

# The Solid Facts: The Social Determinants of Health

Professor Michael Marmot

This is the story of how a scholar came to dirty his hands with the sordid business of policy. I had always thought of myself as a researcher and, like most researchers, I saw the purpose of doing research as publishing a paper in the *Lancet* or the *British Medical Journal* and then moving on to the next piece of research. Then one day the thought occurred to me: "Is the work I do actually useful to anybody? *Could* it be useful to anybody?" This was, I suppose, what you call a mid-life crisis.

I was therefore ready when representatives from the World Health Organisation (WHO) Regional Office for Europe came to our International Centre for Health and Society in London and said: "Could you package the results of your research on the social determinants of health into a form so simple that even policy-makers could use it?"

After a brainstorming session our research team came up with our top 10 messages. We packaged them in a short form for WHO in a booklet called *The Solid Facts*, and then we worked them up into a book entitled *Social Determinants of Health* (published in July by Oxford University Press) with a chapter that gives the scientific evidence supporting each of these 10 messages.

## The Solid Facts

### The Social Gradient

*People's social and economic circumstance affect health throughout life, so health policy must be linked to the social and economic determinants of health.*

The first message is the number one priority. We have to move away from approaches to improving health that concentrate on the individual to those

*Michael Marmot is Professor of Epidemiology and Director of the International Centre for Health and Society, University College, London. The material in this paper is taken from an address by Professor Marmot given in Melbourne on 9 April 1999. Supporting references for these citations are in The Solid Facts (Copenhagen: World Health Organisation Regional Office, 1998; <http://www.who.th/healthy%20cities/determ.htm>).*

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that pay more attention to social and economic causes.

Here I have the disability of being trained as a physician. Physicians are trained to treat individual patients, and I spent a good part of my research life thinking about individual causes of individual diseases. What changed my thinking was our studies of British civil servants — the Whitehall Study.

These studies looked at the health of British civil servants and then came back 25 years later and calculated mortality rates for these men, classified by their grade of employment. The administrative grades — the highest grades — have a mortality about half the average. The professional executives — the next grade down — have higher mortality than the administrators while the clerical officers — the next grade down in the hierarchy — have higher mortality still. The office support group — doorkeepers, messengers and so on — have a mortality that's about twice the average. There's a fourfold difference between top and bottom.

It's important to notice that this data is not simply telling us what we've always known — that there's a link between poverty and ill health. The evidence shows that there is a continuous slope all the way from the very poor up to the well-off. The gradient is fundamental, and it's a hard concept to get across. A remarkable thing happens when you talk to policy people. You tell them "there's a social gradient in health" and what they hear is: "The poor have bad health and the non-poor have good health". You go in with a continuum and it comes out binary.

One important question when you're considering what can be done about inequality-related ill-health is how much of it there is. One way of calculating this is to assume that the desirable death rate is the death rate in the highest class, Class I. If you're in a class that's got a death rate higher than that, that excess may be attributed to being in a social class below Class I.

The next question, when you're considering what to do about it, is where in our society the excess mortality occurs. If you look at the statistics you can certainly see that men in the lowest social class — Class V — have a high mortality, but you can also see that there are not very many of them. Only five per cent of men, for example, are in Class V, so if we calculate what proportion of all attributable deaths occur in each class we find that only 20 per cent of the attributable deaths occur in Class V. If you concentrated only on Class V you might make a difference in dealing with 20 per cent of the deaths attributable to being less than Class I, but in fact far more of the attributable deaths occur in Class III (skilled manual workers) because



there are so many more of them. Nearly half of the deaths attributable to not being in Class I — 47 per cent of them — occur in class III, which is yet another indication of the importance of recognising the gradient and not focusing only on those at the bottom.

I should sympathise: I was trained as a physician, and as George Pickering once said: "Doctors can count up to two". For a doctor there are only two possible answers — the patient is either sick or not sick. Unfortunately, the same sort of thinking appears to be prevalent among policy-makers — people are either poor or not poor — and it's at the level of policy-making that this distinction becomes really important. Continuum problems are different from binary problems and require different solutions.

Conceptually, it's not difficult to think how to address the issue of poverty and ill-health. Yes, it's difficult economically, socially, and politically, but it's not difficult conceptually. The gradient is a different issue, and it relates to our ideas of inequality. It's conceptually much more difficult to understand inequalities in health, and because it's more difficult to understand them it's more difficult to know what to do about them. Indeed, if inequalities in health are related to social and economic inequalities in our society, it doesn't automatically follow that politicians will want to address that issue at all.

Nobody, after all, claims that poverty is good, but there is in fact a body of opinion that says inequality is good. Politicians of all persuasions have economic advisers, many of whom will tell them that economic inequalities are good for society and are what drive economic growth.

## Stress

### Stress harms health

In human studies you always get clever scientists telling you that you can't define stress — what is stress for one person is not for another — and you can't measure it, so asking whether stress harms health is not a scientific question. In order to assess such effects we therefore turned to work done with animals, and in particular to work with non-human primates. When monkeys are fed an atherogenic diet, with 40 per cent of their calories from fat and high dietary cholesterol, the subordinate animals developed more atherosclerosis.

When we show that there's a social gradient in humans people say the difference may be due to differences in smoking rates, cholesterol or fitness. To my knowledge none of these monkeys goes to aerobics classes, reads health magazines or

smokes. They all have the same diet, yet what we find is that subordinate monkeys develop more atherosclerosis. They also show activation of stress pathways — overactivity of the hypothalamic-pituitary-adrenal axis — and there's evidence that the sympathetic nervous system is also involved. Baboons in the wild show the same pattern. As you know, high levels of high density lipoprotein (HDL) cholesterol are protective. Dominant monkeys have higher HDL and protective lipoproteins than subordinates. High grade civil servants have higher HDL levels than their subordinates. We find the same pattern in the human primates of the Whitehall ecosystem that other researchers find in the baboons of the Serengeti ecosystem.

### Early life

*The effects of early development last a lifetime. Ensuring that people have a good start in life involves supporting mothers and young children.*

My colleague Michael Wadsworth directs the 1946 Birth Cohort, a remarkable study that is following a national sample of people who were born in the first week of March 1946. Wadsworth has constructed a childhood score made up from social class, infant crowding, birth weight and height at 2 years. He classified people from best to worst on this scale, and looked at the prevalence of high blood pressure in later life. He found that there's no relation between childhood score and high blood pressure in people who are not overweight at age 43. Among those who are overweight at age 43 there's a very clear relation between the childhood score and the prevalence of high blood pressure. Alternatively, you could say that if you come from a favoured background there's no relation between being overweight and high blood pressure. The relation between overweight and high blood pressure is seen only in those who come from a less favoured background. There is thus an interaction between the effects of an adverse early life environment and what happens to you in later life.

Because early life experiences are important, people often say that what we need to do is invest in education. In Britain every school in the country has to produce performance figures, and one of the indicators is the performance of children in the General School Certificate of Education (GSCE), the standard test that's carried out nationally at age 15–16. The indicator used here is the percentage of 15–16-year-olds passing five or more GSCE subjects with a C grade or higher. Now that's setting the bar fairly low: a child who wants to go on to university would probably do 10 GSCEs and have to get mainly As or Bs.

My colleagues have taken the figures for 107 UK education authorities and classified them by the

percentage of children who got five or more passes at GCSE level. The percentages range from about 45 per cent down to about 13 per cent. They've also classified these education authorities according to deprivation. The higher the deprivation, the lower the performance on GCSEs. The correlation is extraordinary. School performance is a measure of social deprivation. The other day I asked a colleague who is an expert on the contribution of schools: "Given that the figures seem to show that school performance is a measure of deprivation, do schools make any difference at all?" He gave me some highly technical mathematical paper to read, with third order polynomials and goodness knows what, and after labouring through this I called him up in desperation and said: "Do schools make any difference?" He said: "Let me give you another paper to read." Well, we all hope that schools can make some difference, but the main determinant of education outcome is level of deprivation.

Bearing this in mind, should we invest more in education? There's actually some evidence for the proposition that if we simply invest in all schools equally this will simply increase the inequalities in educational outcome, because an equal quantity of investment in education will benefit children from an advantaged background to a greater degree than it would benefit those from disadvantaged backgrounds. Children from more advantaged backgrounds are simply better able to benefit from that extra quantum of educational input. To invest in all schools equally seems fair; it's applying a perfectly good equity principle but it will nonetheless increase the inequality in the outcome, which is a depressing thought.

How does one interrupt this generational cycle? One way is to deal with the issue of deprivation, and of course we should be doing that. Another way that we recommend is to invest in preschool education. If we take advantage of the United States evidence that investment in preschool education may actually bring children into the school system better poised to take advantage of what happens in the school system, one might interrupt at least to some extent this link between deprivation and school performance.

### **Social exclusion**

*Social exclusion creates misery and costs lives.*

If we look at the relative mortality ratios for ischaemic heart disease within the social classes in England and Wales for the period 1970-93 it is clear that in 1970-72 the gradient was fairly shallow — the lower classes didn't have that much more heart disease than the upper classes — but by 1979-83 the gradient had become noticeably steeper and by 1991-93 it had become steeper still.

Coronary heart disease has been coming down very nicely for people of higher socioeconomic status and has not been coming down to anything like the same extent for people of lower socioeconomic status. Health inequalities are actually getting worse.

Suicide mortality figures are even more stark. In 1970-72 there was a high suicide mortality in Class V but no consistent gradient across all classes. The higher suicide mortality in Class V is, of course, entirely consistent with a hypothesis of downward social drift, where people with mental illness drift downward socially or fail to move upward socially, people with mental illness being more prone to suicide. Under this hypothesis the high suicide mortality in Class V is not due to social causation, it's because people who are already ill are drifting down in the social hierarchy.

Over a 20-year period, however, we've seen the evolution of a social gradient. In 1971 suicide was higher than the average only in the lowest social class. In 1991 it's still higher in Class V, but there is now a social gradient. I can remember sitting on a government committee looking at the UK health targets. People were wringing their hands about the failure to meet the targets for youth suicide. Why were suicide rates not going down? I suggested that the reason might be that we are throwing young people on the scrap-heap through, for example, unemployment. The chairman of the committee slapped my wrist (metaphorically), saying: "There's no link between unemployment and suicide," and moved on to the next item of the agenda. I said to him afterwards: "How can you possibly say there's no link between unemployment and suicide? The evidence is overwhelming." He said: "Well, there's not a one-to-one link". "If there were," I said, "that would certainly solve the unemployment problem." Whatever the government of the day says, unemployment is certainly an important indicator of social exclusion.

To take one surprising illustration, Redford Williams in the United States has been interested in hostility as a risk factor for coronary heart disease. His work shows that hostile people have higher risk of coronary heart disease than others. I asked him: "Where does that hostility come from? Why are people hostile?" If you talk to psychologists they'll tell you that hostility is a personality characteristic, and that personality characteristics are relatively fixed throughout life. Redford Williams, however, conducted a sample survey in 10 US cities to measure mean levels of hostility in each of those cities (unpubl. data).

We then gathered together a group of psychologists and told them that we had measured the mean levels of hostility in 10 US cities. If we told them the

name of a city, could they tell us whether the mean hostility level was high or low? Honolulu? The psychologists said "low". Seattle? Low. Minneapolis? Pretty low. New York City? Very high. Cleveland? High. Philadelphia? High. In all cases this fitted Williams' survey data. "Well," we asked them, "what's going on here? You told us that hostility is an individual personality characteristic that's fixed and inflexible, but you can nonetheless correctly predict mean levels of hostility simply on the basis of geographic indices. How do you account for this." It could be selective migration, of course — naturally hostile people may migrate to New York City ("Welcome to New York. You got a problem with that?") — but another and perhaps more likely interpretation of these findings is that hostility is induced by the social environment.

Williams' research also showed that mean hostility levels in these 10 US cities, adjusted for race, education, age and gender, correlated with the city's annual death rates. When I mentioned this to Richard Wilkinson, a colleague of mine at the International Center for Health and Society, he contacted Ichiro Kawachi at Harvard, who's been looking at income inequalities. He provided figures for income inequalities by city and we found that if you put income inequality along the X axis instead of hostility you get much the same graph. Income inequality relates to hostility, and you can predict the mean hostility level by knowing the income inequality of those cities. What Richard and Ichiro also showed, furthermore, was that crime rates follow the same gradient. The cities with high income inequality and high hostility also have high crime rates. I said before that income inequality is a marker for the social environment; this is some of the evidence. We shouldn't, therefore, think about hostility as only an individual personality characteristic. It is potentially changeable in response to the social environment.

The Whitehall Study suggests that your position in the hierarchy is intimately related to your risk of health and disease. Richard Wilkinson has taken a wider perspective, characterising whole societies according to their degree of income inequality. He found that the countries where income is more equitably distributed — Sweden, Norway and The Netherlands, for example — have longer life expectancy than those where income is less equitably distributed. I do not think that it's income *per se* that's the issue, but rather that income inequality may actually be an indicator of the social environment. These comparisons tell us that societies with greater income inequality actually have worse quality social environments, and that's why they have worse health.

Income inequalities are rising in New Zealand, the UK, Norway, Australia, Sweden, The Netherlands,

Japan, Belgium and West Germany, while in Italy, Finland, Denmark, Canada, Ireland, Portugal and Spain they are falling. I am not asserting that the rise in income inequalities caused the increased inequality in mortality we see in the statistics. You cannot prove causation on the basis of these two parallel trends. If it's true, however, that income inequalities are a marker of the quality of our social environment, it's not a surprise that increasing inequalities in mortality have gone along with increased income inequalities.

## Work

*Stress in the workplace increases the risk of disease.*

When I started work in this area I had the same ideas about stress in the workplace that abound in popular culture — that being stressful is to be under pressure, to have deadlines, to be buzzing about Australia catching aeroplanes from Canberra to Melbourne and then Melbourne to Sydney. But there's another possibility, which is that it's not having high demands on you that's the problem; it's having low control when you have high demands. The demand-control model indicates that low control is an important dimension.

We found in the Whitehall Study that the demand dimension did not predict disease, but that the control dimension was vital. We classified people according to degrees of job control, in two ways. We collected self-reports of how much control people thought they had, and for 8000 jobs we asked managers to tell us how much control was involved in that particular job. I would have predicted the correlation between these two different measures of control would be about 0.5. In fact, the correlation was about 0.2, and that was only because both managers and employees agreed that control went down as you went down the hierarchy. When managers and employees talked about low control they were in fact describing different things, because individuals rate their degree of control according to their expectations. If my job is to stand in front of the door and look at people's passes as they come through the door I have, from my own perspective, quite a lot of control. I can say, "Please," or I can be rude, or I can wait until they've walked a few paces in before asking them. In those sorts of circumstances you can imagine why some of the lower grade civil servants told us they had control over their work while their managers thought they had no control at all. The interesting finding is that both measures of control predict coronary disease.

We're now looking at another aspect of work stress, the imbalance between effort and reward. If you're expending extra effort and the reward for

this —whether in the form of income, self-esteem or status — is inadequate compared with the effort expended, then that imbalance between effort and reward is bad for you. People who report high effort and low reward have higher coronary heart disease incidence than those with low effort and high reward, even when you adjust for low control. Conversely, low control predicts coronary disease even when you adjust for effort and reward imbalance. Furthermore, the relation between effort-reward imbalance and control and ischaemic heart disease proves to be largely independent of conventional coronary risk factors.

## Unemployment

*Job security increases health, well-being and job satisfaction.*

Of course, the other health aspect of work is having some. There's ample evidence of the effects of unemployment on health. Even job insecurity has effects. We examined one Civil Service department in Whitehall that was going through the throes of being sold to the private sector, and we found evidence that the consequent job insecurity adversely affected workers' health.

This is, of course, a vital issue, because every politician in power will tell you that labour market flexibility is a good thing, and the other side of labour market flexibility is job insecurity. If politicians feel that labour market flexibility is a good thing, we must at least let them know that they are doing it at a cost. The cost is job insecurity, and job insecurity is bad for health.

Several years ago a Chancellor of the Exchequer said that if an increase in unemployment is the price we have to pay to keep inflation down, it's a price worth paying. My response then was that an increase in unemployment meant that the unemployed would have mortality rates 20 per cent higher than those in the social class from which they came. What that Chancellor was actually saying was that a few extra deaths was a price worth paying to keep inflation down. I wonder if he would have said it publicly in that form. It is important to feed that sort of information into the political debate. Information has power.

## Social Supports

*Friendship, good social relations and strong supportive networks improve health at home, at work and in the community.*

The Whitehall Study gave us direct evidence on the effect of social supports. There's a fivefold difference in mental illness rates between people who have good supports (and fewer material problems) and those who haven't.

Again, this also operates at the level of the wider society. One way of measuring the quality of the social environment comes from a study of violent crime in Chicago. The researchers asked a few simple questions on social cohesion and trust. People in one neighbourhood were willing to help neighbours; this was a close-knit neighbourhood where people in the neighbourhood could be trusted. People in another neighbourhood didn't get along or share the same values. On the basis of the answers to these few simple questions they constructed indices of social cohesion and trust, and what these showed was that areas of high social cohesion and trust had lower rates of violent crime, particularly homicide. We've now gone back to the Chicago study and have evidence that other causes of mortality follow the same pattern. Areas of more social cohesion and trust have lower rates of mortality.

## Addiction

*Individuals turn to alcohol, drugs and tobacco and suffer from their use, but their use is influenced by the wider social setting.*

We are terribly concerned about individual behaviours, but we now also understand that individual behaviours are determined by the social environment. Deprivation, of course, is related to smoking — lower social class, no access to a car, rented housing, crowded accommodation, unemployment all correlate. Stress is related to smoking, and so is being a lone parent, being divorced or separated, having a history of mental illness, current tranquilliser use and being a heavy drinker. If we plot prevalence in smoking by men and women against deprivation scores this once again produces a social gradient, and a very steep gradient at that. Individual behaviour is determined by the society in which we live.

## Food

*Healthy food is a political issue.*

I chaired the British government's Committee on Medical Aspects of Food Policy subgroup on nutritional aspects of cardiovascular disease. When we reported in 1994, we said all the usual things about the importance of lowering fat and increasing consumption of fruit and vegetables. What was new in the British context, however, was that we recommended a one-third reduction in salt intake. As we also pointed to the fact that 81 per cent of salt consumed was in processed food, the food industry were very quick to realise that this meant that they would have to change. First of all, naturally, they attacked the probity of the Committee. After that they went to the government and claimed that civil servants colluding with bossy

leftist food activists with no medical or scientific background to put tens of thousands of jobs in the food industry at risk.

I could not believe it. A committee of experts, with an enormous amount of medical and scientific background, had done something I had naively thought was anything but controversial. We had recommended that we lower salt consumption in the interest of cardiovascular health, and it was as if we had declared World War III. The food industry rode into battle.

The final argument from the Food and Drink Federation was that the recommendations on salt did not appear to be based on sound science. Well, 56 randomised controlled trials have showed the beneficial effect of sodium reduction on blood pressure changes. How much more research do you need? There are also definitive experiments in chimpanzees. It seems that sound science is what the food industry finds convenient.

### Transport

*Healthy transport means reducing driving and encouraging more walking and cycling, backed up by better public transport.*

One of our recommendations in the Acheson Report was for subsidies for public transport, in particular for a reduced fare scheme for pensioners. The evidence from Sheffield in the north of England was that, the mortality rates go up when old people are isolated. When public transport was heavily subsidised, old people moved around more. When the subsidies were taken off public transport and the bus system was deregulated, old people moved around less and were more socially isolated, which was bad for their health.

### The Acheson Inquiry

Every message in *The Solid Facts* was accompanied by a section on policy implications. I have also been involved in the Acheson Inquiry, which carried on the themes covered in *The Solid Facts* and attempted to particularise its policy implications in a British context.

The Acheson Inquiry was the lineal successor to the Black Inquiry, which had been set up by the previous Labour Government in 1978. Richard Wilkinson had written an open letter to the Secretary of State for Health asking why inequalities in health still persisted 30 years after the establishment of a National Health Service (NHS), and the Secretary of State set up an Inquiry under Sir Douglas Black. Black said that looking at the NHS was the wrong way to think about health. Medical care was very important when people got sick, but inequalities in health were not caused by

lack of access to good quality medical care, they were due to the material conditions of society. By the time the Inquiry reported, however, the Labour government was out of office and the new Conservative government refused even to publish the Black Report. The Report became a *cause celebre* among the small coterie of people interested in this area, had an enormous impact on the scientific community and the public health community, but for 20 years had no impact at all on government.

The Black Report was a landmark document, and without it the Acheson Report wouldn't have been able to do its work in the way it did. Black stimulated a whole body of research that informed our thinking and, despite an unfriendly government, an enormous amount of British research did get done in the nearly 20 years separating the Black Report and the Acheson Report. We were in a much better position to make recommendations on the basis of the scientific information than Black had been.

The new Labour government was elected in Britain on 1 May 1997. On 2 May 1997 it announced it would set up an independent inquiry into inequalities in health under the chairmanship of Sir Donald Acheson, a former Chief Medical Officer. The terms of reference for the Inquiry were to summarise the evidence of inequalities in health and expectation of life in England, to contribute to the new health strategy by identifying priority areas for future policy development based on "scientific and expert" evidence, and (because of what had happened to the Black Report) to publish its report. I served on the Scientific Advisory Group that prepared that Report, which was published in November 1998. In it we made 39 recommendations to government about what it could do about social inequalities in health.

There were only six of us on the Acheson Inquiry to review the whole of human life, from birth to death and everything in between, and we were given only 9 months to do our work — a ridiculously short time, but the government had said that it wanted the findings of our Inquiry to inform its health strategy document, the White Paper it was due to publish this year on *Our Healthier Nation*.

We commissioned 17 experts to consult with a wider network of experts to prepare input papers and to prepare draft recommendations. We then reviewed those input papers ourselves, invited the experts to come and provide evidence, received written commentaries on the papers, and submitted those input papers and draft recommendations to an expert peer review group consisting of the Editor of the *British Medical Journal*, the Editor of the *Lancet*, the Director of the Cochrane Centre, and a distinguished medical sociologist.

The expert group produced its own list of best bets, including nicotine replacement and behavioural therapy for smoking reduction; drug education in schools, social support during and after childbirth, preschool milk, and smoke alarms. This was a defining moment for our Committee. Until then we'd been a rather ragged bunch with a lot of different views about what we were doing, and suddenly we cohered as a group. It was very clear to us that we were not going to follow the evidence-based medicine model by asking for other randomised control trials to support the recommendations. If that was all we were going to do we would have little to offer the government or the country. We had to take a much wider view of the evidence.

The Acheson Committee adopted the socioeconomic model of health. Mortality, morbidity and well-being appeared to be linked to social structure. We were trying to find how one interrupted the links. Medical care does deal with these issues, but only some way downstream from the source. If you wanted to address the fact that lower social classes had higher rates of lung cancer than higher classes, you could certainly recommend putting nicotine replacement therapy on prescription for low income people, and we did that. You could also look higher upstream, however, towards the wider social issues involved in tobacco use. The quality of evidence at any point depends on your focus. The further downstream you go, the more likely it is that you'll find a randomised control trial to support your recommendation, and the more upstream you go the less likelihood there is of finding such a trial. You've got to deal with other sorts of evidence.

One of the Inquiry's terms of reference was to identify priority areas for future policy development. As we continued our work it became increasingly clear that it was not going to be possible, nor was it probably desirable, to be too specific in our recommendations. We could not, for example, tell the Chancellor of the Exchequer what the level of tax on benefits should be. That's for politicians to decide, not scientific advisers. We could point to the effect of increasing disparities in income, which can be exacerbated by the tax and benefit system, but it was not for us to be specific about the details.

We made three priority recommendations. The first was health and inequality impact assessment. All government policies should favour the less well off, and there should be assessment of the effect of all policies on health inequalities. The second was that higher priority should be given to women of child-bearing age, expectant mothers and young children. The third was that further steps should be taken to reduce income inequalities and to improve the living standards of poor households.

We recommended reducing poverty in families with children, providing affordable high quality day care and preschool education with extra resources for disadvantaged communities, improving the health and nutrition of women of child-bearing age and their children, and further reducing the poverty of women of child-bearing age, expectant mothers, young children and older people by increasing social benefits.

We addressed the issue of unemployment in two or three different ways — skills training, keeping young people in education, and raising the benefit levels of the unemployed. We did not suggest changes to the structure of the labour market because we were trying to identify the areas for policy development where we could see potential policy flowing from it. Even if changing the structure of the labour market would actually change the nature of unemployment, it's not clear what governments can do about it.

One of the criticisms of the Acheson Committee has been that we were not specific enough or political enough. We were trying to tread the line between being too woolly and vague and being too specific and political. Did we strike the right balance? I'm not sure. We'll have to see.

The most important question, of course, is what happens next. Will policy-makers take heed of our recommendations? If they do, will they take action? If action is taken, will it have the desired effect? Chou En Lai was once asked whether the French Revolution had been a success. He said it was too early to tell. Similarly, it's going to take a while before we see whether these questions are going to be answered in the affirmative. But there are encouraging signs in government policy that things are heading in the right direction.

## Author

Professor Michael Marmot  
International Centre for Health and Society  
Department of Epidemiology and Public Health  
University College  
Gower Street  
London WC1E 6BT  
UK  
Phone: +44 20 7679 1694  
E-mail: m.marmot@public-health.ucl.ac.uk