Does unemployment cause mortality?

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1. Introduction

Previous observational follow-up studies of individuals have shown that mortality rates among the unemployed are higher than among the employed (Moser et al. 1984, Iversen et al. 1987, Martikainen, 1990, Morris et al. 1994). Two mechanisms may explain this excess mortality.

(1) *Causal effects of unemployment*: Becoming jobless and prolonged redundancy have negative effects on health and increase the risk of premature death. The causal effects of unemployment are mainly assumed to be mediated through increased psychosocial stress, tobacco and alcohol consumption, as well as loss of income and material deprivation.

(2) *Selection*: Persons likely to become unemployed, or to have difficulty in re-employment, have *pre-existing* ill-health and/or "lifestyle" (e.g. tobacco and alcohol consumption, diet), socioeconomic (e.g. social class, housing tenure) or personal characteristics (e.g. age, sex, physical weakness, psychological characteristics, and early life experiences) that increase the risk of future ill-health and mortality.

In the following I will present three approaches that have been used to determine whether the relationship between unemployment and mortality is causal. All analyses are based on the 1980, 1985 or 1990 census records of all Finnish men which were linked to information on unemployment and death records in the period 1981-1993 by the Statistics Finland. Only about 0.3 per cent of registered death could not be matched to a census record. All data are analysed by means of Poisson regression analysis, and the GLIM statistical package is used in fitting the models (Aitkin et al. 1989).

2. Three approaches

Observational follow-up studies of unemployed individuals

Several studies have investigated the relationship between unemployment and mortality in terms of observational follow-up studies of individuals. Usually, in such studies the exposure to unemployment, and possible confounders have been assessed at baseline. The cohort is then followed for mortality.

Table 1 shows Finnish data on the association of unemployment in the year preceding the 1980 census with mortality in the period 1981-85 (Martikainen 1990). Total mortality among unemployed men is 2.54 times higher than among employed men. This excess mortality falls by almost 40 per cent when sociodemographic background variables available at the census are simultaneously adjusted for. Nonetheless, relative excess mortality of 1.93 still remains. Adjusted relative death rate among unemployed men is higher for accidents and violence than it is for diseases, 2.51 and 1.70, respectively. Highest relative mortality prevails in alcohol related diseases, respiratory diseases and alcohol poisonings (results not presented). Excess mortality is also more pronounced for circulatory diseases than cancer.

However, strong causal inferences about the harmful effects of unemployment on health on the basis of observational follow-up studies are not warranted because of the inadequate assessment of selection effects. Although selection based on pre-existing ill-health seems of lesser importance (Martikainen 1990, Morris et al. 1994), lack of data on personal characteristics and lifestyle make it difficult to adjust

for all possible selection factors. The following two study designs try to overcome these problems.

Table 1. Relative mortality rates among 30-54 year old unemployed men by cause of death.

Cause of death	Age adjusted relative rate	All background variables adjusted[*]	
		Relative rate	95 % confidence interval
Total mortality (ICD 1-999)	2.41	1.93	1.82-2.05
Diseases	2.03	1.70	1.58-1.83
Malignant neoplasms (ICD 140-239)	1.39	1.17	1.00-1.37
Circulatory diseases (ICD 390-458)	1.87	1.54	1.40-1.70
Diseases of the respiratory system (ICD 460-493)	4.78	3.32	2.14-5.13
Alcohol related diseases (ICD 291, 303,571,577)	5.80	5.24	4.21-6.52
Other diseases	2.90	2.67	2.03-3.51
Accidents & violence (ICD E800-E999)	3.45	2.51	2.28-2.76

* Adjusting for age, socioeconomic status, education, marital status, reimbursable medicines and sick allowance days.

Unemployment and mortality in a period of rapidly increasing unemployment rate

In the late 1980's the unemployment rate in Finland was about 5 per cent. However, unemployment in Finland began to increase in late 1990. By the end of 1992 unemployment had climbed to 15 per cent, and by early 1994 a peak figure of about 19 per cent was recorded. Long-term joblessness became more common and redundancy also affected the well-educated labour force and white collar occupations.

The Finnish context of a deep recession is here used to analyse the association between annual changes in individual employment and mortality (Martikainen and Valkonen, 1996). If selection were a major factor explaining the excess mortality among the unemployed, then this excess mortality should be smaller when the general unemployment rate is high than when it is low. At a time of high unemployment, becoming and/or remaining redundant can be assumed to be less dependent of individual characteristics that increase the risk of ill-health.

Mortality of those who experienced unemployment before the recession and those who experienced unemployment for the first time at different stages of the recession is presented in table 2 . To compare like with like, we analysed mortality in three one-year periods after the unemployment experiences in the years 1990, 1991 and 1992. The excess mortality was lower when unemployment was experienced later in the recession. Men unemployed for the first time in 1990, 1991 or 1992 had, respectively, 111, 72 and 35 per cent higher standardized mortality than did men who remained employed.

Table 2. Mortality[*] ratios adjusted for age, education, occupational class and marital status by employment status and year of first unemployment experience, 25-59-year-old men.

	Person-years (*1000)	Mortality ratio	95 % confidence interval	Age-standardized mortality	Unemployment rate (%)
Employed in 1987-90	940	1.00		240	
Unemployed for the first time in 1990	24	2.11	1.76-2.53	603	7.6
Employed in 1987-91	857	1.00		216	
Unemployed for the first time in 1991	67	1.72	1.51-1.96	436	15.4
Employed in 1987-92	768	1.00		206	
Unemployed for the first time in 1992	67	1.35	1.16-1.56	312	22.0

In addition to reduced effects of selection, the small excess mortality of the unemployed at the hight of the recession may be due to the amelioration of the harmful effects of unemployment, such as psychosocial stress and stigmatization, when many others are also without work. In Finland, the latter explanation seems to be of lesser importance. Men who were unemployed during 1987-89 but were re-employed during 1990-1992 had a clearly higher mortality than those who remained employed (results not shown here). This finding suggests that under favourable economic circumstances unemployment is highly selective and is related to the accumulation of disadvantage and poor position in the labour market. Furthermore, it is unlikely that the effects of the unemployment stigma on mortality could change within the space of just one or two years.

The effects of differential increase of unemployment rates of occupation groups on changes in mortality

By analysing the effects of rapid changes in unemployment rates of occupation groups on changes in mortality in these same groups, it is possible to avoid selection bias. The increase in unemployment rate of occupation groups is not dependant on individual characteristics, but on changes in the labour markets. The approach is thus related to the studies of the effects of 'factory closures', i.e. natural experiments of situations where the total labour force of an employer is made redundant regardless of their individual characteristics. In the following analyses unfavourable changes in mortality in occupation groups with large increase in unemployment are assumed to indicate a causal effect of unemployment on mortality (Martikainen and Valkonen, 1998).

Each subject was assigned to one of three broad occupation groups on the basis of their occupation at the census of 1985. These occupation groups were created on the basis of information on the magnitude of change in unemployment within occupations: (1) small increase in unemployment; on average from 4.5 % in 1988 to 8.2 % in 1992, (2) intermediate increase in unemployment; on average from 5.0 to 15.9 % and (3) large increase in unemployment; on average from 10.0 to 31.2 %.

The mortality of the whole study population increased (due to the healthy worker effect). Table 3 shows relative changes in mortality from the period 1987-90 to 1991-93 in the occupation groups by age. Differences in mortality trends between occupation groups were quite small. However, men in occupations that had experienced small increases in unemployment also seemed to have lower increase in mortality than men in occupations that had experienced large increases in unemployment. This difference in change in mortality seemed to be most evident among 50-64-year-olds. These differences in mortality change were not statistically significant. The smaller than average increase in all cause mortality of those working in occupations that experienced small increases in unemployment was mainly a reflection of a favourable development of mortality from diseases. Increases in accidental and violent mortality were very similar in all occupation groups.

Table 3. Per cent change in age-adjusted mortality from 1987-90 to 1991-93 by age and increase in occupation unemployment. Economically active men in 1985, aged 20-64 during the follow-up.

Increase in occupation unemployment rate	20-64-years	20-49-years	50-64-years
Small	0.6 -4.5 to 6.0	3.1 -4.6 to 11.5	-2.4 -9.0 to 4.7
Intermediate	4.0 1.0 to 7.1	4.4 -1.4 to 9.1	4.1 0.1 to 8.2
Large	4.1 0.0 to 8.3	4.0 -1.6 to 10.0	3.8 -1.9 to 9.9
All	3.4 1.2 to 5.6	4.1 0.8 to 7.4	2.8 -1.7 to 5.8

In the interpretation of the results attention needs to be paid to specific aspects of the study design. Although the study covers the whole economically active population of Finland, the analyses presented in this study may be insensitive to small effects of unemployment because of random variation. For this reason, we have tried to estimate the lowest excess mortality caused by unemployment at individual level that is required to make the mortality trends of the three occupation groups to diverge. No standard

statistical procedures that we know of exists to make this evaluation. However, we can calculate expected (hypothetical) rates of growth of mortality for each occupation group by making assumptions about the excess mortality of the unemployed and combining these assumptions with the known change in the unemployment rate of these groups. Such rough calculations indicate that among men in our data a 30 per cent or larger excess mortality among the unemployed would be detected in occupation group mortality trends. In accidental and violent causes of death the threshold excess is about 60-70 per cent.

3. Conclusions

We have presented three analyses that assess the nature of the relationship between unemployment and mortality. The aim of the first analyses were to demonstrate the problems of causal inference with observational data. This analysis, as well as earlier studies attempting to adjust for the effects of confounding have found that the confounders do not fully explain the excess mortality of the unemployed. In a recent study, an excess mortality of 47 per cent was observed among men unemployed or working part-time for reasons other than illness after adjustment for age, geographic region, social class, cigarette smoking, alcohol consumption, weight and known pre-existing disease. However, causal attribution of mortality due to unemployment remains difficult because most studies have only adjusted for a limited range of potential confounding factors and inaccuracy in the measurement of known confounders may leave residual confounding effects.

The two other analyses presented here have tried to use naturally occurring situations where the competing explanations can more easily be separated. These results provide evidence for unaccounted confounding by showing the weakening association between unemployment and individual mortality with the rising unemployment rate, and that the change in mortality is similar in occupation groups that have experienced very different changes in unemployment rate. The results of conventional follow-up studies are thus likely to overestimate the causal effects of unemployment on mortality.

Whatever the reasons - causation and/or selection - behind the high mortality of the unemployed, the true public health impact of economic recession and increasing unemployment cannot be deduced from the excess mortality ratios observed when the unemployment rate is low.

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