



Calderone Lecture 1996

Public Health: The Rest Of The Story

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The Frank A. Calderone Lecture

Public Health: The Rest of the Story

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First, many thanks to the Calderone family, Dean Rosenfield, Columbia, and the many people involved in making this lecture possible. It is indeed an honor to be here.

It was the first day of school for the four-year-olds, and they were being instructed about the rules. The teacher told them that if they had to go to the bathroom they should raise their hands. A very perplexed four-year old boy asked, "But how does that help?" The question tonight is, "how will it help" to put so much effort into public health activities?

I love the realm of science. In recent years, science has enlightened us about our past, and the planet's—for example, the discovery of the "Ice Man," a 10,000-year-old skeleton in Kennewick, Washington, and the reports of a 40,000-year-old shrub in Tasmania, perhaps the oldest living thing in the world.

We've achieved a new understanding of the universe, with such findings as the past weather on Mars, the discovery of older galaxies, and reports of new planets, now coming at the rate of about one every month. New species of animals sharing our home planet with us have been identified, and bacterial populations in our intestines have been better described. And computer science is making it possible to undertake astonishing tasks such as the Human Genome Project. Like Einstein, I look with joy and wonder at a universe we can barely understand.

But I especially love the realm of public health science. We are entering the third century of the modern public health age. It started in May of 1796 when Edward Jenner gave the first vaccination by transferring material from the cowpox lesion on the hand of Sarah Nelems to the hand of James Phipps. In 1977, the logical consequence of that event was finally realized when a cook at a hospital in Somalia acquired smallpox from one of two children whom he had guided to the infectious disease ward. But no one acquired smallpox from the cook, and the chain of infection of smallpox, going back to the first human case, was broken.

My plan this evening is to address several key questions about the past, present, and future of public health sciences: What has been the impact of public health science to date? What evidence do we have of current impact? What will happen and what could we wish for? What is the rest of the story? That is, what potential would public health hold if we were willing to change our approach, our philosophy, our vision?

The Impact of Public Health Science

A few examples will suffice to illustrate the impact this science has already had. First, the phenomenal change in life expectancy, which has increased from about 47 years for those born at the turn of the century to about 75 years at birth today. We hear these figures so often that they tend to lose their force. But these statistics mean that the life expectancy of the average American has increased by about seven hours per day for every day of this century. That is unparalleled in history and almost

beyond my comprehension. For every day that I have lived, I have spent 24 hours and been given an extra seven, for a net investment of only 17 hours a day!

Moreover, infant mortality rates (IMR) have decreased from about 150 deaths before the first birthday for every 1,000 live births to fewer than ten. Thus, not only has a dramatic 93 percent reduction in IMR been brought about in this century, but we are approaching the limits of what is possible.

Fertility rates are also beginning to fall around the world. Dean Rosenfield has spent his life addressing the problems of population and now the impact is visible. There are districts in Bangladesh where fertility rates have dropped by 50 percent in the past ten years. We still have a long way to go, but I think back to the writings of Jean Jacques Rousseau. In 1762, he wrote that half of all children will die by their eighth birthday. He said "This is nature's law. Do not try to contradict it." When we think of the fatalism of an educated person 235 years ago, we can appreciate the progress made.

One thousand years from now historians will see this as the age of science, with the epicenter in North America. And you will be able to say that you were part of it! Rebecca Riley, of the MacArthur Foundation, was a Peace Corps volunteer in Liberia when the first astronaut landed on the moon. That night, the blacksmith in her village invited her and the leaders of the community to his compound. He asked her, "Is it true that an American is walking on the moon?" She said, "Yes, it is true." He then asked, "Is it true that they built a rocket to send him to the moon?" She said, "Yes, it is true." He shook his head and said, "Those Americans, they sure are good blacksmiths!" And historians will say, "Those Americans, they sure are good scientists."

Current Impacts of Public Health Science

A few in this audience will remember, as do I, April 12, 1955. A press conference was held at the University of Michigan to announce that the Salk vaccine protected against polio. We tend to forget the emotions of that time. The next morning, signs appeared in store windows around the country saying, "Thank you, Dr. Salk." We have now gone five years without a case of wild polio in this hemisphere, and the entire world will be free of polio by the year 2000.

Guinea worm is a miserable disease that keeps people from their work and children from attending school. In the past eight years, the number of cases has fallen 97 percent to about 150,000 cases last year, half of them in Sudan. Again, this disease will soon disappear, and by the year 2000, the world will have successfully eliminated three diseases—this, polio, and smallpox.

Onchocerciasis (river blindness) has been a scourge of millions. Spread by a fly that breeds on fast moving rivers and streams, this disease has caused blindness and severe itching. In the early 1970s, Merck developed a drug against heartworm in dogs. They marketed the drug ivermectin under the trade name of HeartGuard. Ten years later they found that the same drug could protect humans against blindness due to onchocerciasis. In humans it proved even more of a miracle drug, requiring only one treatment a year. That only a single annual treatment was required, and that it was the poorest people in Africa who would need the drug, meant that the company would not be able to make profit on human use.

Merck offered to provide the drug free if we developed a system of distribution that would get it to the right people in the right dosage and avoid diversion to the veterinary market. This drug went to 15 million people last year with the help of global agencies such as WHO, UNICEF, UNDP, and the World Bank; ministries of health in about 30 countries; and countless mission groups, foundations, and nongovernmental organizations, subsidized by Merck and even the dogs of America! Now we are beginning to study the limits of this drug and even asking the question of whether the disease can be eradicated.

Another notable example of advances from public health science focuses on corn, or maize, as it is known in most of the world. Maize lacks quantities of two essential amino acids, lysine and tryptophane. In much of the world, those amino acids are easily supplied by other foods; but where children are weaned on maize, they can become malnourished, regardless of the quantity of maize available. In 1963, a natural strain of maize with higher levels of these amino acids was found. University after university gave up on trying to make this strain edible, and finally only one research facility in Mexico continued the efforts. A biochemist, Dr. Evangelina Villegas, developed a technique to sample the genetic material of a single kernel without inhibiting the ability of that kernel to germinate.

By the late 1980s, the resulting quality protein maize (QPM) was indistinguishable from the previously cultivated strains in terms of taste, color, texture, hardness, or resistance to organisms. With the help of President Carter, this strain was introduced to Ghana. The head of state of Ghana, President Rawlings, was reminded that the problem of protein

malnutrition in children was brought to the attention of the world when Cicely Williams, a pediatrician and specialist in infant health and nutrition in developing countries, used the word “kwashiorkor” for the first time in print in 1933, in an article written from Ghana. Kwashiorkor is a disorder of nutrition deficiency and is linked to inadequate protein consumption. The challenge was to introduce a solution from Ghana and to do it in Dr. Williams’ lifetime. When President Rawlings heard that she was 95 years of age he declared, “We don’t have much time.” He asked Dr. Borlaug if he could have a plan by the next morning. When Dr. Williams died, at the age of 98, QPM was being produced in Ghana, and ground meal was available in the market as a weaning food. Dr. Borlaug estimates that QPM now accounts for 30 percent to 50 percent of the total maize production in Ghana. Parents don’t notice when their children are properly nourished. This problem will quietly disappear with little awareness that a major improvement in the health of future Ghanians has been made possible.

What Might We Expect?

Even without major change in the current course of public health efforts, what is almost inevitable? Again, I will limit this to only a few examples out of the dozens that could be used.

Efforts to immunize the world’s children will be facilitated. We will go from the current confusing schedule, which requires labor-intensive efforts to get parents and children to respond, to a program that will include more antigens being delivered with each vaccination, vaccines that require no boosters, full immunization accomplished with one or two

visits, lifelong immunity after the initial injections, no need for needles or syringes, and no cold chain.

In the development of an AIDS vaccine, we can, at last, see the pieces coming together. Recent investigations have shown hints of immunity in some populations, the discovery of a strain in Australia that has not resulted in clinical symptoms, a more complete understanding of both the virus and the immune system. For the first time in 15 years, we can be confident that a vaccine will be developed.

The assault on cancer shows definite signs of progress. We can anticipate inexpensive tests for genetic predisposition to various malignancies, screening and monitoring based on those tests, and specific prevention procedures tailored to the individual.

What Would We Wish For?

Some improvements in public health will happen without a concerted effort, while others will become reality only if we decide they are worth the investment of our time and effort. What can we hope for if we, as public health professionals, are willing to be involved?

Equity. The foundation of public health is social justice. We must work for a reduction in the great disparities between groups within this country and within other countries, as well as between countries.

The elimination of unnecessary suffering, premature death, and compromised quality of life. These are the goals of public health work.

Erasing poverty. We now know that poverty is a health issue in every culture. It leads to an increase in mortality for almost every condition adversely affecting health that has been stud-

ied. In addition, it is now obvious that the problem is dose related. That is, it is not just a function of the difference between the very poor and the very rich; rather, for every step down in income, there is an increase in the disease burden. As with smoking, alcohol abuse, and diet, we must see this as a health issue—the concern of people interested in health.

The Grameen Bank, in Bangladesh, loans money only to women, more specifically, only to women who have no collateral. Five or six women borrow together and become the collateral for each other. The payback rate for the loans is reported to be 98 percent. Moreover, the region is reporting an improvement in various indices, including a reduction in birth rates!

We could hope for a concentration on outcome measures in determining the efficacy of health programs. Instead of our current obsession with access, quality and costs, we could take a new approach that says we will start with health outcomes as our metric and then look at prevention, quality and cost. Gary Wills in his book *Certain Trumpets*, makes the point that while many books deal with leadership and followership, few look at the third ingredient, shared goals. Our goal in all we do is to improve the health outcomes of individuals and societies. After all, why do we do this except for such outcomes?

Finally, we could work for a system of expenditures based on rational decision making. We now have ways to look at the burden of disease that are much superior to anything we have used in the past. For example, disability-adjusted life years (DALYs) allow us to combine suffering and mortality into a single number. This allows us to compare diseases, groups, time periods and age groups. It provides a new approach to measuring costs and benefits and provides the basis for reach-

ing rational decisions on allocating health resources. It also allows us to promote prevention. Why should we be so focused on prevention? Richard Feynman, the great physicist, once made the case by pointing out that it takes very little energy to scramble an egg, but science is totally incapable of reversing that simple process.

What is the Rest of the Story?

What is possible? What are the barriers to even greater public health impact? First, we should note that science is ahead of everything. This in itself is a problem and the gap is growing. Science is ahead of our law, ethics, sociology, theology, and understanding. To paraphrase a passage in the book, *Plague On Us*, “How much the people of science know about the things they don’t understand!”

Like a body builder who exercises only one muscle group, we have become lopsided. We knew how to do AIDS tests long before we knew when and where to administer them. We have continuing problems with antibiotic resistance, even when we know how to reduce that problem. Lung cancer, heart disease, and injury continue to extract a high toll and we are often fatalistic, not for lack of knowledge, but because we are not sure how to use the knowledge. If the gap between our science capital and our social capital is to be bridged, it will be because our scientists deliberately close the gap.

Second, we must acknowledge that provincialism won’t get us to a full public health impact. Einstein once said that nationalism is an infantile disease. It is the measles of mankind. I am sure that today he would add ethnicity, tribalism, and provincialism as infantile diseases.

Many years ago, while giving measles immunizations in Nigeria, I began to think of the chain of events required to get one dose of vaccine into a child. There had to be the researchers and their support through a government system that provided grants to universities. Think of the vaccine producers and the complex process needed for vaccine production, not to mention the vials, stoppers, needles, syringes, and boxes. Think of the airline industry, from research and development to the planes and companies that allowed the vaccine to be sent to Nigeria. Then consider the vehicles required to get to villages, the health educators, and vaccinators, as well as the school system that provided education to all of the people in that chain. It is clear that millions of people are involved in providing a single dose of vaccine. While the politicians may well argue over whether it takes a village to raise a child, the fact is that it takes the entire world to raise a child.

We need to be concerned that whereas the United States once provided the scientific leadership for international health, we now don't even pay our dues to WHO. And we are embarrassed at international health meetings when people point out that we don't pay our dues and we are the world's greatest exporter of death and disease because of our exportation of tobacco and arms. We must concentrate on becoming global citizens, not focused on a single time zone.

What else is missing? We have to overcome a tendency to focus on one time period. Delayed gratification is essential if we are to do this right. There is a gap between our current deeds and our future needs. We must consider the implications for 500 years in the future of every decision, whether it relates to immunization, toxic waste, or the environment.

There are some children now living who will see both the 21st and the 22nd centuries. That is sobering. Yet the vast majority of the public you serve—or don't serve—has not yet been born. That is even more sobering.

Another barrier, the anti-government sentiment in this country, is actually suicidal. We are confusing our distrust of politicians with distrust of government. When people ask me government-baiting questions, I ask them to show me examples of social justice outside of government. There are few, because no other institution represents all of us. No political party, no church group, and no service organization. We need government...good government...strong government.

What else is missing? Civilization as therapy. I was once asked to give a talk that traced improvements in public health to improvements in civilization. There are ways to measure public health but the difficulty came in trying to measure civilization. Whatever is used as the criterion of civilization, whether knowledge, wisdom, technology, or happiness, it is easy to prove why that won't work as a measurement. But then it becomes obvious what must be used. The measure of civilization is how people treat each other. This becomes the measure of a civilized country, state, organization, university, program or individual.

That, then, is what is missing. Our technical capital must be matched by our social capital, and that is measured by how we treat each other. It is missing not only in our political campaigns but in our approach to life. I, for one, am willing to pay more taxes for creative answers to the problems of poverty, AIDS, tobacco addiction, and environmental pollution, both here and abroad—a host of ills that won't be solved by the marketplace.

Sam Levinson, the humorist, once said, "It is not hard to be brilliant. Just think of something very stupid and do the opposite." It is very stupid, for example, to think marketplace forces will solve our health problems caused by smoking.

So many elements for optimal public health are missing, both in this country and throughout the world. But we can name them. We can identify them. This is not an unsolvable mystery. We don't have to get used to poverty, glaring discrepancies in health between populations, or premature death.

What Could We Do?

What could each one of us do? We can believe that individual actions make a difference. We each could resolve to incorporate behavioral sciences, ethics, theology, and law in everything we do rather than "as needed," and approach every research effort, every curriculum, every intervention with two questions: What does it mean for the world as a whole? Are there implications for the year 2500?

Public health people come to this discipline out of a desire for social justice, a desire to look at denominators, a belief that the world can be better. No matter who is in office, we need to feel the responsibility to provide them with all of the information that could result in the right decisions. In addition, some of you should be running for political office, and all of us should be identifying people in our departments whom we would like to encourage to go into politics. Be heard. Kipling once said that words are the most powerful drug in the world. Use that drug well.

Finally, we must learn perspective. Students sometimes say they wish they could have worked in the old days, on smallpox eradication, for instance—before the complex urban problems we face today, before the appearance of drug-resistant tuberculosis, and before the institution of all of the legal requirements that now slow every project. And I ask them, would you really have preferred practicing 50 years ago, before most vaccines and antibiotics were available, when measles was the single most lethal agent in the world, or now, as polio is about to disappear?

Would you really have preferred practicing 35 years ago, when our knowledge was scant about diet, exercise, and tobacco, or now, when we can offer people life-saving information that gives them power?

Would you really have wanted to practice even 15 years ago, before we had a field of injury control, or now, when we have the power to let children grow without paralysis or brain injury?

Would you have preferred practicing five years ago, before we had HEDIS measurements and a public that is interested in every aspect of health, or now, when we have the knowledge, if not the courage, to make rational decisions?

Would you have preferred practicing one year ago, before we had promising therapeutic agents for AIDS, or now, when some with AIDS have had their death sentence commuted?

The answer, of course, is clear. There has never been better time to make the rest of the story come true. A story of equity in using our science to improve health in the entire world and for the future. There has never been a better time for us to become, in the words of Jonas Salk, great ancestors!

FRANK A. CALDERONE, MD

Dr. Frank A. Calderone (1901-1987) was born on the Lower East Side of New York City. He attended Columbia University as an undergraduate, and obtained his MD in 1924 at New York University Medical School. He was an Instructor in Pharmacology there until 1936, and was immensely popular with his students, who elected him to membership in Alpha Omega Alpha. In 1936, he attended Johns Hopkins University to pursue a Masters of Public Health. In 1938, he was appointed District Health Officer of the Lower East Side for the New York City Department of Health.

In 1942, Dr. Calderone was appointed Secretary of the Department of Health, and First Deputy Commissioner of Health a year later. He held this position until 1946, saving the City of New York over a million dollars through careful planning, operations management, and negotiation.

In 1946, Dr. Calderone became Director of the Headquarters Office of the United Nations Interim Commission of the World Health Organization (WHO). He was instrumental in shaping WHO's policies and structure, and in raising funds to support its continued operations. In 1948, when WHO became a permanent organization, he was awarded a five-year contract as Chief Technical Liaison Officer and New York Office Director. He was later appointed Medical Director of the United Nations Secretariat health service.

Dr. Calderone was a Fellow of the American Public Health Association. In addition to his numerous public health responsibilities, he also managed a family business of eight theatres and extensive real estate holdings, and enjoyed music, sailing, and his family.

THE FRANK A. CALDERONE MEDAL AND PRIZE

In the early part of this century, Salvatore Calderone, immigrant father of Dr. Frank Calderone, commissioned the renowned firm of Dieges and Clust to design and strike a "medal of merit" in solid gold. Only a few of these beautiful medals were ever made and, of those few, only one medal is still in existence. It was used by Tiffany & Company as the model for the creation of the Calderone Medal. Along with a \$10,000 prize, the Calderone Medal is awarded by the Columbia School of Public Health every two years to recognize and honor individuals who have made significant contributions to the field of public health and public health research.

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