
DISCUSSIONS

TERRIS: It might be useful to set down the tasks of epidemiology for the near future.

First, I think epidemiology should expand the scope and intensity of etiologic studies in diseases of unknown etiology, in occupational and environmental hazards (which are not diseases but hazards), and in the epidemiology of positive health (everything that goes into positive health: vigor, vitality, and performance; the effects of nutrition, physical exercise, rest and recreation, social relations, participation in decision making, etc.).

Second, it should provide epidemiological assistance in disease prevention to the public health movement by determining the population groups at greatest risk through, for example, surveys of serum-cholesterol levels, smoking prevalence, and blood pressure, as well as by obtaining data on the morbidity and mortality of these groups so that the greatest efforts may be directed to them. Epidemiologists should also carry out experimental studies to determine which measures are most effective in achieving results in prevention, monitor results of public health programs for prevention, and evaluate these programs in terms of outcomes.

Finally, epidemiology should study the medical care system, its procedures—such as clinical procedures—and technology in terms of both positive and negative effects on the population's health, as well as carry out experimental studies with different forms and methods of organization and various clinical procedures to determine which can improve the population's health most effectively.

BUCK: I think that's a coherent blending of all our points of view, but I have one question to ask. I'd like you to explain the at-risk business in your second point. It seems that you categorize people in terms of accepted etiological factors and then you end up looking at data on their morbidity and mortality. Are you trying to check whether these really are etiological factors?

TERRIS: Well, cancer of the cervix, for example, is a disease of poor people, not rich people. I have a friend in New York City

who has a middle-class clientele. He takes a Pap smear on every woman, thousands upon thousands. He has never found anything; he is wasting his time. Obviously, the Pap smear program should not be concentrated on the rich people, but on the working class, on the poorest people. We know that their risk is much greater. The Pap smear should also be administered to promiscuous groups—prostitutes and people in jails, for instance. They've done studies that show much more cancer of the cervix in prisoners.

LLOPIS: Yes, that is a problem with any test. You also have a lot of venereal disease testing in groups that are not at risk.

BUCK: I agree with you entirely, Terris. It's just that your wording made me think that you were talking about more than just targeting disease screening toward people with the highest morbidity and mortality.

TERRIS: Let me give you another example. We know that smoking is more common in urban than in rural populations, so attention should focus on the urban areas rather than the rural. We also know that in very large countries, health problems may vary from region to region. In the Soviet Union, for example, you know that you don't have to worry about serum cholesterol levels in people in the East; it's in the West where they have the problem. Austria and Czechoslovakia have high serum cholesterol levels too, because for a hundred years they've been eating a diet rich in saturated fats. You want to find out which part of the population is at greater risk so you can direct your efforts there. This should be done not only in terms of morbidity and mortality, now we also have to do it in terms of risk factors. That's really what I meant. It's what we've always done in the infectious diseases. For example, I remember a big campaign in the United States in the 1940s to do mass chest X-ray surveys of factory workers because they had the highest incidence of tuberculosis.

NAJERA: I like the outline. When we talk about the role of epidemiology regarding high-risk groups, I think we should go beyond the known high-risk groups and try to find new ones. I think we should insist that high-risk groups be defined by their mortality and morbidity. And we should encourage general studies. The type of vital statistics or population data that we now have do not always allow us to study the population according to occupation or social class. We should insist on more precise demographic data. At present it is hard to determine groups, since categories

are not well defined or heterogeneous. This affects the precision of epidemiological research.

Another point I want to make is that our health services have developed so much, especially in medical care, that whole populations have become "medicalized". We call it a health system, but it's really disease oriented, a medical-care system. There is too much "medical" in our health system. Perhaps it's time to add a fourth dimension to the basic epidemiologic triad of time, place, and person. We should include the particular health system that serves a population. In classifying populations, especially countries, PAHO has always grouped them by geography—Caribbean Area, South America, Central America, and so on. This lumps together countries as different as Nicaragua and Honduras. Sure, they're neighbors, but their health systems are different, so different, that they should not be in the same category. These differences even exist within the same country. Even where you have a national health system like in England, sometimes there are social-class differences in the utilization of the system. I think this is very important because care or prevention is determined by how people utilize the health services. I think it's time to consider the health system as an important fourth dimension in all epidemiological studies.

TERRIS: My own feeling is that what you're talking about now is health service research as a totality, but we are talking about the role of epidemiology. I think that if we don't limit ourselves to outcome studies, to studies of the effect of health services on disease and health status, then, all of a sudden, we're doing everything. We're no longer doing just epidemiology. Who is using the services? I think health service research should determine this. As you say, even in England with a National Health Service, the poor are not getting as much as the well-to-do for a lot of reasons. Among the reasons may be that the poor don't fully understand what the health services can do for them. But this is a general health service research problem. The study of utilization is part of the totality of health services research. I think we have to stick to the role of epidemiology because we don't really have a role now. Nobody pays attention to us.

BUCK: I agree with everything you're saying. I think it might help if we remember the historical roots of epidemiology: the study of causes and effects. Effects include the outcomes of health care. It's no distortion of the original epidemiological approach to insist that we have a role in etiological studies of outcome. There's no departure there.

NAJERA: What I want to say is that the utilization of health services is a very important dimension of the epidemiology of chronic diseases, that the role of epidemiology is not limited to etiology. Consider, for instance, the difference in the evolution of hypertension in people who have access to health services and people who don't. This is what I want to emphasize. People also differ depending on the type of health service they have, the amount of "medicalization" they receive, and whether they are followed-up or not. I think our health services have become so complicated and sophisticated that they are now a health factor. And many times they are a negative factor, which is why we could also include the importance of iatrogenic diseases.

LLOPIS: I think we also have to say something about evaluating new technologies in terms of outcome and survival, because technology is very expensive. This evaluation is extremely important for Latin American countries because they are big consumers of imported technology.

NAJERA: I think this point is very important. Who decides which technologies are important to those countries that do not produce them directly? Why are they used or imported or put into the system? Whose priorities do they represent? Epidemiology provides the only answer to this, but at present technology manufacturers and health ministries govern these decisions. Technology may be a solution to some problems, but at a very high cost. Besides, there may be other, more important, problems. So, I think this is the place for epidemiology.

Another point is the role of epidemiology in defining social classes. What is social class? We should be interested in the origin of social classes from a labor point of view—what people earn, where they work. We should be interested in how social classes influence the development of disease. Epidemiology should be used to define groups, which we can call social classes, that are subject to different conditions. We should utilize epidemiology to reclassify professions or occupations or ways of living in order to arrive at a better definition of social classes.

We have said before that the health system in England is not so good. True, it's not so good, but it's better than the one in the United States or Spain. We have nothing and something is so much better than nothing. But still it is not good enough. So why not utilize epidemiology to find out how it can be improved?

BUCK: You make a good point about social class and occupational categorization, and I agree that the British system of oc-

cupational statistics may have many imperfections, of which they are probably aware, but, as you say, most countries don't have one at all. My own country is a case in point. Canada could have occupational mortality data because the principal lifetime occupation is recorded on the death certificate. But for some reason this does not enter the statistical system; it probably doesn't enter the United States system for a similar reason.

TERRIS: The reason in the United States is that the dominant ideology insists that there are no social classes in the United States. Didn't you know that this is supposed to be the country without social classes?

BUCK: Well, you are giving a philosophical reason.

TERRIS: They don't want to study social classes.

NAJERA: What is the reason in Canada?

BUCK: We don't want to study them, either. It's the same reason.

NAJERA: The countries without social classes!

BUCK: The point is that before we can fully understand the social class factor we need to have this kind of data from a variety of countries.

I would like to emphasize again that there should be more studies like Cassel's. Cassel was one of the modern investigators who reestablished a mode of research which probably has classical origins. This mode starts with the rich hypothesis of a cause that can lead to many illnesses. I believe that we have some diseases which are interchangeable manifestations of a big cause. If all our research is disease specific, we may miss these big causes. There's a lot we don't know, because for every disease you look at, even when you appear to have quite a bit of its etiology figured out, there is always a substantial unexplained variation in frequency. It may be that the unexplained variation arises differently for each disease, but it may equally well be that much of it comes from a common source. That common source would be a big cause. One reason why we neglect this approach is that funds are raised within disease-specific boundaries.

NAJERA: I think that you have raised a very, very, important point—the definition of disease. Maybe it's not so necessary for acute diseases, but it is for chronic diseases. In order to help the study of disease, we need to think a lot about

redefining diseases from a clinical and epidemiological point of view. I always use the example of fevers before the nineteenth century. Most acute diseases of the time were simply classified as fevers. Why couldn't we say that we are now in the same position with respect to tumors, or cancer, or what we call cardiovascular diseases? We need to use epidemiology to arrive at better definitions, in a practical sense. This is also one of the roles of epidemiology: to redefine health problems. This is one thing that the World Health Organization could incorporate into the Tenth Revision of the *International Classification of Diseases*. We are now at the end of the twentieth century and there has been very little change since the end of the nineteenth century when the first international classification was adopted. We have a little more sophisticated technology, but we haven't had any conceptual change.

TERRIS: I would like to touch on some of the issues discussed earlier. I think that despite all the criticism that the English system of defining social classes has received, it is pretty good. It has produced more epidemiology and more hints, more inferences, than any other system you can think of. It shouldn't be decried. For example, if you look at some of the long-term English and Scottish studies of child development, the interesting thing is that they took Class III, the skilled workers, and divided it into manual workers and white-collar workers. The results were fascinating because they turned out to be two different classes. The Class III manual workers were more like the semi-skilled workers (Class IV) and unskilled workers (Class V), while the Class III white-collar workers were more like the upper classes (I and II). What you really had was the difference between brain workers and manual workers within the class of skilled workers.

Another point that ought to be made is that the mental disease area needs a lot of attention. Not much work has been done in it. Earlier we talked about the problems of maladaptation and lack of well-being. In addition to the serious psychiatric problems, we also need to focus on those people who are neurotic, who are unhappy, people who are not really a part of their society, people whose whole life consists of working and then going home to watch television. In short, people who are not really living. This kind of problem has to do with well-being, with the problem of positive health and performance that we should address.

BUCK: You've really put your finger on it. Cassel, for example, did not confine himself to illness manifested in emotional disturbances. The studies he did of rapidly urbanized Ap-

palachian Valley people, or the ones he did of Maoris who moved from remote islands to New Zealand, indicated that profound social changes were associated not only with what we would call psychological disturbances, but also with cardiovascular disease and many other allegedly physical diseases. I imagine that no one here is going to dispute the psychosomatic relationship. We shouldn't wall off physical from psychological disease.

TERRIS: I will. Although I think it exists, I believe it's been oversold.

BUCK: But we only have to look at the anatomy of the human body, its physiology, to realize that it's all of a piece, don't we?

TERRIS: It may be all of one piece, but I think there's been a lot of theorizing based on that without actual demonstration.

BUCK: I agree with you in that. But my point is that we need more demonstration. Quite apart from the possible effects of cultural phenomena upon all diseases, it is still important to look at psychological disturbances. Look at the amount of ill health and violence related to child abuse that gets transmitted from one generation to another. It's a very serious part of our ill health and we just don't know where to try to break the cycle. I think this issue is profoundly illustrative of the kind of psychological malaise that doesn't reflect its true nature in any mortality rate that we have.

TERRIS: Well, if you take drug addiction or alcoholism, you find that they're really social diseases. They occur mostly in blacks, Chicanos, Puerto Ricans—in the most oppressed groups of U.S. society. And child abuse is found mostly among blue collar workers, again in the most dispossessed parts of our society.

BUCK: Some believe you find it everywhere, but that it's not diagnosed the same in all classes.

NAJERA: Here is an interesting point to make. Take drug abuse, for instance. We find it in the poor, but thirty years ago it occurred among the rich. We should ask why drug abuse has moved from high-income to low-income groups in society. Someone has done something that has put drugs in the hands of another part of society. We should be interested in the reasons behind that.

The role of the family is also a very important point to investigate. It may open a completely new door for epidemiology. Or the role of women in the prevention of

diseases, or infant mortality, or problems generally related with reproduction. Even though it still has a long way to go, the role of women has changed drastically in the past 20 to 60 years, depending on the country. In many countries, we say women are already equal to men, but it's not true. Women still have very far to go. The objective should be not only to get more women into traditionally male-dominated jobs, women also must be allowed to participate in all decision making. These issues shouldn't apply to just a few women, all women should have the same opportunities as men. But it is all still very difficult: defining their psychological or occupational role, determining the place they occupy. We have been studying the effect that women's changing roles have had on the family from the thirties to now. It is very interesting to see these effects and their impact on some things like infant mortality. We often take for granted that only diseases like diabetes are clearly linked with sex differences and that everything else is the same because the differences do not appear in mortality statistics or are not statistically significant. We should analyze the behavior of different diseases in each sex. We should ask ourselves, for example, why women always constitute 60 percent or more of the patients in clinics or consultations. Is it because they are not working or because they get sick more? What are the effects of this on the children? We don't analyze these things deeply enough because we always look at mortality; we should also pay more attention to positive health. What is positive health in the working man or woman, especially if he or she is not a blue collar worker? What is a healthy life in a housewife? For women, what is the compounded effect of work at home and bad work outside the home? These are all interesting new areas of study.

BUCK: All this makes me want to say that epidemiologists may be ready to return to some of their older liaisons. Earlier we mentioned the period in which we worked closely with sociologists. I'm not sure, but I think that we have been departing a little bit from that relationship. What made me think of this was Yuri Brockson-Brynnner's recent book, *The Handbook of Evaluation Research*, which has a chapter on the evaluation of the Head Start Operation, a pre-school enrichment program for disadvantaged children. This very long and detailed review makes the point that the most deprived families, those living under the most appalling circumstances, showed no effect of enrichment, not even a transitory one. The author then cites some references suggesting that if one made more fundamental environmental changes for those people—as opposed to just home tutor-

ing, parent intervention, extra schooling—there might be a possibility of change. I am just trying to lead up to the thought that perhaps epidemiologists interested in broad aspects of disease etiology should ally themselves with psychologists and sociologists. Maybe we are getting a bit too entrenched in biology to make our full impact. Furthermore, some people in these other fields may even be assisted a little bit by our expertise. But even if they don't need us, we might find our ideas enriched by associating with them.

NAJERA: In 1983, in a PAHO seminar in Buenos Aires, we analyzed the uses of epidemiology, especially in research. Let's remember that epidemiology is a science. Let's not forget who is supposed to benefit from it, and try to keep it free from the interests of the most powerful part of society. If we don't do something to free ourselves of these interests, we cannot expect to really focus on these deprived parts of the society that are supposed to be the objects of our studies. Even though we may want to focus on them, something distracts us. Somehow we always find reasons or we don't find funds to conduct the appropriate studies.

TERRIS: In the United States and England we have a well-established tradition of epidemiological research, and PAHO has sent people from many Latin American countries to get some of the best training in the world at elite institutions in these two countries. When these people returned home, however, not very much happened in their countries in terms of research. For some reason they got involved in teaching, or whatever. Somehow we should also make it our task to indicate that the job of an epidemiologist is to stop talking and do some work, research work. If epidemiologists don't do some decent research studies, they're not fulfilling their jobs. And we have to emphasize this, because this seems to be a real problem in Latin America. I think it probably is so in most of the developing world that doesn't have a tradition of research. This is where it must be developed.

BUCK: I think you're right. Perhaps the problem with many of these people is that when they go back home, if they don't have a "critical mass" to return to, they become loners. This is very hard, it's very demoralizing. You have to have great intellectual curiosity to keep on doing research when you have nobody to talk to about it. It's doubly hard if you are surrounded by people who try to divert your energies from research. The solution to this problem is a difficult one. On the one hand, you don't want to put all these people in one

spot and deprive the rest of the country of their training. On the other hand, you don't want to scatter them like seeds either. Nobody ever plants a single seed in a garden hoping to get a bed of flowers. You usually plant several in a spot, don't you?

NAJERA: What probably happens in Latin America, as in many other regions, is that epidemiology is seen with fear because it can show the real problems, the social roots of most of our health problems. That is why epidemiological work and epidemiological research are not encouraged at all. Epidemiologists are told that there is no money, they are told that they must be practical. Well this is an instance where being practical means not being practical! If you don't do any research, if you don't develop your own epidemiological services, you are not being practical. What you are doing is serving somebody else. This is what is happening. Epidemiologists are trained in the United States or in England and then they are absorbed by the health services or ministries—the bureaucratic machinery that wants to be practical. They arrive there as a little piece of the machinery and are completely absorbed by it. They end up doing what the bosses want them to do.

TERRIS: But couldn't this discussion put forth the concept of the critical mass and the centers of excellence in epidemiologic research? Let's emphasize that there really should be an attempt to create these research centers in epidemiology where you can try to get a critical mass.

BUCK: Even though I raised the question of a critical mass, I'm now a little fearful of it. The danger is that in an entrepreneurial scientific world there will be a few centers that will just collect every talent together and impoverish the rest of the country. Would it be possible to get a critical mass without undue centralization? Maybe a critical mass doesn't have to be all that big. Because when it gets really big, it leads to research by committee.

TERRIS: Four or five people in one place, that's enough of a critical mass.

BUCK: Yes, that could avoid the gargantuan "center of excellence" complex. One should try to avoid it, because, in small countries especially, there's always a center that would like to contain the whole country's resources.

NAJERA: The critical mass is a very difficult problem to discuss. If we use rates when we compare countries, we should also use

rates when we talk of critical masses of epidemiologists. For instance, the United States is one country, but it has 250 million inhabitants. You would need all of South America to reach a population of 250 million. South America's population is divided into several countries, each one working separately. So, the problem of having a critical mass for investigation or research is complicated by the fact that all the countries, except for four or five, have populations of fewer than 20 million people. Most have quite small populations and each one wants to have everything.

TERRIS: The other thing that happens is that in a cardiology institute, for example, they will have one epidemiologist, very well trained in the London School of Hygiene. Then, in a neurology institution or in a peripheral vascular disease institute you will also find one lone epidemiologist. In each institute there will be an epidemiologist surrounded by 100 clinicians. But if you have one epidemiologist surrounded by hundreds of clinicians and laboratory people, he is dead, he won't do anything. What they should do is keep an epidemiologist in each institute, but also let them be part of a collective, of a center where there are two, three, or more individuals not affiliated with institutes, people who are the theoreticians in the group. That way, they can meet regularly with the epidemiologists from all of the institutes, and they can talk to each other. What people really need is to talk to each other, to discuss problems. There should be mechanisms developed for epidemiologists from different centers to get together and discuss what they're doing.

NAJERA: In Spain we founded an epidemiological society where we try to get together.

TERRIS: What is the experience in Latin America? Are there centers?

LLOPIS: Most countries have centers, but most of these centers are not part of the health services. Another problem is that although many people call themselves epidemiologists, many of them are not working in the discipline. Most of the time they administer disease control programs, and this follows the tradition of the practice of epidemiology in Latin America. Research is not a priority. This close association with disease control programs is not bad by itself. It is just that if it involves only administration, and epidemiology is not used at all, then instead of the person being in charge of control, control takes charge of the person.

BUCK: I think we should comment on trends in epidemiology training because these are important issues to talk about. I would discourage a trend towards rigid specialization within epidemiology. I'm saying this because we mentioned clinical epidemiology before. Although some specialization may occur in the course of an epidemiologist's work and contacts, it is a great error to institutionalize fragmentation in a field that is still relatively young. I get really scared by the use of "big E" and "little e", or "hard" and "soft" as though it might be pornography, or "clinical" and "classical" epidemiology. I think we ought to do everything we can to suppress excessive specialization. It has been the ruination of medicine and could equally be the ruination of our own discipline.

NAJERA: I think it goes against the essence of epidemiology to divide it into branches. Epidemiology has to be comprehensive. You cannot really be an epidemiologist if you are not thinking about all aspects of health. Although epidemiologists may be in contact with a specific type of work, or apply epidemiology to a specific group of diseases or a specific group in the population, they must never lose sight of the whole problem of health.

The improvement of epidemiology training should start before graduation, it should start in the medical schools. To get people into epidemiology, you need maybe two things: a scientific interest and a community interest. What medical schools do now is to take students and make them only interested in individuals, they turn students into typical, biological, individual-oriented physicians, serving only very specific health problems. We should change something there. The social interest must be fostered and nurtured. If we do this, then we will have a more scientific physician who is more community oriented, a physician who can then be trained as a real epidemiologist.

LLOPIS: I have been involved in many training programs for epidemiologists, especially in surveillance, and on the whole they all have been highly disappointing. In my opinion, we have to change our whole approach. I think we shouldn't start with training programs, but rather with research programs. I don't believe that any effort we make toward training people will be successful if they have no place to work or to develop their skills and interests when they come back. People should be trained in cooperative research programs so that we could have both things at the same time: a place where they return to work that may provide the critical mass and this center of excellence that we were

talking about. If we don't do this, we will have the same problems we have had for many decades and we will not achieve very good results.

TERRIS: I'd like to address a number of problems, and I'm going to speak from my own experience since that's what I know. They're beginning to develop a school of public health in one of the Asian countries. As part of that effort, the National Institute of Hygiene and Epidemiology asked me to give a course in fundamentals of epidemiology, the same one that I've been giving at the graduate summer session of the University of Minnesota for twenty years. I had 28 students, half of them men, half women. All of them were physicians, except one or two statisticians—this is also typical of the developing countries, hardly anyone except physicians. They were all people who were working in epidemiology in the medical school or the ministry or the various institutes, yet they didn't know any epidemiology. (I've been told this is also typical.) What they are taught as epidemiology is infectious disease prevention, so they know a lot about the clinical aspects of infectious diseases and the control methods for infectious diseases, but they don't know how to do an epidemiologic study. They don't have the faintest idea how to do it. This story, I think, illustrates one of the great problems in epidemiology training.

The main task, all over the world, is to teach epidemiology essentially in terms of methods of study and methods of research. What are the basic concepts? What are the basic research methods?

The second point, also based on my own experience, is not very original. I learned this from John Fox and Henry Gelfand at Tulane, where I taught. Although we gave lectures at Tulane, we did not teach primarily by lecture, we taught primarily by exercises. I know you are familiar with my disease-oriented exercises, *The Bank of Epidemiology Exercises*. Each exercise traces the development of the epidemiology of a specific disease such as polio, or coronary heart disease, or tuberculosis. I think it's a very important approach because the exercises use data from real research problems. It's not just lectures. My impression is that most epidemiology taught in the Third World is lecture-teaching. I believe lecture-teaching goes in one ear and out the other, unless you try to work with data and think the problem through.

The third point I want to make is that we're kidding ourselves if we think we're going to get anywhere if we don't encourage research. I agree absolutely with Llopis that what people have to do is to learn by doing. They must get into a research situation and learn, and the only way

that will happen is if money is provided. It's the main reason for the tremendous development of epidemiology in the United States, greater than in any other country, much greater than in England since they never had our resources. We wasted millions of dollars on epidemiological research of all levels of quality, just as we did with medical research. We poured money in. Take MRFIT, it cost many millions of dollars. In Latin America, you don't have to pour that kind of money in, you don't have it. But I think PAHO's idea is to put aside a certain amount of money in grants for Latin American countries to do research. For epidemiological research in Latin America, PAHO would be like the United States' National Institutes of Health (NIH). This is very important. Finally, we, the epidemiologists, must try to convince the governments and the health departments, the Ministries of Health, to put money into epidemiology. We must woo them.

LLOPIS: The problem with increasing financial resources is that at this point most funds go to health care. In some instances, more than 80 percent of the money goes to pay salaries. There is very little chance of redistributing resources, and this is because we have been poor planners, we have squandered what little money was available.

NAJERA: I think this problem of training is very complicated. What Llopis said about having a place that people can come back to and do research is probably the most important thing. You not only need to have services, you also need to have research in order to attract people and keep them interested in the field. But still, I would like to come back to the issue of undergraduate training, because if we don't do something at that stage it will be very difficult to change people that have already been trained to think in terms of individuals and reshape them into epidemiologists. In 1962, I started comparing the curricula of medical faculties in many countries of the world, mostly in the so-called developed countries. I was trying to find the place for epidemiology, for prevention and community medicine. I found out that practically no curriculum had any emphasis on prevention or on community health during the undergraduate years. Since then, very little has changed in most countries.

TERRIS: It's gotten worse.

NAJERA: I remember that at that time I came up with a proposal to incorporate epidemiology into the medical curriculum. First I proposed introducing what I called "community

anatomy", meaning demography, at the beginning of the curriculum, at the same time students were taught individual anatomy. The objective was to plant in the students' minds the idea that there were not only individuals, that these individuals live together in a community. This community has a shape and an age distribution and so on, and it can be studied through demography. Then, as they studied individual physiology, I proposed introducing sociology as "community physiology." Finally, epidemiology would be introduced at the same time that they studied general pathology. In other words, as they understand the disease process in the individual they should also understand the disease process in the community. But my proposal has never been applied anywhere. There have been many attempts to change the graduate medical curriculum, but I don't think any of them has been really radically planned.

TERRIS: My experience has convinced me that we are deluding ourselves if we think we are going to change most medical students. However, I firmly believe that we should have departments of community, preventive, and social medicine in medical schools. But, if it were up to me, if I were starting all over again, I would not ask for a compulsory course in epidemiology for all students. Instead I would want to have an attractive elective course in epidemiology for interested students. In the United States, only 5 to 10 percent of all students are socially conscious, really socially conscious, and they are the ones who are going to go into public health. Some will start out as clinicians, will suddenly get the bug, and come in. These are the ones that must be found among the medical students and then be taught and encouraged toward public health and graduate training in public health.

BUCK: I agree with you entirely about the elective course. But the problem is that you can't get people to come to a movie unless you show a preview. If there is no core course in epidemiology, how can you attract interested students to the elective course?

TERRIS: I think you're right. The emphasis should not be on trying to teach this to everyone, but on getting the introductory course to pick up the interested people and work with them. Otherwise you're kidding yourself. I really was a big failure, and every time I visited a school that said it had a successful epidemiology training program, I found, after I talked with them a while, that epidemiology was a failure there too.

BUCK: I've always thought I was a big failure, too. But the other day, for reasons I won't bore you with, I sat down and tried to figure out the number of people I knew that I had influenced for sure. It was a very small number, but if multiplied by itself it might be enough. It's like using the net reproduction rate which measures how many daughters will be born to a cohort of newborn girls. If the average is one, you achieve replacement. So we could figure out how many epidemiologists we have to produce to get enough. First, of course, we have to decide how many would be enough. We obviously don't have to turn 50 percent of every medical class into epidemiologists. It might be very dangerous if we did.

NAJERA: Well, there is another possible solution to this problem that my father proposed many years ago. He taught in Argentina after having good experience as an epidemiologist in the Spanish Health Services. His idea was that it was impossible to get medical students to go into epidemiology; that this was a futile effort. He proposed that what society needed was a completely new career, that public health and epidemiology should be independent disciplines. They should include sociology, economics, demography, and all the subjects that we know we need, but with much less medicine. At least not so much otolaryngology, or ophthalmology, or surgery, or anatomy.

BUCK: I used to think that this was an attractive solution. But if we look at the Soviet Union we see that it may not work. Their medical curriculum is divided into separate streams, so that some students go into stomatology, some go into clinical medicine or pediatrics, and some into public health. Now, nothing much seems to have come out of that streamed arrangement, maybe because the public health stream does not contain enough instruction in epidemiology.

NAJERA: The example of the Soviet Union is not valid because the curriculum divisions are still all specialties of medicine, and that is not really the point. What my father proposed was a completely different, a distinct career. So much so that you could not go from public health into clinical practice. This would be like going from medicine to engineering. The curriculum might have some medical content, mainly the basic sciences and general pathology or knowledge of the process of disease, but there would not be much clinical content. Another approach, the premedical setup in England, has not been successful either, because it never was ambitious enough. In Spain, we have something like that in

one of our schools, in Alicante, but again, it doesn't go far enough. They take first-year students and give them this pre-introduction to health aspects, but then they go on to the clinical and medical component more or less as usual.

TERRIS: I think that what is happening in the United States is very interesting from this point of view. In the old days, in my generation, to be an epidemiologist you had to be a physician and a male. Now we have Ph.D programs in epidemiology. My guess is that in the schools of public health most of the successful Ph.D candidates are not physicians and at least half are women. What is also happening is that the whole field of public health and medical care administration, both in the schools of public health and in practice, is now becoming an area not for physicians, but for people trained in public health and medical care administration. This is what is happening in the United States. There is nothing theoretical about it, it has just happened this way.

NAJERA: Perhaps this will be a way of evolving into the new profession I talked about. In Spain you still have to be a physician, but now we have more women than men in the field of prevention and epidemiology. There has been a shift in that.

BUCK: I think there is a potential problem here. Unless you provide the non-medical people with much more than methodological courses in epidemiology and statistics, especially if their background is very general, these courses will not really prepare them for creative epidemiological research, nor for administrative positions in public health or health care administration. Milton Roemer had the right idea when he said that students should be given a rich mixture of human biology, economics, political science, administrative theory, statistics, and epidemiology. This is not the same thing as the streamed medical curriculum, because it offers much more than you can offer today in a medical school.

NAJERA: Maybe with the help of these non-medical epidemiologists we are going to be able to change our definition of disease; without them we are stuck.

TERRIS: I would like to emphasize a point I made when we discussed why the London School of Hygiene was so important to the movement of transition from the old to the new epidemiology. That is that the key factor in the whole process was the close collaboration of epidemiologists with statisticians. You see, there is not going to be good research

if there isn't a team of medical or non-medical epidemiologists—and in Latin America it's going to be mostly medical, let's not delude ourselves on this point—and statisticians working very closely together. Medical epidemiologists are not sufficiently sure of themselves on methodology; they need the statisticians. There are dangers in working with the statisticians, they can cause difficulties, but we need them. I think this is crucial. The critical mass must include both epidemiologists and statisticians. Of that I'm convinced.

LLOPIS: At present, we are worried about the future of the schools of public health in Latin America. The Rockefeller Foundation, which has a long history of supporting public health in the region, now says that it is much more concerned with medical schools than with public health schools. So much so that they are funding clinical epidemiology programs through medical schools in several Latin American countries.

BUCK: I think we all know the problem, but our reaction to it must be active rather than passive. We have to present a cogent and logically impeccable alternative.

TERRIS: The Rockefeller Foundation people are selling this program, with real money to back it up, all over Asia, Africa, and Latin America. They are going to divert promising people into doing drug trials. Both the Rockefeller Foundation program and the Robert Wood Johnson Foundation's "clinical scholars" program avoid public health schools like the plague. I think it is an absurdity. Here we have the Third World with all its terrible problems of famine, malnutrition, infant diarrhea, malaria, and all the other infectious and noninfectious diseases, and all this money is being spent to teach clinicians how to do clinical trials. These foundations operate under a false banner. They are misusing the term epidemiology. Why? Because of the great prestige of epidemiology in the world today, because of the fact that the schools of public health are the outstanding centers of teaching and research in epidemiology. This is threatening. They want the medical schools to continue to be dominant; they want the clinicians to keep their political power; they want to make sure that health services don't infringe on the narrow professional interests of the clinicians.

BUCK: The strangling of preventive medicine in medical schools is fostered by the doctrine that prevention is everybody's business. It should be, but the danger is that what is everybody's

business becomes nobody's business. When the role models in the medical school faculty are not oriented toward prevention, then the abolition of a department of preventive medicine is dangerous.

TERRIS: Although clinical epidemiology should be epidemiology, it is not. It is clinical trials. This is useful: it is about time clinicians became a little more scientific about what they do. Also, I think that some of the people who are being trained to do drug trials will realize that epidemiology is more important than drug tests and then will become genuine epidemiologists and public health workers. But still, the real reason for the program is political. As I said before, clinicians in the United States and elsewhere are afraid that non-clinicians will run the health services. This is why the Robert Wood Johnson Foundation has a clinical scholars program and the Rockefeller Foundation has a clinical-epidemiology program. They want clinicians to know enough epidemiology, public health, and medical-care organization to step in as the leaders and run the show. And some of these people, with their medical arrogance, do not hesitate to denigrate schools of public health because they are multidisciplinary.

BUCK: It is all right to criticize deficient schools of public health. But the approach of these foundations is equivalent to prescribing euthanasia, and that is inappropriate. If a school of public health is depleted, stagnated, it should be strengthened, not killed.

TERRIS: This book will help. It gives a picture of the domain, the scope of epidemiology.

LLOPIS: On the other hand, we have made the point that the schools of public health need updating.

TERRIS: That should be a major role for epidemiologists to concentrate on in the future: get the schools of public health into the new era.

LLOPIS: Yes, and PAHO should take a leadership role in updating and reshaping Latin America's epidemiology programs.

TERRIS: If in ten years PAHO hasn't updated the schools of public health in Latin America, we will come back and haunt them.

LLOPIS: It cannot wait 10 years. We have to haunt them now.