1964 is, I believe, the
best expose of the complexities of the problem. The recommendations of the Conference are now being tested in practice in Colombia. The preliminary reports are promising. If these are confirmed, when the study is complete we will have a study plan that should enable us to accumulate enough data from contrasting situations to enable us to build the mathematical models we need. If these can be validated, we would then be able to advise countries on the optimum ways of developing their health services and the types of medical education needed to produce the kinds of physicians and other health personnel required.

The various steps to be taken in such studies may be summarized as follows:

A profile should be obtained of the health of the people, measured in terms of mortality, morbidity, and through various special studies or health indices not necessarily directly related to overt disease (e.g. growth and development). This material would be analyzed in relation to the basic demographic data from census sources, e.g. number, age, sex, education, economic status, and place of residence.

Details should be obtained of the health services currently supplied, i.e. the effective demand, measured in terms of physician visits, hospital admissions and hospital days, clinic visits, community services, and other health services received. This information would come from the studies of the various services mentioned and also from household surveys and would again be related to basic demographic data. Wherever possible, the expenditure in the form of cost per unit service should be obtained. It should be noted that this, the existing service, sets the minimum level for future planning since a retrogressive step would be intolerable in a progressive society.

A study should be made of present unmet needs and demands. It should be noted that perception of a need may be made by the population or by the health experts themselves and that these two estimates will seldom precisely coincide. The data required will come from hospitals, clinics, and other health services as well as from special surveys and studies. From another angle, the geographic distribution of resources and facilities alongside demographic data and knowledge of the nature of the areas in question will serve to indicate unmet needs even in the absence of accurate field data, although of course the establishment of priorities for services in these areas require more precise information. Comparison of the health levels in groups covered by social security or insurance programs with the health of populations without such coverage would also reveal unmet needs. This step, in effect, defines the maximum level for future planning.

It is advisable that a time limited goal—say ten years—should be set for health achievement as part of an over-all plan of socio-economic develop-
ment. These goals would be related to the present health status, demands, and needs as determined above, to the economic conditions and prospects, and to the health trends identified from historical data and from projection into the future taking into account the probable, even predictable, changes in disease patterns in the course of socio-economic development.

An estimate needs to be made of the health manpower, by number, category, and training, required to meet these goals. This estimate may be based initially on experience and eventually on models such as I have suggested above.

An inventory should be obtained of present health resources, with projections through the period covered by the plan. This would include a profile of the present availability and supply of physicians and allied health manpower by categories, with descriptions of the numbers, qualifications, and their locations in relation to population and to health facilities. Estimates of functional productivity should be made. Projections of future supply should be based on present training resources.

Similarly, an evaluation must be made of the present supply and planned program development of facilities for health services, based on studies of hospitals, health centers, etc., together with a projection based on planned construction.

An appraisal must be made of the resources available for education in medicine and other health fields, including their organization, distribution, curriculum, length of program, staffing, enrollment, the manpower pool from which students may be drawn and their educational preparation for further study, and finally, the financial resources.

The study of the manpower and educational requirements in relation to the available resources and educational practices would give guidance for future developments in educational programs for physicians and other health personnel, including the possibility of the establishment of new schools, better adjusted curricula, and better utilization of present teaching resources.

Finally, an assessment needs to be made of the economic resources now available for health services and medical education, an estimate provided of the costs of alternative programs, and the appropriate financial recommendations made.

This is obviously a very complex subject indeed. As I have already pointed out, its complexity is indeed reflected in the literature, especially in the wide variety of solutions proposed, usually on the basis of studies limited to a restricted area. Much more complete data are needed before any generalized pattern of solution can be formulated, and this, I believe, will only be possible through the formulation of mathematical models in which the parameters can be varied so as to give different weights to the
radically different conditions with which one is dealing in different countries. Above all, we must recognize that the present pattern of medical education in many developing countries is based on the "home grown" patterns of overseas medical education used by Britain and France during the colonial era, but which are not appropriate today for the great majority of developing countries. My thesis is that what is most appropriate can only be discovered by the application of scientific method in a logical series of studies such as those I have outlined.

An important, but subsidiary, question is "what should be the role of the American medical school in international health?"

This must be looked at from two angles, the American and the international. These do not coincide. American medical schools like to train foreign students who meet their high admission standards in almost exactly the same way in which they train Americans. This means that the student, when he is qualified, expects to have available the sophisticated laboratory and other facilities on which he has been taught to call freely in order to make his diagnosis and control his treatment. In most developing countries such facilities either do not exist at all, or are only available in the few big medical centers where the work-load is so large that no services are available for practitioners outside the center. Thus, an American-trained practitioner who is not working in such a center does not have the tools that he has been taught to regard as essential, nor has he been trained in the many clinical subtleties which enabled physicians in the past to do quite a good job without these tools.

The same applies in public health. Most American schools of public health teach public health in the context of the United States, and often of the urban United States. The context and the resources available here are so different from the situation with which they will have to cope on their return home that much of their training is a waste of time—both for them and the school. Not all is wasted, of course, because there are certain principles, especially in epidemiology and biometry, which are generally applicable. However, the problems are so great that in the school of public health at Yale, we have decided not to accept foreign students for primary training in public health if they come from an area where there are already schools of public health. We will accept them at the doctoral level because they could be presumed to have had sufficient basic training to understand these differences, and to realize that, even in their doctoral studies, the different ecologies with which they will have to deal must be kept constantly in mind.

But there is another side to this coin. The United States has inherited many of the international responsibilities of the former colonial powers. It does not as yet have the facilities for training even its own nationals to meet
these responsibilities as well as did the Dutch, the French, and the British. In WHO, time and again we are forced to come back to these nations for the experts needed since we cannot find them in the United States. Even more serious, the numbers of experts available from these other countries is decreasing rapidly. They are getting old and are not being replaced.

I have had many applications from well trained—according to American standards—physicians and public health men that have had to be turned down because these men have had no overseas experience at all, and are completely naive regarding the problems that they would be required to solve as "experts." Developing countries are getting very tired of so-called "experts" who are ignorant of the social, cultural, and ecological problems of the developing world. We must not forget that in many developing countries there are already a few first class experts who can spot the pseudo-expert at once.

Here clearly is a major new role for American medical schools in international health. That is, to provide training with opportunities for practical field experience, for the many highly motivated young men and women who recognize the American obligation to the world and are seeking opportunities to play their part. A few schools have done a little in this respect, but so far it is a drop in the bucket.

International obligations are national obligations which must be met. It is easy to say that there are great federal resources that can meet them better than can a private university. But I submit that a great private university such as Yale would gain as much as it gave if it embarked on well-designed international enterprise.

There are several ways of approaching this. I cannot discuss them all. There is, for instance the "school" approach, in which one school in the university decides to establish relationships with the same school in another university in some agreed field. Another is the study of an area defined by geography, culture, language, history, etc. Yale has a long record in this, but usually the scientific disciplines have not been involved. There is, however, another approach which, as far as I know, has never been attempted by any university—that is, the ecological approach in which all aspects of life and its products, including the arts and humanities, are studied in a defined area or context, concentrating the full intellectual power of a great university in a coordinated manner. This must include history, languages, the arts, literature, culture, social, economic, and political systems, science, industry, and last but not least, medicine in its broadest sense.

I developed this concept as a result of the meeting referred to above and it was further stimulated by participation in the 100th Ciba Foundation
Symposium on World Health Problems (to be published by Ciba). During these discussions, it soon became clear that sensible answers to the health-related questions could only be obtained after an exhaustive study of economic, industrial, and agricultural problems in conjunction with experts in those fields. It was also apparent that such discussions could not produce plans that had even a reasonable chance of success unless social and cultural factors were taken into account. It was only a small step from there to realize that no one can truly understand such factors unless he knows the history of the country, its language, literature, and arts. It is in these that its culture is enshrined immortally for those who have eyes to see and ears to hear. Too many scientists lack both!

I am too well acquainted with the difficulties of communication even between departments in the same school, and even more between different schools at Yale, to think that this will be easy. However, I should like to point to the program developed recently on the initiative of the School of Forestry, which involves meteorology, biology, city planning, public health and other departments as an example of what can be done.

St. Matthew wrote “Let not your left hand know what your right hand doeth” (6:3). This is not good advice today. The world has shrunk to such an extent through the advances in communications, news, travel, etc., that it is very important to know what the right hand is doing. (There are no political shades in the use of the words left and right!) The point is that only a holistic view of man—the ecological approach—can give us guide lines which might lead us to safety and progress in the future.

Today we have tools that can help us to do it. The computer, unintelligent though it is, is so fast that it can be instructed to perform calculations beyond the ability of man alone. With the use of modern mathematics, which is the only truly universal, cross-disciplinary, and cross-cultural language, manipulated by the computer according to intelligent instructions, we can surely gain much fundamental insight into the ecology of man, taking into account observations far too complex for analysis under older systems. Medicine has been slow to use these tools.

It is my privilege at WHO to have the responsibility for the creation of a new division of Research on Epidemiology and Communications Science, which has as its main terms of reference just such an approach. Only the future will record whether we succeed, but the prospect is exciting and I believe that Yale should seriously look at the prospects with international and not parochial or departmental eyes.

There is a rich harvest awaiting a new kind of combine-harvester.
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