

Promoting Healthy Aging: The Importance of the Environment

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There can be few issues of greater importance to all of us than that of healthy aging. And I say this not simply because I happen to be aging myself! There is a broader issue at stake that goes beyond my own personal drama. We all know that the Baby Boomers will begin entering the United States over-65 year old population in 2011. And we all know that, soon after that, the number of older people in our society will be double what it is today. If we think our medical care system is under strain now, we ain't seen nothin' yet. When there are twice as many older people in our society, medical care resources, among many other things, will be overburdened as never before in our history. Our only hope in this circumstance is to promote a healthier population earlier in life so that people enter the over-65 population healthier than they are doing now.

This is easier said than done. In fact, it is very difficult to convince people about the importance of prevention. And it is even more difficult to urge a focus on a healthier environment. Let me illustrate this dilemma by telling you a story I tell my students at Berkeley as they begin their graduate degree programs. I tell of a curvy road in the mountains where, at one point, cars fall off a cliff at a very high rate. And these cars crash at the bottom causing very serious damage. Head injuries. Spinal cord injuries. And the medical care at the bottom is not good. As a consequence, people have to be transported long distances, usually by helicopter or ambulance, to get help. Not good.

In my story, I suggest that we develop a state of the art health promotion and injury prevention program for this road. First, we will develop a hazard assessment and barrier program that will prohibit certain groups from driving on this road. Certain old people or people with vision and physical problems will be directed to take an alternative road. Those drivers who are permitted to proceed will have to submit to a behavioral intervention: a safe driving course. But we will also develop an environmental intervention by getting car manufacturers to reinforce and

strengthen the cars before they can proceed. And we will build a state-of-the-art medical facility at the bottom of the cliff. This new facility will have the best medical staff imaginable – neurosurgeons, orthopedic people, and other specialists. And we will remove all economic barriers for care so that everyone has universal access. And we will insure that everyone gets culturally appropriate medical treatment with language translation help when necessary. In short we will do everything that it is now being recommended in first-rate health promotion and disease preventions programs.

In my classes, someone will eventually raise their hand and quietly ask, “How about fixing the road?” I then attack that person by asking how they can permit the diversion of funds from critically injured and bleeding people to do a highway construction project? Eventually, someone will tentatively suggest that if we don’t do the highway work, people will keep falling off the road. We eventually agree that a truly effective health promotion program must take account of the fundamental forces that cause our problems in the first place. But this is difficult because our attention is inevitably drawn to the suffering people lying on the ground and it is difficult to talk about some vague future prevention programs that will be of possible value far off in the future.

We don’t do very well in dealing with fundamental forces in our public health work. This realization was forcefully brought home to me when I served as a smoking counselor in a large clinical trial aimed at preventing heart disease among middle-aged men at very high risk of developing coronary heart disease. Every time I was able to help one of these men stop smoking, I recall driving back home over the Bay Bridge from San Francisco to Berkeley and thinking that one or two kids that day were probably taking their first tentative puffs on a cigarette in some school yard somewhere. I am not arguing against helping people who are sick or who are at risk to becoming sick. I am not arguing against helping people lower their disease risk by changing their behavior. Obviously, these are important and worthwhile things to do. But unless we fix the road, new people will keep entering the at-risk population forever and we will never get ahead of the game. The problem is that fixing the road is based on fuzzy statistical projections of things that might happen some day. It is difficult to clearly demonstrate the importance of this future-telling in comparison to the drama of death, and illness, and medical care today. Right now. Somehow, we need to help policy makers see that our fuzzy statistical projections have a comparable urgency to that experienced by dying and bleeding people.

This concern with clinical problems makes it difficult to focus on prevention. But it has a second consequence as well. It keeps our attention riveted on specific diseases and risk factors such as obesity, diabetes, hypertension, and asthma and makes it difficult to look at the fundamental forces that are determinants of many of these diseases and risk factors. Continually looking at the trees makes it very difficult to see the forest.

We in the field of Public Health have been struggling for years to develop ideas relevant to population health and the environment but we are hampered by this clinical model of disease that is totally inappropriate to our needs. In the United States, most of our research and training programs in health are funded by our National Institutes of Health. Some by CDC as well. But both of these funding organizations are primarily concerned with clinical disease categories such as heart disease, cancer, and arthritis. This way of dividing things up is very helpful in the study and treatment of individual diseases but it is not at all useful in understanding population health. Infectious disease epidemiologists got it right in the way they looked at infectious diseases. Their categories were water-borne diseases, food-borne-diseases, air-borne diseases, and vector-borne diseases. These categories are not very useful in the treatment of individual patients but they are exactly what we need for the prevention of disease. They tell us where disease is coming from and where to direct our prevention efforts. We have no similar classification scheme for the non-infectious diseases of concern today.

Several years ago, the Canadian government announced that they were going to develop an NIH for Canada. Many of us warned that patterning the Canadian program along the lines of the American NIH was going to set back the cause of prevention by 50 to 100 years. We urged the government not to follow the NIH model. The Canadian Institute of Health Research did follow the NIH model anyway but it also developed an Institute of Population and Public Health, an Institute of Gender, an Institute of Aboriginal Health, an Institute of Aging. I served for 6 years on the Advisory Board of the Institute of Population and Public Health and I was amazed at the difference it makes when we move beyond the consideration of individual diseases, one at a time, and think about health and disease. We here in the United States have a way to go in meeting the Canadian challenge. We do, of course have an Institute of Aging at the NIH but much of the concern there still remains on specific diseases of the elderly.

Let me tell you another story about the damage that is done by focusing on the trees instead of the forest. This is a story about our work with bus drivers in San Francisco. We have been studying 2,000 bus drivers for many years now. The project started when a former student of mine became the Director of Health for San Francisco city employees and, as part of her job, supervised the physical exam for the bus drivers when they get their driving license renewed every two years. She called me one day to say that she thought the prevalence of hypertension was too high in this population and would I come and have a look. I did. And she was right. Among drivers over the age of 60, the prevalence of hypertension was 90%! Drivers also had high rates of back pain, gastrointestinal difficulties, respiratory problems and problems with alcohol. The biggest problem, however, is that even if we could treat all the drivers and cure their problems, the problems would keep resurfacing and new drivers would keep developing the same problems unless we could figure out the basic determinants of these health problems. The basic problem, of course, turned out to be the design of the job itself.

We therefore began a project to see if we could figure out what it was about the job that was causing so much trouble.

The big problem for bus drivers in San Francisco is the schedule. In San Francisco, drivers must keep to the schedule but it cannot be done. For example, if you were to look at the schedule, you would see that you had to get from Mission and Army Street to Mission and Geneva Street in 2 minutes. It cannot be done. Even if you drove your Ferrari on Sunday morning with no traffic to contend with, it would take much longer than 2 minutes.

I always thought that a bus schedule was developed by driving a bus from stop to stop and seeing how long it took. That would be OK if you had lots of buses available. But in San Francisco, there are not enough buses available. The schedule is therefore made by a computer that simply allocates times depending on the number of buses that are available. But then, drivers are penalized when they are late in arriving at the bus stop. The drivers compensate for this by giving up their rest stops at the end of the line. They just keep driving and hope to minimize their lateness in this way. They dash into a fast-food restaurant when they need to use the bathroom and when they need food.

And since they are almost always late, passengers are almost always mad at them. The drivers feel that they are being unjustifiably blamed for a situation that is not in their control and

they sometimes behave impolitely to passengers who then get upset with the driver. Then there is the traffic over which they have no control.

Most drivers have a terrible shift arrangement. They must come to work very early for the morning rush hour and they must be at work for the evening rush hour but they have nothing to do in the hours between these two intervals. There is generally not enough time to go home so the drivers generally hang around and do little. At the end of their very long day, they are usually completely worn out and many go to the local tavern to wind down. By the time they get home, they are often not in good shape for social interaction. They go to bed and get up at 4 AM to begin another grueling day.

Yes, they have hypertension and back pain and stomach and breathing and alcohol problems and they should be helped with those problems. But the job needs to be fixed. We almost missed looking at the job because we were so focused on specific clinical conditions.

My interest in the importance of the environment began over 30 years ago. Against my will. It all started when a young man came up to me after a class at Berkeley and said: "You need to meet my Mom". I was, of course, puzzled by this suggestion but I did agree to have lunch with his Mom. It turns out his Mom was Roslyn Lindheim, Professor of Architecture at Berkeley. She was the only faculty member in that School who was interested in the fact that the way in which we build our physical world has consequences for our lives and our health. But she was a lone and isolated voice. No one else in the School of Architecture knew what she was talking about. After several spirited meetings, Roz and I finally decided to give a class on the subject. It was called Environmental Design, Stress, and Health. Half of the students who enrolled were from Public Health and half were from Architecture and City Planning.

Roz and I argued energetically with one another in front of the students. She would say outrageous things like "every room needs a window!" And I would say "On what basis do you make a claim like that? What's the evidence to support such a contention?" She would look at me as if I was from Mars and say "It's obvious that rooms need windows!" Then she would say "Bring in facts that you feel good about because of the evidence". So I would bring to class solid evidence based on elegant multivariate statistics and she would say "These findings may be statistically significant but they are trivial facts. This is what you call evidence?" All this in front of 20 to 30 open-mouthed students.

We gave that class for about 10 years and students from all over the world still tell me that it was the most important educational experience they ever had. Roz and I finally decided to write a paper describing the agreements we had reached as a result of our battles. And that paper, the hardest one I have ever written, is now the paper of which I am the proudest. Roz died shortly after that from a brain tumor but her family created the Roz Lindheim Prize at Berkeley which gives a Fellowship each year to a student who best integrates public health and environmental design considerations into their research. So her legacy lives on. But very few faculty members in either school at Berkeley is continuing either our class or research that combines these different disciplines. Bill Satariano is. And two new Assistant Professors in City Planning are. But this field is still in its early stages. This Conference is exciting because it brings to the forefront a serious concern with the environment. This, in my view, is a wonderful happening and it is long overdue.

So, what did Roz Lindheim and I come up with in our paper regarding fundamental factors? We began by noting that many current health, housing, and city planning policies stem from the belief that these policies contribute to health and welfare. These ideas, which were first seen as important in the mid-nineteenth century, developed from efforts to mitigate the most unpleasant effects of industrialization and urbanization: the dirt, dilapidation, overcrowding, and unsanitary conditions of industrial cities. But, Roz and I argued, it is inappropriate to uncritically continue and extend these policies as priorities for the 21st century because these policies do not take into account new information. First, sanitary programs in the nineteenth century were primarily directed toward, and had a major impact on, the infectious diseases that decimated populations at that time. These diseases are no longer the main causes of morbidity and mortality in industrialized nations of the world. The main causes of disease today include conditions not related directly to sanitation, such as coronary heart disease, stroke, cancer, mental illness, accidents, and suicide.

Second, the development of modern industrialized communities has generated a range of new disease-producing agents also not related directly to sanitation, such as toxic chemicals and waste, increased levels of ionizing radiation, vehicle exhaust and other new synthetic products that pollute air, water and food. Third, we now have new evidence that was not available indicating that disease occurs more frequently (a) among those with fewer meaningful social

relationships, (b) among those in lower social class positions, and (c) among those disconnected from their biological and cultural heritage.

The significance of supportive social relationships in maintaining health was first established in 1897 by Emile Durkheim in his classic study of suicide. Seventy years later, John Cassel, a distinguished scholar right here at the University of North Carolina, noted that the lack of "meaningful social contacts" resulted in higher rates of tuberculosis, schizophrenia, alcoholism, accidents, and suicide. Since those early studies, overwhelming evidence from all over the world has now accumulated showing that people with weak social ties have higher rates of virtually every disease that has been studied, independently of other disease risk factors.

What does this finding have to do with the way in which we design our cities and our neighborhoods? It turns out that some of the major causes of the breakdown is social relations occurs because of technological change, population mobility, explosive population growth, the separation of living from working, and the destruction of existing communities. These changes have combined to make it more difficult for people to maintain bonds that tie individuals to family, community, kinship networks, and geographical locations. These developments often lead to interrupted social ties which, as we all know, are clearly associated with increased rates of disease and ill-health. The importance of appropriate environmental design in ameliorating these challenges is be clear.

The second issue we focused on in that paper was the importance to health of social class position. It has been known since the beginning of recorded history that people in the lowest social classes of society have the highest rates of morbidity and mortality. Every study ever done on this topic shows this pattern. This information, however, has not been very useful because it is not easy to visualize an intervention to fix this problem. Short of revolution, social class is with us always and it doesn't make sense to focus on an issue about which nothing can be done. The breakthrough on this topic occurred several years ago in the study of British civil servants. As almost everyone now knows, Michael Marmot studied 10,000 of these civil servants over the course of many years. As one would expect, he found the highest rates of every disease among those at the bottom of the occupational hierarchy, but he also found a very marked gradient of disease from the top to the bottom of the hierarchy. Thus, people at step 2, one step from the top, professionals and executives, doctors and lawyers, had rates of disease twice as high as those above them, the directors of the civil service agencies. And the

rates progressively increased as one went down the hierarchy. And all these findings were independent of the obvious risk factors that might otherwise have explained them such as serum cholesterol levels, hypertension, smoking, obesity, and so on.

These findings help us look at determinants of health beyond simply looking at poverty because people near the top are not poor, they do not have poor education, poor nutrition, poor housing, or unsafe jobs. There must be something else that influences health even near the top of the social class hierarchy. One of the major hypotheses that has been suggested to explain this phenomenon involves the concepts of participation and control. The lower one is the hierarchy, the less opportunity there is to control one's destiny. To influence the events that impinge on one's life. Importantly, we now have evidence that having less control over one's destiny actually influences biologic processes that make us more vulnerable to a wide range of different diseases.

Housing provides a good example regarding the issue of control.

Turner has argued that when "people control major decisions and are free to make their own contributions to the design, construction, and management of their housing, both the process and the environment produced stimulate individual and social well-being. When people have no control over this process, when they have no responsibility for key decisions in the housing process, their housing may instead become a barrier to personal fulfillment. Turner cites the well-known examples of housing projects in St. Louis in which the conditions of several public housing projects were approaching an irreparable state. When management was taken over by tenants, occupancy increased, elevators worked, grounds were well-kept, and crime and vandalism decreased. Not everyone agrees that tenant take-over always leads to such improvements in environmental quality, but there clearly are cases in the United States, and in other countries of the world, in which tenant control has resulted not only in the bettering of conditions but also in raising self-esteem and morale and improving health.

All of this research suggests that people's participation in and control of the significant events that shape their lives may be even more important than the objective circumstances in which they find themselves. The impact of the most demanding situation may be softened if one has chosen to be in that situation and if one has options for dealing with these demands. Those lower down in a hierarchy often have less opportunity to participate in the planning and execution of activities that affect them. They are asked for their opinion less frequently, they

have less chance to decide on important matters, and they are less often able either to prevent undesirable events from occurring, or to cause good things to take place. These issues are of particular significance to those who design things for other people. I will go so far as to suggest that no matter how elegantly wrought a physical solution, no matter how efficiently designed a factory, no matter how safe and sanitary a building, unless people can, in some way, create, manage, change, or participate in the activities that affect their lives, dissatisfaction, alienation and illness are likely outcomes.

I have to this point discussed the fact that disease occurs more frequently among those with fewer meaningful social relationships, and among those with less control in lower social class positions. I would now like to mention a third important issue that potentially connects those interested in environmental design with those of us of working in the health world. Specifically, the importance for health of being connected to our biological and cultural heritage. Admittedly, the evidence is weaker on this topic than on the issues I have already discussed but they nevertheless seem important and should, I think, be mentioned here.

Consider, as an example, the matter of artificial light. Due to artificial light, time and space have been restructured. Day can be turned into night. We no longer have to abide by biological rhythms. Many physiological functions exhibit diurnal, seasonal, and lunar rhythms that persist even when a person is shielded from awareness of the passing of time or the movements of celestial bodies. Biological rhythms that follow a 24-hour pattern of periodicity include pulse, temperature, blood pressure, urine output, blood leukocytes, pulmonary function, basal metabolic rate, and enzyme and hormone secretion. Circadian periodicities occur even at the cellular level, with the number of cells undergoing mitosis differing according to time of day. We may intellectually forget diurnal, lunar and seasonal influences because most of us now live in artificial environments but we cannot escape their physiological and mental effects. Interruptions of these rhythms from such artificial time reorganizations as shift work have been reported to result in damage to worker performance and output and to be associated with increased accident rates, feelings of less well-being, increased rates of gastrointestinal problems, and neuropsychiatric disorders including depression, anxiety, and confusion, drug abuse, and sleep disturbances.

In spite of this information on the negative effects of artificial light, we nevertheless build windowless buildings or buildings in which the windows do not open. Children have been

placed in windowless schools, workers in windowless factories, and secretaries in windowless offices. By so doing, people have been subjected to possibly harmful exposures and have been deprived of awareness of the time of day, the weather, the seasons of the year, and colors and motion of the natural landscape. As you can see, Roz Lindheim has convinced me that windows are good things to have.

Another example: Artificial ventilation causes health problems. Since World War II, more and more buildings have been cooled and heated mechanically. These mechanical systems require controlled air intakes necessitating the provision of windows that are sealed to prevent them from opening and "unbalancing" the system. In recent years, buildings have been sealed even tighter to save energy. New chemicals and synthetics also are being used for building materials, finishes, carpets and furniture leading, too often, to indoor air pollution. I mention artificial light and ventilation merely to illustrate the problem of interrupting our ties to nature and biology. Obviously, my discussion barely scratches the surface on this broad topic.

And none of these considerations are an argument for moving back to the good old days anyway. All the evidence indicates that those days were in fact not so good and, in any case, it would be ridiculous to deny the real advances in our technology, nutrition, medical care, and building capability. I am suggesting that we take advantage of these modern developments but only to the degree they can be of value to human welfare. Much of what we do today is intended to maximize industrial growth and expansion without appropriate attention to the consequences for people's lives. We ignore human needs at our peril. If people's needs are not meaningfully attended to, it is absolutely predictable that new housing developments will fail, that industrial efforts will founder, and that disease will persist.

All of the issues I have discussed here have as a common element: the importance to health of being "connected": being "connected" with others and being "connected" with one's biological and cultural heritage. These connections help define a person's sense of self, a person's place in the world. People also need to connect to the future. They need the opportunity to shape situations, places, and activities that affect their lives. These considerations are not passive, but require that people actively relate to one another and with their environments.

The importance of these issues for those of us in the health sciences cannot be overstated. The approach we in the health sciences haven taken so far regarding the promotion of health and the prevention of disease has mostly not been very successful. We have relied primarily on identifying disease risk factors with the hope that, if we shared that information with people, people would rush home and, in the interests of good health, change their high risk behavior. That's the model. In fact, there are 3 problems with this model that render it very problematic indeed. The first problem is that after decades of epidemiologic research, it has proven very difficult to identify disease risk factors. Consider, for example, the disease I have worked on for most of my life: coronary heart disease. For over 50 years, research has been done all over the world by thousands of brilliant scientists to understand risk factors for this disease. As a result, we now have knowledge about many of them including serum cholesterol, high blood pressure, cigarette smoking, physical inactivity, obesity, diabetes. and so on. We all know the list. In spite of this success, however, most of the coronary heart disease that occurs is not explained by these risk factors. It is estimated that all of the risk factors we know about, combined, explain less than half of the CHD that occurs. This does not, of course, diminish the importance of the risk factors we have identified, but it does suggest that things are more complicated than we had thought. The problem we have with CHD is very much the same for many other diseases as well.

The second problem is that even when we do identify disease risk factors, we have a very difficult time in getting people to change their behavior. The third problem, however, is the most challenging of all. Even if everyone at risk did change their behavior to lower their risk, new people would continue to enter the at-risk population at an unaffected rate. This is because, as I mentioned several times already, we rarely identify and intervene on those forces in the environment that cause many of our problems in the first place. It is clear that we need to do a better job of identifying those fundamental factors in the environment that affect our health. We need to fix the road.

As you have seen, I am very critical of our work in the health sciences. In the spirit of fairness, I now need to be a little critical of those working in designing our environment. My sense is that those who design and build our physical environment do so for many reasons including beauty, efficiency, effectiveness and cost but I'm not sure how much attention is devoted to issue of health. In my view, the work of environmental planners has as important a role in promoting health and preventing disease as anything else that it is being done in the health field. But that

major role is often not recognized by those in the environmental sciences. I hope you can see by my remarks that the way people in the building sciences go about their work has very important implications for the health and well-being of people in the community

If we in the health field hope to develop effective programs to prevent disease and promote health, we cannot do this without a better working relationship with environmental planners. And environmental planners need to be more aware of the profound impact their designs have on the health of all of us. We need to find better ways to work together. And this Conference is a wonderful step in that process.

35 minutes