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I have been very interested in the planning and development of this particular roject and conference. The need to come to grips with the nature, numbers, and requirements of the environmental health work force is long overdue.

I cannot begin to discuss the environmental health work force without recalling my first job as an entrance grade county sanitarian. I really didn't know what a sanitarian was. I was put to work at \$225 per month after being given two days orientation with another sanitarian and being provided with inspection pads, a clip board and a thermometer went my appointed rounds, I frequently wondered what I would tell someone if they asked what I did. I could only come to the conclusion that I "inspected." This was probably not an unusual state of affairs for a sanitarian in 1950. I will refrain from further dealing with any specific professional groups such as sanitarians or engineers in this paper and use the opportunity to discuss the field of environmental health.

The field of environmental health includes such programs as water quality, air quality, radiation protection, occupational health and safety, food and milk protection, noise pollution control, hazardous material management, housing conservation and

rehabilitation, solid waste management, water supply protection, insect and rodent control, institutional environmental health and recreational area environmental health. All of these program areas have a health goal as a minimum, although they may also address quality of life factors. personnel are involved in such activities as inspection, sampling, analysis, information dissemination, regulation, incentives, standards development, research, planning, epidemiology, risk assessment, and biostatistics. All of these measures are components of the practice of environmental health that modify or otherwise control factors in the environment that impinge on human health. A wide variety of professions are essential to this effort. The variety of personnel include natural scientists, physical scientists, medical scientists, attorneys, public health professionals, planners, statisticians, meteorologists, engineers, computer scientists, and scores of others too numerous to mention. all are essential to environmental health practice.

At this point in my discussion, it is important to note a distinction between the term "environmental health professionals" and the term "professionals in environmental health." Professionals such as geologists, engineers, biologists, physicists, computer scientists, food technologists, chemists, toxicologists, geo-hydrologists, planners, economists, attorneys, statisticians, epidemiologists, risk management scientists, and many others are essential to the field of environmental health, but are not environmental health professionals. They are professionals in environmental health. Environmental health professionals have been educated, at a minimum, in the major components of environmental health and in the basic public health sciences of epidemiology and biostatistics. Both environmental health professionals and other professionals in environmental health are utilized at all levels of government as well as in academia, industry and citizen groups. Most environmental health professionals are products of accredited schools of public health or accredited environmental health programs outside schools of public health. Most environmental health professionals are produced by undergraduate and graduate programs accredited by the council on education for public

health or the national council for the accreditation of environmental health curricula. Other programs are graduating personnel such as environmental scientists who may become professionals in environmental health. Most non-accredited environmental science programs do not require the core public health sciences.

Accurate numbers for resources and personnel involved in environmental health have been damagingly and erroneously misrepresented to the Congress and official agencies by the annual report prepared by the Association of State and Territorial Health Officials. I have addressed this issue many times with no success. As an example, I will quote from a letter I wrote in 1982.

"The NPHPRS only reports those programs within the jurisdiction of each state's designee to the Association of State and Territorial Health Officials. Many, perhaps most, states have more than one "health agency" although only one may actually have the title of something like "state health department." Inasmuch as each state's designee to ASTHO is usually the chief executive officer of the health agency bearing such a title, it is conceivable that more activities go unreported than reported in some states. In my state, for example, the official designee to ASTHO prior to 1978 was the director of the health services division. Inasmuch as the health services division only has responsibility for personal health programs, all of New Mexico's programs relating to mental health, drug abuse, alcoholism, laboratories and environmental health were left unreported. In 1978, I recommended that the Secretary of the Health and Environment Department, rather than the director of the health services division, be the official representative to ASTHO. This had the effect of requiring reporting not only of the health services division, but also of our environmental improvement division, scientific laboratory division, residential treatment services division, health planning and development division, and behavioral health services division. The expenditures reported for New Mexico immediately increased five-fold by merely changing our representative to ASTHO.

As you know, many (probably the majority) of states have created "EPAs" separate from the official state health agency. All of the programs administered by these "EPAs" are basic health programs and, perhaps more importantly, disease prevention programs. Similarly, I believe my department is the only "health agency" in the nation operating a comprehensive occupational health and safety program. In most states, occupational safety and health programs are administered by departments not bearing a title including the term "health."

Not only do the preceding situations place serious limitations on the expenditures and activities reported by NHPRS, but also seriously skew the relative percentages of health expenditures and activities reported by NPHRS. It is conceivable that some states may spend more for either environmental health or behavioral health outside the official state health agency than for personal health within the official state health agency. The amount of funding attributed to "prevention" might be significantly increased if these health activities were reported.

The NPHRS also attributes some 37% of environmental health program expenditures to "consumer protection and sanitation." If the health programs outside official state health agencies were reported, the leading expenditures would undoubtedly be air quality, water quality, and perhaps waste management.

Assuming that there is some relationship between health program reporting and educational needs, expenditures and projections, the NPHRS also would tend to skew these figures.

Other forces also seem to be at work to damage or retard the quality and supply of environmental health practitioners from schools. One of these is the parochial attitude that schools of public health should produce graduates for "health agencies," while denying that environmental health programs in agencies termed pollution control,

environmental quality, ecology, atomic energy, labor, or environmental protection are also health programs having health goals and would not be in existence except for these public health goals.

Second, concurrent with increased expenditures in our nations health care (treatment) system, schools of public health continue to increase emphasis on health care at the expense of public health (prevention) programs including environmental health.

Third, faculty in schools of public health as well as environmental health programs outside schools of public health are frequently offering curricula with which they are personally comfortable rather than the priority emerging and future needs in the field. Too often, environmental health agencies (whatever their titles) are involved, not in prevention, but in curative efforts to solve problems created due to decisions made by other agencies or at other levels of government. Only when environmental health agencies have professional personnel capable of addressing the public health impacts of land-use, alternative energy systems, transportation, and resource consumption at the initial planning stages prior to the decision-making stage, will environmental health become preventive rather than curative. The importance of those efforts must be emphasized both by the schools and the hiring agencies. but even these skills will not be fully effective until society can ameliorate problems of ignorance and poverty.

Fourth, several recent appointments of non-public health professionals as deans or department chairs of schools of public health suggest that some schools are more interested in pursuing the almighty research dollar than educating public health practitioners. As an example of this trend, I will quote from a letter I wrote to the University of Michigan School of Public Health in 1985.

"Obviously, the new environmental health chair at the University of Michigan School of Public Health will not only set the tone and affect the reputation of the environmental program for many years to come, but, more importantly, will have a significant impact on the quality and quantity of environmental health leaders and programs providing service to the public in the united states and throughout the world.

"It is essential to note that the chair must be, above all, a visionary environmental leader with a keen public health philosophy. more important than being a researcher. This leader must have the reputation and experience necessary to attract faculty and students having a priority of serving people. The chair must have the vision necessary to look to the future and ensure curricula and educational content appropriate to the people needs of the future. Hopefully, the need for research funds will not outweigh these more important characteristics.

"Of equal or greater importance than scientific research ability, our environmental health leaders and your department chair should be extremely knowledgeable and effective in developing and implementing public policy, the political process, and comprehensive management skills. Public health leaders must be able to translate the results of research into effective public policy at the federal state, and/or local levels.

"I am increasingly concerned that schools of public health are more concerned with faculty research than providing student education and community service,

and ultimately insuring quality professionals, programs, and public service by official agencies, industry, professional, and voluntary groups.

“For many years, I was impressed and proud to observe that University of Michigan alumni held key leadership positions in public health throughout the world. Those leaders in attendance at most key national public health policy gatherings were disproportionately representative of University of Michigan School of Public Health alumni. For many years, Michigan School of Public Health alumni practically monopolized leadership positions in national professional groups, such as the American Public Health Association. This situation has been deteriorating coincidentally with the increasing emphasis on research funds over the past few years. Educating tomorrow's leaders has become secondary to grants, contracts, student enrollment numbers, and faculty size.

“Environmental health priorities of the future will continue to include air and water pollution, solid wastes, radiation protection, toxicology, toxic chemicals, occupational safety and health, hazardous wastes, food protection and water supplies. but to be more effective, of greater service, and engaged in a preventive rather than a curative mode. Future leaders must have the requisite knowledge to effectively address the environmental health impacts of population numbers and distribution, resource consumption and conservation, alternative energy resources, land-use, and transportation methodologies.”

Fifth, environmental health graduates must have adequate knowledge of public policy, public health risk assessment, cost-benefit analysis, the political process, and be able to bridge the gap between scientists and elected decision and policy makers.

I do not wish to imply that schools and programs have not changed. Changes have been created by the changing environmental health problems, changing societal values and expectations, changing environmental health priorities, and the emergence and development of a vast array of environmental health programs, organizations, and institutions.

I have no doubt that students and graduates are more knowledgeable and mature than ever before. students are demanding educational relevancy to a greater extent than in the past, and this pressure continues to have some effect on educational curriculum.

It is obvious to everyone that the complexity of the total environmental health delivery system is increasing, resulting in needs and demands for different types of personnel. Some recognition has also been given to the premise that improved managerial skills will improve the effectiveness of the environmental health delivery system.

The changes in health problems which have been accompanied by changes in curriculum include decreases in communicable diseases as major causes of death; the aging of our population with associated increases in a multitude of chronic diseases; changing lifestyles relating to exercise, obesity, smoking and nutrition with their implications for public health; and increased recognition of the relationship between the environment and cancer, heart disease, and genetic diseases. The increasing realization that the best answer to public health problems lies in prevention has and will continue to have an effect on environmental health curriculum.

Environmental health person-power requirements include not only those working in and managing such programs, but also those academicians producing such person-power and those research scientists developing the necessary health knowledge base. the spectrum

of such person-power ranges from inspectional level sub-baccalaureate personnel doing routine inspection and sampling through the baccalaureate, master, and doctoral levels required for the more complex aspects of policy, management, research, and education.

Programmatic and academic efforts should be based on sound epidemiology and risk assessment. We should give greater consideration to recommending priorities based on years of productive life lost, rather than on causes of death. Utilizing epidemiology and risk assessment for public health policy guidance would refocus future programs so as to have the greatest impact on overall health status and environmental quality. We would also learn that we should not be decreasing efforts on problems of the biological environment (such as food protection), and that the required additional emphasis on problems of the chemical environment should not be at the expense of biological environment issues which are still of importance when utilizing the tools of epidemiology and risk assessment for focusing environmental health policy.

Arguments about the need for specialists vs generalists are nonproductive. Both are needed and this need will continue. The generalist may be better suited for those who plan to be involved in management, while specialists are essential for the various specialized branches of environmental health.

There continues to be a gap between town and gown. While some environmental health educational programs and operating programs have excellent continuing communication, many still operate in comparative vacuums. The best interests of both town and gown, as well as the entire public, are served when town and gown work together through organized mechanisms instead of leaving such communication to chance and personalities.

The career heights to which professionals in environmental health and environmental health professionals may aspire are as great as the individual's

capabilities and desires. While it was once assumed there was a career ceiling over environmental health personnel, time and experience have proven that individual capabilities equal those in other professions. There is a solid record of achievement in government, academia, industry, professional organizations and community service. There are directors of health, directors of environmental health agencies, professors, deans, industry and association executives, and various other managerial and executive capacities listed within the rank of environmental health personnel.

Environmental quality is an important goal in our society, and protecting human health is an essential component of that goal. Capable environmental health personnel are necessary to achieve that goal, and as a profession, we need not take a back seat to any other group. Any question of capabilities comes from negative attitudes rather than from the lack of expertise. Environmental health personnel must realize their value and continue to aspire and achieve, and be proud of their part in insuring a quality environment.

Appropriately educated personnel will not ensure resolution of all environmental health problems, but resolution will be impossible without them.

The expertise gathered at this conference will offer important recommendations and contributions to the issue of evaluating the environmental health workforce. These contributions will be of great significance to all involved in educating and utilizing environmental health personnel. The next few days will be informative and exciting for all of us.

