SHORT REPORT

Company closure and mortality in a Greek bus company

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Background

Previous studies strongly support an association between unemployment and an increased risk of morbidity and mortality.

Aims

To assess the impact of company closure on the mortality of redundant employees.

Methods

The mortality of a cohort of male ex-employees of the Athens Bus Transportation Company Epixirisi Astikon Siginonion (EAS) was followed from September 1992 to October 1993. Information on causes of death was obtained from death certificates and classified according to the ninth revision of the International Classification of Diseases. The expected number of deaths was calculated based on 5 year age groups. Cause-specific mortality rates for the Greek population were obtained from the Greek National Statistics Service, and standardized mortality rates (SMRs) were calculated using population census data for 1991.

Results

The cohort consisted of 4400 subjects. Thirty deaths were recorded. Crude mortality was significantly elevated (SMR = 1.75; 95% confidence interval (CI) 1.18–2.5; Table 1). A statistically significant excess in mortality from ischaemic heart disease was shown (18 deaths observed; SMR = 4.83; 95% CI 2.86–7.64). One year before the privatization and closure of EAS (1991), nine deaths were recorded among its 7400 employees (SMR = 0.34).

Conclusions

Our study found a significant increase in all-cause mortality and death from ischaemic heart disease in male workers who were made redundant and suggested a significant negative impact of unemployment resulting from company closure on mortality. These results may signal future mortality patterns in Greece if the current climate of austerity and recession continues.

Introduction

Current evidence strongly supports a positive association between unemployment and an increased risk of morbidity (physical or mental illness or use of health care services), both at the population and individual levels, and a greater risk of mortality at the population level. In particular, in a systematic review of the available evidence, Lin et al. [1] found that unemployment was significantly associated with increased all-cause and cardiovascular mortality. Moreover, a more recent study suggested that unemployment was independently associated with an elevated risk of mortality [2]. There are some early signs of a negative impact of the current financial crisis on health in Greece [3,4] where the austerity programme implemented by the Greek government includes restructuring and closure of several public services. Given the lack of empirical data on the association between unemployment and health in Greece we have retrospectively investigated the closure of the Athens Bus Transportation Company, Epixirisi Astikon Siginonion (EAS), a case of privatization and company closure that attracted considerable public attention in Greece during the 1990s.

In August 1992 the state-owned EAS (7400 employees) was closed, and the urban transportation service was taken over by a new private company. Of 7400 former employees, 4500 (4400 male and 100 female) were unemployed until October 1993 when a newly elected government announced the re-establishment

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of a state-owned bus company. In this study we present mortality data for the cohort of male former employees, followed for 13 months from September 1992 to October 1993.

**Methods**

Information on causes of death was obtained from death certificates, classified according to the ninth revision of the International Classification of Diseases (ICD-9). The expected number of deaths was calculated based on 5 year age groups. Cause-specific mortality rates for the Greek population were obtained from the Greek National Statistics Service, and standardized mortality rates (SMRs) were calculated using population census data for 1991. Statistical analysis was performed using Epi-info and Open Epi statistical software. The protocol of the study was approved by the scientific committee of the postgraduate programme (Applied Public and Environmental Hygiene) of the Medical Faculty at the University of Thessaly, Greece.

**Results**

In 1991, 1 year before the privatization and closure of EAS, nine deaths were recorded among the 7400 employees (expected number of deaths = 26; SMR = 0.34; 95% confidence interval (CI) 0.16–0.62). The mean age of the male workers who were subsequently made redundant was 43. Sixty five percent of these workers (n = 2860) were drivers; 25% (n = 1100) were blue collar workers (e.g. painters, carpenters and mechanics) and 10% (n = 440) were office workers.

During the follow-up period, 30 deaths occurred among the 4400 male former employees. Crude mortality was significantly elevated (SMR = 1.75; 95% CI 1.18–2.5; Table 1), with a statistically significant excess in mortality from ischaemic heart disease (18 deaths observed; SMR = 4.83; 95% CI 2.86–7.64). Mortality from cerebrovascular diseases was elevated, although not significantly (three deaths observed; SMR=1.87; 95% CI 0.59–8.38), while cancer mortality was lower than expected (Table 1).

**Discussion**

Our results show a statistically significantly increased all-cause and ischaemic heart disease mortality among former employees of EAS during the follow-up period. Previous results from large cohort studies provide evidence of a positive association between unemployment and increased risk of death from all causes [1,5]. The observed increased risk of death from ischaemic heart disease may be linked to psychosocial stress arising from loss of employment [6,7]. Unemployment is also reported to be associated with a higher case fatality rate following an acute ischaemic stroke [8]. Our results are limited by the absence of a control group and the possible influence of confounding factors. We were unable to assess the possible confounding effect of factors such as smoking, alcohol or obesity. However, evidence regarding the potential association between unemployment and smoking or drinking remains controversial [9–10]. Nevertheless, the increased mortality among this young cohort (mean age 43 years) of former EAS workers is unlikely to be due to the confounding effect of variables such as smoking alone.

In conclusion our results show a significant increase in all-cause mortality and death from ischaemic heart disease in male workers who were made redundant and suggest a significant negative impact of unemployment resulting from company closure on mortality. These results may be indicative of future mortality patterns in Greece if the current climate of austerity and recession continues. The results of this study indicate the need for further investigation of the impact of financial crises on health in Greece.

**Table 1**. Mortality among ex-employees of EAS (1992–1993)

<table>
<thead>
<tr>
<th>Cause of death (ICD-9)</th>
<th>Deaths</th>
<th>Observed</th>
<th>Expected</th>
<th>SMR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes (001–999)</td>
<td>30</td>
<td>17.1</td>
<td>1.75*</td>
<td>1.18–2.5</td>
<td></td>
</tr>
<tr>
<td>Ischaemic heart disease (410–414)</td>
<td>18</td>
<td>3.72</td>
<td>4.83***</td>
<td>2.86–7.64</td>
<td></td>
</tr>
<tr>
<td>Cerebrovascular diseases (430–438)</td>
<td>3</td>
<td>1.04</td>
<td>2.87</td>
<td>0.59–8.38</td>
<td></td>
</tr>
<tr>
<td>All cancer (140–208)</td>
<td>4</td>
<td>5.38</td>
<td>0.74</td>
<td>0.2–1.9</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.05, **p < 0.01, ***p < 0.001.
Key points

• Crude and ischaemic heart disease mortality were significantly elevated in former employees of a Greek bus company in the 13 months following its closure in 1992.
• In the year prior to closure all cause death rates among employees were substantially lower than expected.
• The results of this study should stimulate further investigation of the impact of financial crises on health in Greece.

Conflicts of interest

None declared.

References