Findings on palpation are not always a guide to the true functional findings and the cause of hyperthyroidism. Our results supported this, with only 40 out of 63 cases being correctly diagnosed before the thyroid scan was obtained.

Early diagnosis is particularly important in view of the excellent results achieved with radioiodine. Recent follow up studies (paper in preparation) of treatment of single hyperfunctioning nodules have shown that all patients could be rendered euthyroid, in most cases with only one dose of radioiodine, with no incidence of hypothyroidism in patients followed up for up to 10 years.³

We conclude that thyroid scanning is essential in the management of hyperthyroid patients who do not show the classical features of Graves' disease, especially when a nodule or a multinodular goitre is palpated and when no goitre is palpable. This would permit early and successful treatment of single and multiple hyperfunctioning nodules.

We thank Susan Finer and Susan Ellam for database assistance and advice and Toni Buckley for typing the manuscript.

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(Accepted 1 August 1985)

Occupationless Health

"He never got over losing his job": death on the dole

RICHARD SMITH

In politics corpses matter: a few deaths may change policy in a way that an ocean of misery will not. Much energy has thus been devoted to arguing whether unemployment kills. From his aggregate studies (also known as time series analyses) Brenner has calculated that societies in which the number of unemployed increases by more than one million in five years will experience 50 000 more deaths from general illness and 167 000 more from cardiovascular causes,¹ but Gravelle has countered under the heading "Lies, damned lies, and time series results" by arguing that unemployment is "not important in explaining variations in general population mortality."² Scott-Samuel in his turn has attacked Gravelle for underplaying the results of an important study from the Office of Population Censuses and Surveys³ and offered his own calculation that male unemployment causes 3000 extra deaths a year in Britain.⁴

Aggregate studies before Brenner

Time series analyses relate measures of economic activity and stability with measures of health in different communities over varying periods of time. Brenner is the name most associated with these studies, but Fraser attempted comparisons between different countries more than 10 years ago,⁵ and Singer in the 1930s was using these techniques to try to find an association between unemployment and maternal and infant mortality and deaths from specific causes.⁶

He worked out differences in death rates from various causes for all the county boroughs in England and Wales from 1928-33 and tried to correlate these with changes in unemployment rate. After attempting to eliminate the effects of other variables he found statistically significant correlations between unemployment and maternal and infant mortality and deaths from diarrhoea and

enteritis, diphtheria, scarlet fever, and tuberculosis. Stern, however, has recently reworked these data and found that only the correlation with maternal mortality was significant.⁸

Morris and Titmuss tried to extend Singer's work in a paper published in 1940,⁹ and Farrow has recently summarised their work.¹⁰ They looked at deaths from rheumatic heart disease and unemployment rates in 83 county boroughs from 1927-38 and found correlations between unemployment, poverty, overcrowding, and mortality. The correlation between unemployment and mortality

Five years ago we were a happy, contented family. My husband had a good job. I was working at North Tees Hospital. We were able to buy a nice house, we had annual holidays. If we wished to buy anything we bought it. We had a little in the bank. Then my husband fell into ill health. He was made redundant, he was 54 then and because of his age was unable to find employment. I went on to full time working at the hospital. As the years have gone on—our savings went, no more holidays, no social life at all. We began to sell our possessions. The colour TV. Our lovely grandfather clock, our rings, watches, bits of silver and brass, our stereo—anything we could sell we sold to pay the ever rising cost of living, the bills which are more each time they arrive. My son is now 15 years old, he is a big boy with a big appetite. He seems to grow overnight. It is a nightmare trying to keep up with his clothes. He is in men's clothes now, which are very expensive. He's a good boy doing very well at school and we are determined that he goes on to higher education. I have been in ill health for two years, I'm sure it is all the worry and stress of trying to cope. Both my husband and I are ex-service. Is this what we fought for? Extract from a letter quoted in *Unemployment and the Family* by Jennie Popay.²⁷

persisted even after allowing for the correlations with poverty and overcrowding. Stern found the methods sophisticated for the time and the results persuasive but not conclusive.⁸ Brenner did not know of the work of Morris and Titmuss until after he had done many of his studies and was delighted when he learnt of it. He wrote: "These findings are nearly identical to those I have reported for the United States in all major categories of heart disease for all ages."¹¹

Brenner and his battles

Computers have made aggregate analyses much easier but also more baffling: the innumerate, which by the standards of Brenner is most of us, can be bewitched by the mathematical magician. Despite computers, these studies do not allow any more confident conclusions now than they did in the 1930s and 1940s. We cannot know, for instance, whether excess deaths occur among the employed or the unemployed, and Brenner does not suggest that all the excess deaths occur in the unemployed.¹² Many, he hypothesises, do occur among the unemployed but they probably also occur among those left in unstable work and in those who lose one job and find another that is perhaps more poorly paid and more dangerous. Furthermore, the death rate tends to increase when the economy picks up again—people starting new jobs that demand new skills may experience increased mortality.

Brenner began his work by finding an inverse relation between the first admission rate to New York State mental hospitals and the employment rate from 1914 to 1967 and an index of business cycles from 1841 to 1909.¹³ Next he found that for the whole of the United States homicide and suicide rates rose within a year of unemployment rising,¹⁴ and then he moved on to looking at "chronic physical illnesses with a stress element, especially cardiovascular diseases"¹⁵: for most age groups and both sexes deaths from cardiovascular disease increased after a lag of two to three years. Before turning his attention to Britain, Brenner went on to relate the infant mortality rate,¹⁶ mortality from alcohol consumption,¹⁷ and total mortality to economic instability.¹⁸

In his analysis of the relation between mortality and changes in the national economy in England and Wales from 1936 to 1976 Brenner used a model with four main components: real per caput income, which shows a steady increase and is associated with improved nutrition, sanitation, and living conditions; the unemployment rate: a measure of "rapid economic growth" derived from deviations from the steady increase in real per caput income; and government expenditure on welfare. He found that long term economic growth was negatively related and unemployment (indicating recession) positively related to mortality in all age groups. Rapid economic growth was weakly related and welfare expenditure inversely related to mortality only for those under 4. Just as in America, deaths from suicide and homicide rose within a year while deaths from cardiovascular disease took two to three years to increase. Brenner emphasised that the increases in mortality resulted from a slowing of the expected decline and a widening of the long observed differentials in death rates between different socioeconomic groups.

Later a group from London used Brenner's model over a longer time (1922-76) and fed in what they argued were better data.¹⁹ They found no statistically significant relation between unemployment and mortality. The dominant feature between 1936 and 1976 was, they pointed out, the dramatic fall in unemployment at the beginning of the war, and any analysis that included this fall was bound to find a correlation with mortality, which has been falling steeply all the time. Brenner replied by saying that he had made it quite clear that his model was applicable only to the shorter time span and could not be used in particular for years that included the 1930s depression.²⁰ Other aggregate studies have been made of Scotland and have either found no relation between mortality from all causes or a slight negative association.^{21, 22}

These aggregate studies were at the centre of the debate over unemployment and health a few years ago, but their importance has now receded—partly because of their inherent limitations and

partly because better studies have come along. To summarise the problems with these studies,²³ firstly, studies of correlation cannot prove causation, and, secondly, what goes for whole populations may not go for individuals within those populations. Thirdly, the authors of these studies often present few details of their findings, and when they are generating so much data and applying so many statistical tests it is easy to concentrate on the most impressive results. Fourthly, minor procedural changes—for instance, use of a different time span—produce dramatically different results. Fifthly, there are many confounding variables (those that vary with unemployment and may be the true causes of changes in health) such as changes in diet and availability of health services. Finally, these are necessarily all studies of the past and thus the results may not apply to now—for instance, today the unemployed experience less absolute poverty than the unemployed of the 1930s, which might make a big difference in the effects of unemployment on mortality.

Longitudinal studies

More important now than these aggregate studies are longitudinal studies, which follow a group of people through time as their employment status changes: these can prove causal links between unemployment and mortality. Sadly, such a specific longitudinal study was never set up in Britain—despite unemployment beginning to increase dramatically over five years ago. Clever use has been made, however, of data from the 1971 census, which did ask about employment status in the week before the census.

Moser *et al* used data from the Office of Population Censuses and Surveys longitudinal study that follows up a 1% sample of the population of England and Wales.⁴ They looked at 5861 men aged 15-64 (3.6% of the total) who said that they were waiting to take up a job or seeking work in the week before the census. The study does not include those who were temporarily or permanently sick, retired, or otherwise inactive, or women because of the difficulty of interpreting their employment status—for instance, 38% of the sample was put in the inactive category, to which housewives are assigned.

The standardised mortality ratio for 1971-81 for men aged 15-64 at death who were seeking work in 1971 was 136 (95% confidence intervals 122 to 152). It was higher in the second half of the decade (144) than the first half (129) and was raised for all ages, although it was particularly high among those under 54, reaching over 200 in those aged 35-44 (fig 1).

FIG 1—Standardised mortality ratio from 1971-81 among men seeking work in 1971 by age at death.

Moser *et al* calculated that some of this difference in mortality between those employed and unemployed was due to socioeconomic distribution: the standardised mortality ratio for all unemployed men standardised for age and class was 121 (95% confidence intervals 108 to 135). But within each social class the mortality was higher among the unemployed than the employed, and the

difference in mortality between the highest and the lowest social classes was greater for the unemployed than the employed. The causes of death that predominated among the unemployed were "malignant neoplasms" (SMR 141), particularly lung cancer (SMR 175), and "accidents, poisonings, and violence" (SMR 202), particularly suicide (SMR 241).

Was the excess mortality among those seeking work caused by the unhealthy being more likely to become unemployed? Moser *et al* had to be ingenious in trying to answer this question because the data had not been collected with this question in mind. They pose the hypothesis that if people were becoming unemployed because they were sick then there would be greater mortality in the whole group at the beginning of the decade compared with the end as some of these people died and the health of the group as a whole improved. In fact, the mortality before standardisation for social class was higher in the second half of the decade, and after standardisation there was no significant difference between the two periods.

Another method used to eliminate the "health selection effect" is to look at the mortality of the wives of men seeking work. If unemployment itself harms health, the argument goes, then it might also harm the health of wives. The overall SMR for the 2906 women was 120 (95% confidence intervals 102 to 139). Thus there seems to be an effect of unemployment on the health of wives comparable to that on their husbands.

It must be remembered, too, that many of those who lost their jobs because they were sick would be included in the temporarily or permanently sick groups—and so would be excluded from this study. The bias is thus towards the "healthier unemployed," but the conclusion of Moser *et al* on whether unemployment per se causes increased deaths is suitably restrained.

"Although these data provide no strong evidence for a selection effect, we cannot rule out the possibility that there is one operating. The complexity of the hypothesis and the large sampling variation make conclusive interpretation of the data difficult." But we should not, I think, become too obsessed with trying to work out whether poor health or unemployment comes first because either way it adds up to a great many people in poor health not having jobs.

Another problem with concluding too much from this study is that unemployment was about 4% in 1971 but is now over 13%. As unemployment has grown so the characteristics of the unemployed have changed; unemployment is now much commoner among the middle aged and the middle class, in whom it was rare in times of fuller employment. Possibly any effect whereby the unhealthy are more likely to lose their jobs may operate more strongly when fewer people are unemployed; we do not know. The researchers thus warn against extrapolating from their findings to estimate the impact of unemployment on health today. But it is hard to resist making a few calculations based on these data, and Scott-Samuel has calculated that if the population attributable risk of death associated with unemployment has remained constant and if the risk applies equally to the whole of Britain then the number of deaths from male unemployment in 1984 in Britain would have been 2125 among men and 1077 among their wives.⁴

Conclusions and possible mechanisms

It has not been proved that unemployment kills. The circumstantial evidence is strong, and many studies point in the same direction. But those who want proof as strong as the proof that cigarette smoking causes lung cancer will probably never have it. This is as much a reflection of the difficulty of the problem—with its many confounding variables—as of the inadequacies of the studies. Also any association there may be between unemployment and death cannot be nearly as strong as that between smoking and death.

As there is no consensus that unemployment leads to an increase in mortality, not surprisingly there has been little research into mechanisms; nevertheless, when thinking about unemployment and health there is a tendency, which has to be resisted, sooner or later to adopt an oversimplified model: changes in the economy are seen as the cause of the problem of unemployment, which leads in

turn to poor health and death. Spruit has criticised this model,³⁴ and Svensson has proposed a more complex one (fig 2).³⁵

We must not dismiss as an epidemiological nuisance the complicating factor that the unhealthy are more likely than the healthy to find themselves without jobs. Some of these sick people will feature in the unemployed statistics and so lead to an association between unemployment and premature death; but others will be classified as long term sick or prematurely retired and so not contribute.

FIG 2—How might unemployment lead to poor health?

Furthermore, double jeopardy operates: those who lose their jobs because they are unhealthy, a vulnerable and ailing group, are then exposed to the full misery of unemployment and a further deterioration in health. Many of these people are unskilled middle aged men, some of them probably heavy smokers and drinkers, who are ripe for developing heart disease.

So how might unemployment cause death? The proved deterioration in mental health associated with unemployment may cause death not only through suicide but also through aggravating physical illnesses and reducing people's ability and will to recover from them. Epidemiologists have made little progress with sorting out the importance of mental health in conditions such as heart disease, and they are always tempted to ignore it because of "measurement problems." But even measuring blood pressure may be difficult, and the talk of "measurement problems" may hide an ingrained or inbuilt impatience with trying to sort out how an ailing

Unemployed man in Wigan 1939 (left) (BBC Hulton Picture Library). Woman queuing for work in Kirkby employment exchange 1975 (right) (picture by John Sturrock, copyright Report).

pysche may lead to physical disease, so that substantial effects of unemployment on physical health and mortality are not being elucidated.

Poverty is the next way in which unemployment may lead to poor physical health, because unemployment leads to poverty (2 November, p 1263) and poverty leads to poorer health and higher mortality. It does this in a myriad of unelucidated ways, but poorer living conditions combine with reduced access to medical services. The inadequate diet of the unemployed (2 November, p 1263) must harm health, but so may changes in tobacco and alcohol consumption, drug taking, and general lifestyle. The harm caused by some of these factors may not become apparent for many years.

Finally, much of the damage associated with unemployment may be experienced not only by those without any job but also by those who worry about losing a job, accept poorer working conditions rather than leave a job, leave relatively good jobs to pass through a series of poorly paid and perhaps dangerous jobs, put together an inadequate and insecure living in the black economy, or are pushed against their will into premature retirement. These groups constitute the non-employed or the subemployed, and researchers are increasingly focusing on them.²⁶

This article makes only passing reference to unemployment and suicide: the next will consider the issue more fully.

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