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# THE PAST, PRESENT, AND FUTURE OF NUTRITION

## Cultural Revolution In Nutrition

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"EVERYTHING FOR A BETTER LIFE"

Thank you very much. It's a tremendous pleasure to be here in beautiful Istanbul. It's my third time here and it is a marvelous city. And especially this time it's been a great pleasure to meet so many people who are interested in improving nutrition and lifestyle for everyone. I was asked to talk this morning about some of the latest information about nutrition and health but also consider how we might go about in actually putting that into practice putting that into action. So, I'm going to try to begin this study looking at nutrition in what we would call the socio-ecological model. And that means we start with the individual in the middle of the picture but then we look at the many layers of influence that determine what that individual ends up eating or not eating.

And those factors, those layers of influence include family members, friends, coworkers, then in another layer there's the physical environment about us that influences our ability to be physically active. But there's the food environment with restaurants, stores, what goes on in schools. That's extremely important. And then beyond that there are other macro influences. Economic factors, advertising, policies and many other very important influences that end up determining what we actually put in our mouth on a day-to-day basis on a meal-to-meal basis.

But I'm going to start back in the middle. At the individual level really looking at the effect of different dietary choices on our health and wellbeing in the long run. Because that is really critically important if we don't have the right information about the consequences of what we eat, we can enact policies, take actions that send people down a path that may be counterproductive or distracting. And we've been down too many of those paths already. So, having the best possible information the relation between diet and health is fundamentally important. I've also heard from talking to several journalists here yesterday that in Turkey there's a lot of confusion about what is a healthy diet or what are healthy foods. And that's a problem we're facing in the US today. There's an information overload. There's a news story one week that says we should eat food X and another story the next week saying that's the worst possible thing you could eat. How do we sort that out? How do we know what's really correct?

So, I'm going to talk a little bit about the process of how we go about obtaining the best possible information and also then a bit of a summary about what seem to be the most important factors and then talk about how we can implement that information.

Some of the earliest clues that diet might be important in the cause and prevention of disease came from this important study conducted across seven different countries by Ansel Keyes and his colleagues. And it was very simple. There were 14 different areas in these seven countries about 1,000 men were identified. Their diets were measured and then they were followed for a 10-year period, tracking the incidence of coronary heart disease or heart attacks, the number-one cause of death in almost every country in the world now. And the most important finding from this study was first their documentation that there were huge differences in rates of coronary heart disease across different countries. About a 20-fold influence, a 20-fold difference in rates from Northern Europe, especially East Finland, which at that time had the highest rates down to Crete and some Japanese villages there in the lower left-hand corner. In general, the countries with the lowest rates were the Mediterranean countries that were studied along with Crete with very low rates of heart disease and then Northern Europe and the United States the rates were far higher.

So, the obvious question is "Why are these important differences existing?" There were some clues from this seven-country study. For example, there was a very strong correlation with saturated fat in the diet in rates of heart disease. But there were of course many other things that differed between life in Crete and life in Finland. Different levels of activity, smoking, other aspects of diet. So, we couldn't really be conclusive that saturated fat was the responsible factor. There were many other what we call 'confounding variables' that might explain these differences. Other epidemiologists were looking at rates of cancer around the world. And this is breast cancer risk. And again there were huge differences in rates in the lower left-hand corner are developing countries and traditional Asian societies and then the western, affluent countries up in the right-hand corner.

Again, these huge differences begged an explanation. Why are there such dramatic differences in rates? And here again there were some correlations with dietary factors, animal fat or total fat in the diet was strongly related to breast cancer risk. But again, many other potential confounding factors or other potential explanations—differences in physical activity, reproductive factors, obesity, or aspects of diet. None of these were controlled in this kind of comparison. But still, it was very powerful motivation to understand why these rates were so different. One reason could be genetic factors, but we saw that people who move from low-risk countries like Japan to the United States after those populations were in the United States for several years, they developed breast cancer rates that were just as high or maybe even a little bit higher than the European Americans living in the Unites States, so genetic factors were not the explanation for these huge differences in rates of breast cancer or heart disease or other cancers, as well. So, if we could find out what the responsible factors are, the obvious goal was to apply those factors—whether it be a change in diet—to everyone so we could all have low rates of heart disease or low rates of cancer.

So, these studies were a great stimulus to further work. Even though these studies shouldn't be regarded as conclusive, they were so compelling to some people that they became the basis of dietary recommendations. So, it's important to remember that the initial dietary recommendations were based on very weak data that really should not be conclusive. And this was the food guide pyramid used in the United States published in 1992. Interestingly enough, this was used around the world. I was in Iran just a couple of years ago and they were using exactly the same pyramid but of course in Farsi. And many other countries have adopted similar recommendations. The main message was that all types of fat are bad. Right up at the top it says 'Fats and oils use sparingly.' And Mediterranean countries were criticized heavily because they were consuming all this olive oil, which was thought to be bad for people. And at the bottom because if we don't eat fat, we have to eat something and that meant that we had to eat a lot of carbohydrates, so large amounts of bread and crackers and breakfast cereals were recommended. We were told we could have up to 11 servings a day of these carbohydrates. And if that wasn't enough carbohydrate, they put potatoes there in the vegetable group, so we have 13 servings of carbohydrate a day. And that was actually recommended. There were some other things that were actually a little bit questionable with this pyramid too because they created what was called a 'meat group,' which had red meat and fish and poultry and nuts and legumes all together as though it made no difference and even by that time we were having some strong suggestions to that it made a big difference which of those we were choosing. And then of course there's the 'dairy group.' I grew up in the Midwest of the United States, where dairy production is a major way of living and we were told we should have four servings of dairy per day we were told two or three or more recently three servings a day from the US guidelines. But when we looked around the world, it's interesting that many parts of the world do not consume dairy products at all. Big parts of Asia, for example, parts of Africa and Latin America do not simply have dairy production. And yet, they seem to have very healthy bones. So, there were lots of questions about the food guide pyramid.

One example of an important question that arose during that time about trans fat and this actually worried me for quite a while and I use this as an example of how we can learn about the health effects of different dietary factors. These are 60-pound blocks about 25-kilogram blocks of partially hydrogenated soybean oil. This was used very widely in the fast food industry for deep frying and this was also used as a basis for margarine and vegetable shortening until quite recently. This was created by a process called partial hydrogenation, where liquid oil is converted under conditions of high temperature to these blocks of partially hydrogenated soybean oil. There was a clue from one kind of study. This is called a controlled feeding study done by a colleague in the Netherlands. In this kind of study, we take a small number of people maybe about 40 or 50 people and it's called a controlled feeding study. We put them on different diets actually give them the food under very controlled conditions for a few weeks and then we watch the changes in serum cholesterol or blood glucose or other biological indicators that change quickly. And we looked at the effect of these different dietary factors that way.

And in this study trans fat was compared to saturated fat. We saw that if we look at total cholesterol, saturated fat increased total cholesterol more rapidly and to a greater degree than trans fat, but I think most people here know that total cholesterol actually isn't a very useful measurement because we really need to break it down at least into LDL cholesterol, bad cholesterol, and there there was pretty equal effects of trans fat on LDL but we also look at HDL, good cholesterol, and unlike any other type of fat, trans fat reduced HDL cholesterol. So, the best prediction of heart disease is the ratio of LDL to HDL cholesterol and there trans fat has almost twice the adverse effect gram-for-gram as does saturated fat.

So, on this basis, you'd expect trans fat to be considerably worse than saturated fat and there was some other controlled feeding studies that also found additional adverse short-term effects of trans fat on these bare-chemical indicators. Other investigators were doing controlled feeding studies looking at other types of fat in the diet. And again this is from our colleagues in the Netherlands did this controlled feeding study with about 50 young, healthy people who started off on a typical western diet and then they took 10 percent of calories from saturated fat and replaced it either with olive oil, with made it more like a Mediterranean diet, or with complex carbohydrates, which made it more like the lower-fat, higher-carbohydrate diet that was being recommended by the American Heart Association, World Health Organization at that time.

And what they saw was that total cholesterol came down on both types of diets, but if you looked at HDL cholesterol, this high carbohydrate depressed the HDL cholesterol and elevated triglycerides. And we know from other long-term follow-up studies that low HDL and high triglycerides predict more heart disease, not less heart disease. So, this was worrisome because it suggested if all else is equal, this dietary recommendation to reduce fat and consume more carbohydrates might have adverse effects on heart disease risk. And this study was repeated again and again and very consistently this was the result.

But of course there are many other things that change when we make a dietary shift and we can't reliably predict the clinical outcome. In other words, heart disease just on the basis of one biochemical test or a few biochemical tests. The physiological effects of diet change are much more complicated than that. So, we also in addition to these controlled feeding studies, really want to study the relation of diet with the outcome of real interest, heart attacks or cancer or mortality. And for that, we need long-term studies. Now, one problem is that the theoretical, ideal study is usually impossible to conduct in human beings. Ideally, if we wanted to study the effect of trans fat on heart disease, we'd take infants at birth and randomize them to a high-trans fat diet or low-trans fat diet and keep them on those diets for the rest of their life. And of course that's impossible to do ethically. And we just simply can't do that kind of study. We can do it in animals but we can't do it in human beings. So, the next-best study beyond a randomized trial would usually be long-term observational follow-up studies. The Framingham heart study was the original long-term cohort study like this but it was in fact by today's standards rather small. So, our group has set up these large cohort studies and I realized back in the 1970s when I was looking at the literature on diet and heart disease, that while people were being told to avoid eggs or eat this and not eat that when I looked for the supporting evidence there was almost no evidence available. There were people who were being told adamantly to avoid eggs and there was not a single study that showed that eating more eggs was associated with higher risk of heart disease. And that seemed to be a great deficiency. It was apparent to me that we really needed to have long-term studies to see if people who ate more eggs had higher rates of heart disease or whether maybe it made no difference. So, that was basically the motivation for setting up these long-term follow-up studies, so that we could have some empirical evidence to give people guidance and to serve as a basis of food-related policies. So, the first study was the nurses' health study that began in 1976.

My colleague Frank Speiser actually launched this study to look at oral contraceptives and breast cancer risk, which was an important topic at that time. In this study there were 121,000 women across the United States all of them registered nurses who we thought could provide very good data, and I realized we could look at diet in this population, as well. So, we worked on developing the standardized and validated dietary questionairre. So, we first administered those in 1980. We collected dietary data from about 100,000 women at that time. And so we've been following them over time it's almost 40 years now and the success of this study really is due to the participants. About 90 percent are still participating after 40 years of follow up. So, that's providing a wealth of unique data.

And of course diet is changing over time. So, every four years we update information on diet and we're also keeping track of other factors like physical activity and smoking and family history of heart attacks and medications and everything else that we think might relate to health outcomes. So, when we want to look at fat intake, or trans fat intake and heart disease risk, we can adjust statistically for these other variables like smoking and physical activity. And we're looking at almost every outcome you can think of. It's not just heart disease. It's breast cancer, other kinds of cancers, Parkinson's disease, and now cognnitive function and Alzheimer's disease as people are getting older. The nurses' health study was only women so we added 52,000 men health professionals follow-up study in 1986. And then we also added nurses' health study II, which was a younger group of women because many indicators were suggesting diet earlier in life was important in possibly other cancers as well. At the bottom I've listed some of my co-investigators and I'll mention some of them as we go along but I do want to point out that this is really the work of many people.

This is what we saw when we first looked at risk of dietary fats type of fat in relation to coronary heart disease. This is after 14 years of follow up, about 1,000 women had died of a heart attack or had been hospitalized for a heart attack by that time. We've documented that all with medical records. And here we're looking at increasing intakes of different types of fat in relation to risk of heart disease. Comparing each type of fat with the same percentage of calories and carbohydrate intake. And here and everything else I'll show you we've adjusted for smoking and other risk factors. For heart disease or cancer. And it's surprising from what I've shown you already by far the most adverse type of fat was trans fat in the diet. We saw about and 80 percent increase in risk with just 2 percent of energy from trans fat.

Saturated fat was only very weakly related to risk of heart disease if you compared it with the same number of calories from carbohydrate. But monounsaturated fat and even more so polyunsaturated fat were related to lower risk of heart disease so we had good fats and bad fats and when you put them all together, as total fat, total fat was really not related to heart disease but the type of fat was very important. So, obviously from this this has been confirmed by other studies. You really like get all the trans fat out of the diet as much as possible and replace some of the saturated fat with a combination of monounsaturated fat and polyunsaturated fat and in practical terms that trade-off with saturated fat means reducing fat from red meat and from dairy fats and consuming more fat from vegetable oils like olive oil or soybean oil or sunflower oil.

There are a few examples where randomized trials looking at fat and heart disease or cancer have been successfully conducted and of all of the other large trial there was really a failure to keep people on distinct diets over a number of years. And so this quite a lot of effort and expense of those other trials really weren't able to answer the question that was raised. More recently, the prevent study conducted in Spain, which actually did manage to keep people on different diets. And in this study there were three groups: the controlled diet, which was meant to be a low-fat diet; the Mediterranean diet, where people were given added nuts; and Mediterranean diet where they were given extra-virgin olive oil. And interestingly, over a five-year period both of the forms of Mediterranean diet reduced heart disease rates compared to the controlled diet, which was meant to be a low-fat diet.

It was meant to be a low-fat diet because people really didn't reduce their fat intake very much and it was more like their usual diet. And that' very consistent with the data that we've seen in our study where healthy fats actually reduce risk of heart disease. We've also been looking at the sources of protein in relation to risk of heart disease in some of our recent analysis. And there it does seem that the source of the protein is very important and basically red meat is related to higher risk of heart disease but if we replace red meat with poultry fish or nuts, or beans, we see lower risk of heart disease. So, for example, replacing red meat with nuts is related to about a 30-percent-lower risk of heart attacks, so this does seem the source of protein is very important.

So, to summarize this little part of my talk, coronary heart disease rates can be dramatically reduced by nutritional means but this will not be achieved by replacing saturated fat with carbohydrate, which had been the main recommendation until recently. We should abandon recommendations regarding the percentage of energy from fat and avoid pejorative references to fat or fatty food. Fat per se is not bad for us. Advice about dietary fat should focus on replacing saturated fat and trans fat with vegetable oils including sources of omega-3 fatty acids, which we can get from fish and some forms of vegetables oil.

We've also been looking at cancer in this large population of women and particularly breast cancer because of the slide I showed at the beginning. And we've really not seen any reduction in risk of breast cancer with higher fat intake in the diet. This is now the slide is based on 14 years of follow up and 3,000 cases of breast cancer that occurred at that time and there's as you can see no increase or a wide range of fat intake no increase in breast cancer risk. And this has been confirmed in many other studies that have been conducted in populations around the world. But interestingly, for breast cancer what we're finding is that diet during high school adolescent years is much more related to risk of breast cancer later in life than is diet during midlife. Diet during midlife really doesn't seem to be related in any important way to breast cancer risk except for alcohol consumption. When we look at diet during the adolescent period, we here for example see a lower risk with higher fiber intake in the diet and also we see higher risk with more red meat in the diet consumed during high school although during midlife and later life, we don't see a relationship between red meat. So, I think this goes back to emphasize some of the work of the foundation here that school children are very important in terms of setting them in a good position for being healthy for the rest of their life. It's not just their learning about good nutrition but actually what they're eating at that point in time is very important.

Now, everyone is aware that obesity is a global epidemic and it's an issue here in Turkey as it has been in the United States, as well. For example, this is just looking back from the 1960s we've seen that the prevalence of obesity is about threefold higher now compared to that period in time. And in children the rates are increased even more three to fourfold. And that of course makes the point that the current rates of obesity in the US are not inevitable. Something happened that changed. Something changed. Also, if we look around the world, we see that the rates of obesity vary tremendously. For example, Japanese women still have only about five percent of prevalence of obesity, where it's almost forty percent in the United States and Sweden is still only around six or seven percent for women. But the US is again much higher. And those are affluent countries. It's not because they are poor countries and people don't have enough to eat. And there are places around the world where we see the prevalence is even higher than the United States and that includes some of The South Pacific Islands and Gulf State countries nearby Turkey.

There's a large literature that's developed in the last several years about the fact of diet and dietary fat on obesity because there had been this belief that fat in the diet the percentage of fat in the diet increased obesity but actually that's not turned out to be true. If we look at the overall data and this is probably one of the best studies published in the New England Journal of Medicine this is a study conducted in a work site where people were educated about a healthy diet but there were also at least for one meal a day provided different diets. And there were three different diets: a lower-fat diet 30 percent of calories from fat, a higher-fat diet 39 percent of calories from fat and a Mediterranean diet which in that case was about 33 percent of calories from fat. And what we see in short-term studies lasting six months or so people lose weight on all types of diets but six months is not what really counts it's what goes on in the longer run. And in this case and in most other studies, people tended to regain fat more body weight on the lower-fat diet but they kept it off on the Mediterranean diet. And so after two years there was definitely better weight control on a higher-fat diet and Mediterranean diets. But what was really interesting was the study stopped after two years but then four years later, the investigators went back and collected new data and without any intervention over four years, people on the Mediterranean diet had maintained their weight loss. That was a way of eating that had been really internalized and found satisfying and could stay with it over the long run, whereas the low-fat diet had basically regained all of their weight. So, there was a major difference and that of course is what we really want to do is have people find a way of eating that they can stay with in the long run.
Now, just to comment about a few other aspects of diet that we've been looking at, of course fruits and vegetables are important. It was claimed that they would have a major impact on cancer risk and we just haven't seen that and the other large prospect of studies have not seen that either but we do see a very important reduction in coronary heart disease risk with higher fruits and vegetables in the diet.
And that's probably for multiple reasons. But there's much greater intake of potassium, antioxidants, folic acid, many other factors in fruits and vegetables are quite important in reducing risk of cardiovascular disease. I'm going to say a few words about carbohydrate because that is actually the biggest source of calories in virtually every diet around the world. And of course I think most of us were taught this in first or second grade that if we look at a grain it's comprised of the bran on the outside, the endosperm in the middle, which is mostly starch and the germ which has the embryo of the new plant in it. But what happens in the processing is that we start with a whole grain and if we just grind it up, we have whole-grain flour. Or we can eat as a whole grain like brown rice but most of the grain unfortunately in western diets has been refined and that means the bran is taken off and with it 60 to 70 percent of most of the minerals and vitamins that were originally there. So, we've really stripped away most of the nutritional value. And we feed that, the germ and the bran to animals and they grow big and strong but then we take what's left the endosperm and we grind that up and we feed that to people. And that's actually the depleted form of the original grain. And what happens to us is not so good. If we do consume more fiber which has been removed and if we refine the grain the fiber is actually related to lower risk of coronary heart disease and this is in men and women this has been seen in study after study very consistently. And of course that fiber's a marker for a lot of the minerals and vitamins that are travelling with it. But also that large amount of starch especially when it's finally ground up as white flour has adverse effects on diabetes and cardiovascular disease risk. This is looking at risk of type 2 diabetes and we see with higher glycemic load in the diet that means large amounts of refined starch or sugar, going from right to left higher risk of type 2 diabetes and going from back to front there's increasing intake of fiber from grains. And so that combination of high glycemic load, large amounts of refined starch and low fiber intake is related to about a two-and-a-half-fold increase in risk of type 2 diabetes.
And again this pattern is seen in study after study. And fortunately the guidelines the older US guidelines were essentially telling people to eat that kind of diet which leads to higher risk of type 2 diabetes. And of course we can't leave out the issue of sugar-sweetened beverages because this is a major source of calories in many countries including the US but Coca Cola and Pepsi have countries like India and China and I'm sure Turkey in their marketing plans as well. This is their future because we are actually now seeing soda consumption going down in the United States. And like the tobacco companies, the soda companies are looking to global markets, which is unfortunate for those populations.

We see very clear relationship between consumption of sugar-sweetened beverages and type 2 diabetes, so one or more servings a day is related to about a and this study and the nurses' health study to an almost doubling of risk of type 2 diabetes and the problem is that many people consume many servings of sugar-sweetened beverages per day.
And we've looked at this metabolically and I won't go through all the details but the bottom line is we see that higher amounts of sugar-sweetened beverages are related to obesity, diabetes, coronary heart disease, gout and of course dental cavities, as well. So, it was fine when we were consuming them for a party or something a small bottle occasionally that was not a problem but for many people this has become a daily beverage and that is a serious issue. As I mentioned, the major rational for consuming large amounts of dairy products has been a reduction in fractures because of the high calcium in dairy products but in reality we just don't see that. This is looking across...This is a meta-analysis combining the data from many different studies all the available studies looking at milk consumption and risk of hip fractures. And even with 30 servings per week compared to less than one-and-a-half servings a week, there's just no hint of reduction in risk of hip fractures. And it does seem it's possible to have too much milk consumption. This is from a study conducted some years ago but it's been confirmed in more recent data as well. There is quite a consistent body of evidence showing that three or more servings of dairy—milk in particular—per day is related to higher risk of fatal prostate cancer. So, in modest amounts, dairy products are fine but it looks like too much can also probably have some problems associated with them.
So, I've covered quite a few topics very quickly here. We've done some additional analysis looking at how much heart disease and how much diabetes, how much cancer we could potentially prevent by combining a package of healthy lifestyle behaviors, so we defined a low-risk group. Of course, it would be not smoking, body mass index less than 25. It's better to be a little less but most people can get to 25 or lower. And then exercise just half an hour a day of brisk walking. And then a good diet meaning being in the upper half of our population based on lower trans fat, healthier fats, lower glycemic load, more grain fiber, fish twice a week, and getting the recommended amount of folic acid. And obviously optional alcohol about one serving every other day. And we could calculate from our data based on 14 years of follow up if everyone had adopted that healthy package, which is very modest. That's not a very radical lifestyle package very modest set of behaviors. That would eliminate 82 percent of heart disease in this population.
We've done a similar analysis for type 2 diabetes and there we estimate 92 percent of diabetes can be avoided with that simple package of lifestyle behaviors, so these are very avoidable diseases but unfortunately only about three percent fell in that low-risk category, so there's a huge amount of work for all of us to do translating what we know into practice because there's very great potential just by comparison our best drugs Staten, only reduces heart disease by about 25 percent but here diet and lifestyle 82 percent. So, there's huge unrealized potential.So, if we look back at the older 1992 food guide pyramid, it was really wrong in many ways. It really didn't distinguish the types of fat, which is critical. It didn't distinguish among the sources of protein or the forms of carbohydrate. It put potatoes there where they don't belong with other vegetables. It was really off target so much in so many ways that the US Department of Agriculture had change their graphic and change their guidelines. This is from 2010, and their new graphic is in some sense simpler but it still really fails to give people the guidance they need. It just talks about grains. But whether they're whole grains or refined grains makes all the differences. They should be of course whole grains and the protein source makes a huge amount of difference. It's not just you need protein and vegetables and fruits of course are good but they kept potatoes there and interestingly they said nothing about the type of fat in the diet, which is extremely important. And they implied that you should have a serving of milk with every meal. So, our department at Harvard has come out with an alternative play. It has a little bit more detailed information but I think it's the detailed information people need to have. Again, whole grains make all the difference. It's healthy sources of protein. Red meat just occasionally. Fruits and vegetables but we took potatoes out of the vegetables. We put healthy oil there. And water is the major beverage.

Interestingly, this very much represents a traditional Mediterranean diet, so I think people from Greece and Turkey and Italy, Spain should feel very comfortable with this because in fact when we put all the science together we end up with what people were eating in this part of the world 60 years ago. Now, I'll say just a few words. How do we convert this information to policy and this is how we think it should work but this is how it actually seems to work. There's not a straight line connecting knowledge with policy in some it can go in all kinds of unexpected directions. And I think it's important for us to learn how to do this more effectively but some of this really depends on simply having the right place, the right person, at the right place at the right time who will be an advocate and a strong supporter. And we should of course look for our allies wherever we can find them —in the government or industry or wherever they might have some influence. Just as a quick outline, there are many level of policy that can be used for promoting healthier nutrition. Education and awareness is of course essential and crucial as a foundation. Labelling, more information, economic strategies, a combination of taxes, subsidies are widely used in public health. Promoting and limiting availability and for example national food programs. Fortification sometimes vitamin D in milk. Iodine in salt. Folic acid in grains have all been very effective and important for public health policy actions. And occassionally banning. And we have banned trans fat in restaurants and in other places. I'll come back to that.

We do have lots of other experiences. Obesity is a huge challenge. And it's not going to be solved by the health sector alone. We need supportive policies and actions in every sector but we have a lot of other experience from other challenging areas: smoking, not wearing seat belts, drunk driving, poor immunization rates. And it is possible to make great improvements based on our past experiences. And the World Health Organization has put together some of the features of successful public health policies. And I think they apply to the obesity epidemic as well and that includes adequate duration and persistance. These are problems that will take decades to solve. Slow and staged approach, legislative action, education, advocacy and shared responsibility by consumers, communities, the food industry and governments. And so just to show very briefly this is a picture of the smoking epidemic in the United States.

We still do have people smoking but in men smoking has come down from about 60 percent to 20 percent which is of course a huge improvement. But we're not done with that. I was asked to chair a group to develop a strategic plan for taking on challenge of obesity in the New England area. And we came up with this simple set of eight sectors where we need to do work and I still find this a very helpful sort of checklist of where we need to be acting, where we need to be doing something. Schools, we've talked about that. Healthcare providers we've done not very well in that area. Work sites employers are really starting to realize healthy employees are good for business and a lot of action is happening there. Media. Physical environment for promotion of physical activity of course. Food environment monitoring and evaluation. And then economic analysis. So, this I find is a very useful way of looking at where we need to be acting. And this is not to spend too much time here but just to point out the fact that as an individual there's many different places where we can be doing something about this problem whether it be at the individual level in our community in our state or the provincial level at the national level or at the global level. This is going back to the example of trans fat. With a lot of activity and lobbying we did get the FDA to put trans fat on a food label. You'll see that down about the third line a food label. Interestingly enough, once it was on a label, almost all the manufacturers removed it. So, this had a really big impact. It wasn't just education but it was strong motivation to change the manufacturing process. And we've seen a dramatic reduction in trans fat in foods in the marketplace. This didn't cover restaurants but New York City and then Boston and then other parts of the country banned trans fats from restaurants and that had another big impact in reducing trans fat consumption and I'm told by the leaders at the Food and Drug Administration that there will in effect a national trans fat ban across all sources in the United States starting in July.

That's what they've promised. This is their announcement and they say they're going to enact this starting in July. So, many people looking at this challenge of obesity are perhaps discouraged or sobered. It seems so big and so difficult sometimes. It is important to remember that we have had some other victories and it's not an impossible challenge. One of the most striking accomplishments was in Finland. You may remember they were at the top of the world in terms of heart disease risk in the 1960s. And they really put in place this multi-sector approach to reducing heart disease risk and they experienced an over-80-percent reduction over the next several decades. So, a huge change they're almost down at the level of the Mediterranean countries now.

Also, we're starting to see the obesity epidemic turn around in some parts of the US in children. This was steeply rising but now this the New York City school system with lots of effort they are starting to see some decline. They're small declines and the levels are still far too high but it does seems like we are starting to turn this epidemic around but with a lot of coordinated effort. The Economist viewed this as the natural course of human evolution, which is probably description of where we are today. And the next step of course is going to be on a stretcher being rolled to a hospital or in an ambulance or something but I think it's not inevitable. There are some options. And it is possible to put together healthy diets that are attractive and enjoyable again the Mediterranean diet has set a great example but we know enough about it to put that together with different foods and different flavors so that it can be enjoyed by everyone around the world. This was a really quick survey across a lot of work by many people over the last three decades. I have put together a few books that might be useful if you want to look at this in more detail. The influence is recent book looking at this socio-ecological model and how we may use that to help people change their course. Nutritional epidemiologist this is a textbook if you really want to do this kind of research and eat, drink and be healthy is essentially putting together what we've learned for the general public.

And then a book focusing on weight loss. Now, I apologize for that brazen commercial and if you buy one of these books, there is no money-back guarantee here. You've got that book. But I do guarantee that each book contains 80 grams of fiber. So, if you get out your food processor, and run those books though, if you've got some good olive oil and some fresh basil they're really not too bad. So, thank you.