SAGE CROSSROADS
Rio
June 28, 2005

_____: Ladies and gentlemen, on behalf of the IAG, I have the pleasure to welcome you to the awarding ceremony that honors Sir Michael Marmot. We thank the Scientific Program Committee and here, especially, Professor Anita (Neery) for making this possible, and providing this World Meeting of Gerontology as a splendid venue for this event.

It has three parts. First, the president of the Ibsen Foundation, Mr. Yves Christen; then Professor Lenny Poon, the chairman of the selection jury for the Ibsen Longevity Award, will describe the objective and background of the prize; then I will briefly present Michael Marmot to you, and then he will deliver his award lecture on Social Determinants of Longevity and Mortality.

Dr. Yves Christen, would you like to come to the microphone?

CHRISTEN: Thank you very much, Paul Baltes.

Just a few words on behalf of the French Ibsen Foundation. You know, there are two things. The organizers of the—congrats, I am sure, unto ( ) for providing this wonderful opportunity to organize this awarding ceremony here in this beautiful city of Rio.

I also would like especially to thank all the organizers indeed, but especially Anita ( ) Mahias and Anita ( ) Marie for helping us in this organization.

Let me also thank the members of our jury, and especially Lenny Poon who served as the chairman of the jury—with, in fact, a very, very international jury with members from many, many countries in the world. Some of the members of the jury are among the keynote speakers of these world international meetings or among the organizers of the nine symposia. And Paul Baltes, one of the members of the jury, also used to be one of the laureates of the prize before. And thank you, all of you, for coming.

I give now the floor to President Leonard Poon.

POON: Good morning. It is my pleasure to introduce the jury of this award, as well as the previous laureates of the Ibsen Longevity Prize.

This is the criteria of and definition of the Ibsen Foundation Longevity Prize. Let me read that for you:

“This award is awarded annually to a researcher who may be a biologist, a geneticist, a gerontologist, psychologist, demographer, statistician, or any scientist who is working in the area of longevity in recognition of outstanding contributions to the field of longevity.”

I would like to introduce to you members of the jury from different countries who themselves, are working in the areas of longevity: Paul Baltes, our chairperson today from Germany; Eileen Crimmins from the University of South California; James Carey from the USA; Caleb Finch, again from USA; Bernau Ferret from France; Bernard Juen from Denmark; George Martin from the USA; Jean-Pierre Michel from Switzerland; Judes (Perrea) from Canada; myself and Jean-Marie Robine, who is in the audience, from France; Bruno Villas, from France; and Yves Christian who is the *ex officio* for this committee.

This committee gets together to nominate potential laureates, discuss, and select the laureates. Here are some pictures of our jury.

I would like to give you a very brief history by providing you with the names of the laureates, starting in 1996: Caleb Finch, who is a biologist; Dr. (Kennestal), a demographer; Roy Welford, from the United States; Dr. Mauley, Professor Mauley, a geriatrician; Paul and Margaret Baltes—they were the joint laureate in the year 2000; Jim Coctin, who is a ecologist (sic), a biologist; George Martin in 2002, who is a geneticist biologist; in 2003, Jim Vaupel, who is a demographer who has made a major contribution in the areas of demography of the (eau de zode) in aging; and finally, in 2004, Linda Partridge, a geneticist from the United Kingdom.

So that leads us to the 2005 laureate, Sir Michael Marmot. The person who will be making the introduction is another Ibsen Longevity Prize laureate, Paul Baltes.

BALTES: Thank you so much. It is a very special pleasure to introduce Michael Marmot, this year's Ibsen Longevity Prize winner, for his work in social comparative research on health and longevity.

His exceptionally high status and distinction is evident, for instance, in the following recent events.

In the year 2000, Michael Marmot was transformed. He was knighted by the Queen and became Sir Michael. In 2002, he was elected to the Institute of Medicine of the American Academy of Medical Sciences. In 2004, he received what Italians like to call their Nobel Prize, the Bizon Prize. The Bizon Prize is given every year to four scholars and scientists. It's rich in prestige and rich in money. He received one million Swiss francs as a recipient of the Bizon Prize, a good predictor of the Ibsen Foundation Longevity Prize.

Actually, the Ibsen Foundation decided basically at the same time as the Bizon Foundation did to award this prize to him.

In the same year, 2004, Michael Marmot was elected vice president of the European Academy of Sciences, primarily responsible for the behavioral and social sciences in that academy.

Then this year, for IAG, perhaps the most important event, he was asked to chair one of the truly weighty commissions of the World Health Organization, the Commission on Social Determinants of Health Around the World.

This commission is asked to analyze the scientific evidence on social factors of health, develop recommendations, and lead their implementation in various countries around the world.

Unquestionably, the conditions and patterns of aging will be among the primary emphasis.

If I think of any impact that IAG can have, it will have to include communication and interventions involving this particular commission.

It would be a mistake if I were to take too much time to introduce Sir Michael. Therefore, let me be brief about the substance of his work.

After getting his medicine degree in Sydney, he moved to Berkeley to work with one of the leading sociologists, epidemiologists, at the time, and then he went to the UK, where he has been since.

In his early career, of course, he received many special distinctions, but what he is best known for, I dare to say, is being the best medical epidemiologist who studies social factors of health and disease—let me call it health justice. Because one of his exciting concepts is that of the social gradient of health, a dynamic concept that I'm sure he will speak about in this lecture.

Currently, he is director of the International Center for Health and Society at the University College in London. He's also the director of a new, exciting longitudinal study on aging, the so-called English Longitudinal Study of Aging (ETSA). And as I mentioned already, he is chairman of the WHO Commission on Social Determinants.

From my experience with Michael Marmot, and I had the pleasure of working with him for ten years on a committee of the MacArthur Foundation, the Committee on Mid-Life. He is not only an exciting, brilliant scholar. He is a fine human being; and, moreover, and this is the reason why I need to turn over the microphone to him, he is an exciting speaker. I wish you a wonderful lecture.

Sir Michael Marmot. Let's welcome him.

[Applause]

MARMOT: Thank you. Thank you, firstly, to Paul Baltes, for that lovely introduction. And, of course, thank you to the Ibsen Foundation for this splendid award. It is a privilege to be here to talk to you about the substance of the work that led to the award.

I call it, "Dying for Status: How Social Standing Affects Health and Longevity."

There is a great deal of interest worldwide in the fact that poverty is bad. Among the reasons why poverty is bad, it's bad for health.

This is not primarily the subject of my lecture. I am interested in the social gradient in health. I can illustrate this with the first Whitehall Study of British civil servants.

Now these are people in stable employment, none of whom is poor by the usual sense of the word. Yet you see this remarkable gradient. If one is the average for the whole population, the administrators, the top rank of the civil service, have about half the average mortality. The professional and executive grades which are the next level down in the hierarchy have about 20 percent lower-than-average mortality. The clerical offices, about 40 percent higher. The office support grades, the messengers, the paper keepers, the doorkeepers, etcetera, have about twice.

So at age forty to sixty-four, there is a four-fold difference in mortality between top and bottom for people in stable white collar jobs.

This is not the poorest of society, and it's not the richest of society. Yet we see this remarkable social gradient and we see it at every age. This is age seventy to eighty-nine. The relative difference is somewhat smaller at the oldest age. But of course, the absolute difference is bigger.

If we look at the size of it, it's not just a British phenomenon. When we first published on Whitehall, people said, "Ah, the British—what really do you expect from the British? The class system. This is the United States." At the ends of the spectrum there is a thirty-three-year gap in male life expectancy between Asians in Westchester County (life expectancy eighty-nine) and American Indians in South Dakota (life expectancy fifty-six).

Now you might say, well, they are very unusual groups. American Indians, Asians in Westchester County—the richest county in the United States. So let's take a more generalizable phenomenon. Let's go to the nation's capital, Washington, D.C. If you take the Metro from the southeast of downtown Washington to Montgomery County, Maryland, in the suburbs—a distance of about 14 miles—for each mile traveled life expectancy rises about a year and a half.

This is the most life-enhancing journey in the world. There's a twenty-year gap between poor blacks at one end of the journey (male life expectancy fifty-seven), and rich whites at the other.

These are all people living in and around Washington, D.C. So these are staggering differences at the end of the spectrum. But it is a gradient. The higher you are in the hierarchy, the lower the risk and the greater the life expectancy.

The ends of that spectrum are staggering. This is for young people—probability of survival from age fifteen to sixty-five years among U.S. blacks and whites—the average for U.S. whites is 77 percent. There is a 77 percent probability on average that a fifteen-year-old will reach sixty-five among males. For whites living in a poor community, that was just under 70 percent.

The average for U.S. blacks was about sixty-two percent, so this huge—a huge black-white difference. In a poor community in Harlem in New York, the probability of a fifteen-year-old man reaching sixty-five was 37 percent in the world's richest country.

These inequalities in health among great riches are enormous.

The question is, how do we understand them?

I hasten to add that we don't see them only in the United States. Glasgow in Scotland, this is male life expectancy, a deprived area of Glasgow, life expectancy is sixty-five, which puts it behind Nicaragua, Ecuador, El Salvador, Honduras, Poland, Bulgaria, the UK average, Belgium. The affluent area of Glasgow has a twelve-year longer life expectancy.

Within one city in Scotland, there's a twelve-year difference. If we look at Scotland as a whole from 1991 to 2001, we see that in the best-off areas of Scotland, life expectancy has been increasing. In the worst-off areas—the most deprived areas of Scotland, in Glasgow—life expectancy has been decreasing. The gap between the best and the worst has increased to nearly fourteen years in 2001.

These are really very big differences, and they can't be explained by poverty in the usual sense. When we think of poverty, we tend to think of lack of access to clean water, lack of access to adequate nutrition, infant and child mortality. This is adult mortality, and it's not due to poverty in the usual sense.

We see interactions between the individual's social position and the area in which people live. These are regions of the United Kingdom, and you can see that in the different regions, the mortality for social class one hardly varies. But the mortality for social class five varies a great deal.

So if you're at the bottom of the social hierarchy, it matters much more where you live, than if you are the top.

Even in egalitarian Sweden, we see this same phenomenon. This is from a national sample, based on the census of Sweden. You can see that people with a doctorate have lower mortality—this is men aged sixty-four—people with a doctorate have lower mortality than those with a master's degree or a professional qualification who, in turn, have lower mortality than those with a bachelor's degree have lower mortality than high school graduates all the way down.

The idea that a PhD has lower mortality than a Master's Degree, and a Master's lower than somebody with a Bachelor's, means we've got to think about social position and health in a different way than thinking about absolute deprivation.

So explanations. The first that's worth thinking about is where you came from and the importance of early life and, indeed, could it be health selection. I'll come to what I mean by that in a moment.

Let’s start with early life—the idea that what happens early in life has a powerful impact on health and disease in later life.

This is from our second Whitehall study of civil servants, the Whitehall II Study of British Civil Servants. It is looking at CHD death and incidents of myocardial infarction in a ten-year period by employment grade and height. We use height as a marker of early life. Height represents, like most things in the world, genes and environment and represents the impact of early life. What we see is that for tall, middle, short, short people have higher incidents of coronary disease independent of adult grade of employment.

It suggests that whatever height is correlated with, whatever height is a marker for, seems to increase risk of coronary disease. Independent of that, this is employment grade, so that’s an adult social position; and you can see that for the same height, those of lower grade have higher mortality than those of higher grade. So it seems like there are circumstances from early life that are important, but also, adult social position is of crucial importance.

David Barker, who has done a huge amount of work on the importance of early life, published these data from his collaborative study in Helsinki, looking at (incident) coronary disease by adult social class and thinness at birth.

He looked at ponderal index at birth less than twenty-six, ponderal index at birth greater than twenty-six, and you can see that there’s an interaction. He describes it as thinness at birth is the important thing. Adult social class only matters if you are thin at birth. I would describe it the other way and say adult social class always matters. Thinness at birth only really matters if you are low social class.

Either way, there is an interaction and you can see that for those who are thin at birth and those who are in low adult social class, they are particularly at high risk.

So it suggests early life may play an important role, but it’s not independent of where people end up.

I said I would say a word about health selection. This is a simplified model that, in fact, a Nobel Laureate in Economics put in a paper, and he and I have had a long exchange over this. He says genes lead to health, and health leads to socioeconomic stages.

In other words, people with adverse genetic inheritance will get sick and because they get sick they’ll either be downwardly socially mobile or not upwardly socially mobile, so there’s actually no link between socioeconomic status and health. It is all the other way—health causing socioeconomic stages.

Or the other possibilities—that your genetic profile determines your health, your genetic profile determines your socioeconomic status, and any apparent link between socioeconomic status and heath is spurious.

There is, I have to say, virtually no evidence to support this model. We do have very clear evidence from birth cohort studies that downward social mobility cannot explain the

social gradient in disease—health and disease we see in adulthood. In other words, the idea that sick children end up in lower social positions and healthy children end up in higher social positions has some validity, but the effect is quite small and cannot explain the social gradient in adulthood.

We have now been looking at various genetic markers that could explain social class differences, and have yet to come up with one. The Epowe type for example, in our data, shows the 4-4 variant is no different by where you are in the hierarchy.

So there is very little support for this idea. There must be some role here if genes' genetic endowment is related to intelligence, as it must be, and intelligence is related to upward mobility, then you can see some role for genes.

In our Whitehall data, we can show that the social gradient in health and disease in adult life cannot be explained by intelligence, because we have measured cognitive function.

So there's—while this is superficial plausible, it's unlikely to be the major explanation for the social gradient in health and disease.

The first class of explanation is where you came from. The second is what you do. And I've said, "Round up the usual suspects."

When people think about inequalities in health, the first thing they think about is medical care. It must be that people lower in the hierarchy have worse medical care. Or, if they get over that set of thoughts, they then think it must be that poor people behave badly. They smoke, drink to excess, eat bad food, can't be trusted to do physical activity. It's all down to their bad behavior.

I think neither of those is an adequate explanation. If we look back at the first Whitehall study, this is CHD, coronary heart disease mortality, twenty-five year follow-up. That's the social gradient adjusted for age. Here we've adjusted for smoking, systolic blood pressure, plasma cholesterol concentration, height, and blood sugar, and you can see that we explain about a quarter of the social gradient in mortality.

So there is a clear social gradient after we've taken these standard risk factors and height and blood sugar into account.

What about medical care? Well, one of the striking findings is that we see social gradients in coronary heart disease and physiological disturbance that we think are precursors for coronary disease in nonhuman primates. Robert Sapolsky has been studying the baboons on the Serengeti for some considerable time. And they, I must say, have disastrous medical care, very little access to high quality medical care facilities, these baboons, but they don't differ according to status. Yet high status baboons are better off.

Similarly, Carol Shively's studies in reeces monkeys—this is the degree of arteriosclerosis in males. If you want to give a female as much arteriosclerosis as a male, then take out her ovaries.

If, like me, your doctor doesn't like the sight of blood and doesn't want to take out her ovaries, then make her subordinate. For intact females, this is dominant. These are subordinates, and the effect of being subordinate has almost as much impact on arteriosclerosis as removal of the ovaries.

What you can show is that it's not disease that leads to subordination, but it's subordination that leads to disease by doing the experiment of changing ranks.

Coming back to Sapolsky's baboons, this is HDL cholesterol in male baboons, the low-grade—sorry, the labels are strange—and this is the higher HDL cholesterols in the dominant baboons, and lower HDL cholesterol in the subordinate baboons. The uncomfortable comparison between civil servants and baboons, we see similarly high-grade civil servants have higher levels of HDL cholesterol than low grade.

But this, of course, raises a puzzle and a problem for me. If we see hierarchies in health in nonhuman primates, are they not inevitable? If wherever we see social animals, and we see hierarchies, and health follows that social hierarchy, perhaps there is nothing we could do about it.

My answer to that is to compare species and compare circumstances. In fact, although we see hierarchies in virtually all nonhuman primate species—there are 150 different non-human primates—and the consequences of hierarchies for health varies among species. In fact, Robert Sapolsky and I are now doing a review, looking at the characteristics that determine whether hierarchy in nonhuman primates translates into worse health.

Similarly, if we look across human societies, with different circumstances, we find that the social gradient in health varies so that it may be that hierarchies are inevitable, but the consequences of hierarchies for health depend on circumstances.

That leads me to the third part. In addition to where you came from and what you do, it's what you have thrust upon you. It's the circumstances in which you live and work, the social determinants of health.

What about money? If I talk about social circumstances, then it is reasonable to say, "What about money? What about income?"

I want to go through this. The first is, if you have little money, absolute amount matters. If I go back to the northern English city of York a hundred years ago—this is mortality of children under one year of age. They're classified by the poorest, middle working class, or highest working class. You can see that infant mortality varied from 173 per thousand live births, to 247 in the best-off area of York, the servant keeping class, infant mortality was still 94 per thousand live births.

So you can see that poverty really mattered, but it is not just individual poverty. It's what poverty means for a whole community. In fact, what poverty means for a whole community a hundred years ago, was indeed poor conditions for having children—a lot of infection, inadequate circumstances for birth, and so on.

When we look a hundred years later, this is infant mortality per thousand live births in England-Wales, in 2000, and 3.7, 3.6—this is social class of the father per thousand live births for the best off and 8.1 for the worst-off.

The worst-off in England and Wales in 2000 is an order of magnitude better than the best-off 100 years earlier.

For all intents and purposes in the rich countries of the world, it's over. Material deprivation is no longer a major cause of illness. It's finished. It's done with.

Social circumstances are really important, but when the worst-off group has an infant mortality of 8.1 per thousand live births, you can say that for all intents and purposes we are not dealing now with absolute poverty.

We can see that once you get above a threshold it works for a whole country. Income matters very little. These, for a series of countries, with gross domestic product, in purchasing power parities in U.S. dollars—so it's adjusting for purchasing power—and you can see these countries varying from Cuba, with a GDP purchasing power at $5,000 up to the United States with $34,000 and there is simply no relation between income of a country and life expectancy.

Japan, life expectancy at birth, 81.3. Running down here: Sweden, Spain, Switzerland, France, Greece, UK, Costa Rica, United States. When I have shown these figures from the United States, people get very uncomfortable at the idea that life expectancy in the United States is only .4 (of a year) ahead of that evil, evil regime in Cuba. How could that possibly be?

I say, "OK. Well, let's not deal with Cuba. Let's deal with Costa Rica and life expectancies a year longer in Costa Rica, with a GDP of purchasing power of $9,500 compared with the United States.

So once you get above—a country that's above a GDP of about $5,000, there's simply no relation between income and poverty, income and life expectancy.

We have got to think about people's social circumstances in other ways. It's true, within a country, if we classify people according to their income, that those with higher income have longer lives. But given that income doesn't seem to matter for a country above about $5,000, I think it's not the income that's important. It's the social position that is important. It is other things that go along with the income.

That leads me to the second. Above material deprivation, it's how much you have relative to others.

A rich man, said H. L. Mencken, is one who earns a hundred dollars more than his wife's sister's husband. These experiments are being done with American university students—the dollar experiment.

You live in a society where the average income is $100,000 and your income is $125,000. Now consider a new situation. Average incomes are now $200,000, and your income is $175,000. In the two societies the dollar has the same purchasing power. Which situation would you prefer?

In other words, would you like to absolutely better off with $175,000 but below the average? Or absolutely worse off with $125,000, but above the average?

A majority of people opt for the $125,000. They'd rather sacrifice material gains for better relative standing. We are very much driven by relative position.

Amartya Senn, Nobel Laureate in economics resolves this, and I'll explain what he means by space. Essentially, space is dimension in the way he uses it.

He says relative deprivation in the space of incomes if measured on the scale of incomes can yield absolute deprivation in the space of capabilities. In other words, if you are relatively worse off in terms of income, that may translate into absolute differences in what you can do. The thrust of the Amartya Senn's argument is it's not what you have that's most important. It's what you can do with what you have, your capabilities.

It's an old idea that harks back to the father of modern economics, Adam Smith, who said, "By necessary, as I understand, not only the commodities which are indispensably necessary for the support of life, but whatever the customs of the country renders it indecent for creditable people, even the lowest order to be without." Adam Smith says, writing about Scotland in the eighteenth century, that no self-respecting member of the lowest order would appear in public without a linen shirt.

He says, "I imagine the people of ancient Greece and Rome got on quite well without linen shirts, but now, throughout the better part of Europe, no self-respecting member of the lower order would appear in public without shame, unless he or she had a linen shirt or equally, a pair of leather shoes. The poorest person would be ashamed to appear in public without them."

This leads me on to the idea of what it means to be a full social participant, that material conditions are important but not important in the absolute sense of absolute deprivation. They are important because they allow you to partake of society.

If having a linen shirt or leather shoes means you can take your place in public without shame, then having the wherewithal to buy a linen shirt and leather shoes—which of you has had a child say, "My life is over because I haven't got a new pair of trainers or sneakers and I can't appear in public." This is Adam Smith.

The third importance of money for health, if you are really swimming in it, money I mean, then it's a way of keeping score. It's not simply relative position. And this example that I like of the Oscar winners, Oscar winning actors and actresses lived an astonishing four years longer than their co-stars, and the actors nominated who did not win.

I it's most unlikely that this is simply a matter of more money buying you longer life. The nominees, the also-rans, the ones who were nominated and didn't win, made something like fifty films, on average. So they were hardly in penury.

That four years is enormous. Winning the Oscar is like reducing your chance of dying from a heart attack from about average to zero. That's enormous.

That's what I mean by if you are really swimming in it, it's a way of keeping score. Even at that exalted level, then, boost to status to self-esteem have this huge impact on life expectancy.

In my book, *The Status Syndrome*, I put together the idea that what's important underlying the social gradient is human flourishing, which we can describe as autonomy or control over life's circumstances, the opportunity for full social participation in the Adam Smith sense, and health, and that these three are closely related. Indeed, autonomy and social participation are closely related to health.

To give you some of the evidence for that, some of the psychosocial pathways by which social circumstances affect health—

There was a football match in Europe. Getting excited about football, I know, is something foreign to people in Brazil. But in Europe they do get excited about football. On June 22, 1996, the Netherlands played France in the quarterfinals of the European football championships held in England.

It was a draw, extra time, and still nil. So there was a penalty shoot out.

On this particular Saturday the death rate went up 50 percent in men in Holland—41 men in Holland dropped dead from a heart attack or stroke, which was 50 percent more than expected from the previous years or the days before or after.

Now, of about 15 million people who live in the Netherlands, it was estimated that more than 8 million were watching that match. I suspect 7 and a half million men and a few women. And, of course, this excess death rate was only in the men, not in the women.

It's just one slightly quixotic example of how acute stress can increase heart attack rates.

The question is, what about the chronic situation? When does a psychological threat become a stress? And the various modulating factors? How much control you have over that threat, its predictability, the degree of support you have, the degree to which that threat is a threat to stages, and the presence of outlets?

There is good human evidence—this summary comes from animal evidence—but there is good human evidence to support each of these.

The vital flight response, which you know well, is the response of an animal to physical stress or threat, and there are a large number of neural/hormonal changes. The autonomic nervous system, and the HPA axis are of course importantly involved. The sort of model

that we've been using is we start from the social structure affects work and the more general social environment, impact on health behaviors, but also direct psychological impact, on the brain and endocrine and immune system, pathophysiological changes in organ impairment and impacts on well being, mortality and morbidity. It plays out on the substrate from early life, genes and cultural difference. We have evidence for each of those.

If we look at the HPA and the sympathetic—parasympathetic nervous system, these are Whitehall II data, so these are civil servants. We measured salivary cortisol throughout the day and higher-grade civil servants and lower-grade civil servants, and you can see the diurnal variation in cortisol. But through most of the day, and particularly in the morning, you see these big differences. The high-grade civil servants have lower levels of salivary cortisol, which we think is a stress hormone.

One of the ways that the HPA axis may exert its effect is in the metabolic syndrome of ( ) and resistance. Employment grade high and low. You can see that the lower the employment grade, the higher the prevalence of the metabolic syndrome for men and for women. The metabolic syndrome leads on to diabetes and coronary disease, and plausibly is related to activity of the HBA axis and catacolomines.

We can show directly that self-reported job control is related to coronary heart disease incidence in Whitehall men and women—high job control, intermediate job control and low job control. The lower the job control, the higher the incidence of coronary disease. Here we've controlled, adjusted for effort, reward and balance, and I'll come back to that in a moment.

But you can see it makes no impact on the association between low control and high coronary disease. Here we've adjusted for grade and the standard coronary risk factors and the potential reporting bias of negative affect. Again, it makes no difference to this association between low control in the workplace and increased risk of coronary disease.

We also have this delicious finding—I say delicious in the sense that very rarely does theory lead you to predict a finding that you actually then find! The idea that having low control at home would be more important, more salient for women, was indeed predicted by one of my colleagues—and that low control at work would be more salient for men. We also found—this was asking women and men how much control they had over circumstances at home. You can see women who report low control at home have more than twice the incidence of coronary disease compared with those with high control. There was no association in men. This was adjusted for age and household, social position—sorry. That should be control at work and coronary risk factors.

Social supports. There's a huge amount of literature now on this subject that people with more supportive social relations, more participation in social networks, have longer lives, greater longevity, and reduced mortality.

We've also been looking at another factor in the work place, effort, reward and balance.

The reason I put it here under the label of social supports is the whole idea that what's important about participating in society is having appropriate feedback, reciprocal relations. I do something for you; you do something for me. I put out effort in the work place; I get reward for that effort.

That reward may be esteem. It may be status. It may be money. We use all three in characterizing it.

So here are people with high effort and low reward, low effort and high reward—nice, if you can have it—and those with high effort and low reward have more than twice the incidence of coronary disease. That's independent of low control.

I've been talking a great deal about the social gradient, but whole societies can benefit or suffer from low control and low social cohesion.

Japan, as I showed you in a previous slide, has the longest life expectancy in the world, and this is one measure of social cohesion, if you like, which in common equalities. This was the share of total household income enjoyed by the top 20 percent and the bottom 20 percent.

So the highest 20 percent gets 35.7 percent of total household income in Japan, and the lowest 20 percent get 10.6 percent. So it's about three and a half times is the ratio. In the United Kingdom, it's more—it's closer to seven times. In the United States it's more like eight times, and it's—I'm sure you know, in Brazil, it's 30 times. The highest 20 percent have 30 times the income, the share of total household income of the bottom 20 percent.

That's one mark of social cohesion. Japan's long life expectancy goes along with a narrower distribution of income. It also goes along lower crime rates. These are crime rates in the USA and Japan per 100,000 in population. Murder. Robbery. Rape. Aggravated assault. Burglary. All—many fold higher in the United States than in Japan. There's a good case to be made that those high crime rates are related to high inequalities and low social cohesion.

At the other end of the scale, a poor community that seems to do well despite low income, is the Indian state of Kerala. These are the poorest states of Kerala, income in 1985 dollars, around a $1,000. Infant mortality in Kerala was 17 per thousand live births, despite having this extremely low national income or state income. And much lower in Kerala than these other poor Indian states.

What's different about Kerala? Look at female literacy: 66 percent where in the other states it is a third or lower.

Females married under the age of eighteen, 3 percent in Kerala, much higher in some other states.

The status of women, the inclusion of women in the wider society is much more evident in Kerala than it is elsewhere. With education standards being high in Kerala generally, and particularly high for women. I think that is one of the routes to low mortality.

At the other end of the scale, we see these communities that have been suffering, and this is life expectancy at age fifteen. So—infant and child mortality in Europe for men, 1970 to 2001, is the European Union, the countries of Central and Eastern Europe, the former communist countries, and you can see that this gap between these former communist countries and western Europe, the European Union, opened up considerably over the period from 1970 to 1990. Things got a bit worse.

In the early 1990s in those countries—and then their life expectancy started to increase in parallel with those in the West, but there is still a six-year-gap, even in 2002. Six years of life expectancy at age fifteen is enormous.

In the Soviet Union, the former Soviet Union, and Russia, they've had this roller coaster ride. A seven-year drop in life expectancy from 1989 to about 1994. It increased—then because of the crisis in 1998 it fell again, and now there is a glimmer of hope that it is starting to rise.

So here, looking at Russia, we've got five, ten, fifteen—more than a fifteen-year difference in life expectancy at age fifteen. Absolutely enormous!

One way we've been looking at this is to ask how much control do people have over their lives in these different East European populations? So we took small samples of the population and measured degree of control over their lives, and then correlated that with all-cause mortality.

In the Czech Republic people had higher degrees of control over their lives, and have low mortality. In Russia, people had less control over their lives and higher mortality. There's a very clear inverse relation—higher control of the population, lower mortality.

Coming back to the social supports argument, this is—we see this in all of these central and East European countries. This is the Czech Republic. Single, divorced, widowed, and married. Married people have, of course, lower mortality than single, divorced and widowed. This is 1960 to 1961.

The disadvantage of being unmarried increased sharply at a time that mortality was going up, it went up more sharply for single, divorced and widowed. And that disadvantage continued.

So it looked like single men were particularly at risk. It's plausible that that relates to less social support.

I come back to Amartya Senn in thinking about these societies. He says, "The success of an economy and of a society cannot be separated from the lives that the members of the society are able to lead. We not only value living well and satisfactorily, but also appreciate having control over our lives."

I think this issue of control is fundamental to the social gradient in health, and I think it's also fundamental to what's been happening to explain differences among different countries.

It’s precisely to take these ideas serious, these and others, that we’ve now involved in this commission that Paul Baltes mentioned, the Commission on Social Determinants of Health, set up by the World Health Organization, which I have the honor to chair. We said, “What good does it do to treat people’s illnesses and then send them back to the conditions that made them sick?”

What we now want to do is try to take our understanding of social determinants of health and put it into practice to improve people’s lives.

Thank you.

[Applause]

_____: Watching the time, let me just simply thank Michael Marmot. I think you saw something that is very special, a low-key approach, but a powerful intellect. Somebody who knows how to hide ideology, but has it. The striving for justice in health. And somebody who communicates to us the power that humans have in terms of organizing and improving their lives.

The relative ranking and standing idea is a very important one. I now understand why, this morning when I woke up, I felt good. Why did I feel good? I now know, because I could be situated next to Sir Michael Marmot. He made me feel better. I hope you feel the same way. You are a higher in prestige and social ranking because you came. I wish you a wonderful day. Thank you again.

[Applause]