Social inequalities in mortality in a retrospective cohort of civil servants in Barcelona

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Background The objective of this study is to describe the inequalities in mortality by occupational category and sex in a retrospective cohort of civil servants working in the city council of Barcelona (Spain).

Methods The cohort was followed for the period 1984–1993. There were 11 647 men and 9001 women. Age-adjusted hazard ratios (HR) of death for occupational categories and manual versus non-manual groups and 95% CI were derived from Cox proportional hazards models.

Results For total deaths in males, compared with high-level professionals, auxiliary workers (HR = 1.30, 95% CI: 0.96–1.77), skilled manual workers (HR = 1.29, 95% CI: 0.95–1.77), unskilled manual workers (HR = 1.46, 95% CI: 1.07–1.98) and police and fire manual workers (HR = 1.42, 95% CI: 1.08–1.87) had higher risk of death. Among women, for all causes of mortality, only police manual workers had higher mortality (HR = 5.63, 95% CI: 1.89–16.7) whereas auxiliary workers had the lowest HR (HR = 0.51, 95% CI: 0.25–1.05). The HR comparing manual and non-manual categories for all causes of death was 1.29 for males (95% CI: 1.09–1.52) and 1.07 for females (95% CI: 0.77–1.49). Among males, whereas manual workers had lower cardiovascular mortality (HR = 0.85, 95% CI: 0.63–1.15), cancer mortality was higher in the manual category. No association between manual category and mortality was found among women.

Conclusions This study provides an analysis of social inequalities in mortality in a cohort from a Southern European urban area.

Keywords Social inequalities in mortality, retrospective cohort, socioeconomic factors

Social inequalities in health have been described in the majority of Western countries, the people of disadvantaged classes being those who have poorer health status and higher mortality. The study of social inequalities in health has been less extensive in southern Europe (including Spain), mainly due to lack of data. Most studies have been based on cross-sectional data. In Barcelona, the second largest city in Spain, located in the north-east with a population of 1 600 000 inhabitants, we had the opportunity of analysing a retrospective cohort of civil servants working in the city council. The objective of this study is to describe the inequalities in mortality by occupational category and sex in this cohort.

Methodology The population studied was a cohort of the civil servants of the Municipality of Barcelona aged >15 years. This was a retrospective cohort. We included 11 647 men and 9001 women who worked for ≥6 months in the period 1984–1993. Although some of the people (47.2%) left the local council before 1993, we knew the vital status of 90% of the subjects at the end of 1993. The 10% of people for whom we did not know vital status were excluded from the analysis. People excluded were younger, more likely to be females and non-manual workers.
The time of follow-up was counted from the date of starting work in the local council until 31 December 1993 yielding a total of 157,165 person years of follow-up.

People were identified through the registry of employees of the Local Council of Barcelona. The vital status at the end of follow-up was determined through the same registry in addition to the municipal census of Barcelona. The cause of death was obtained for 93.6% of deaths through the mortality registries of Barcelona and Catalunya.

We studied the following occupational categories: high-level professionals with a university degree (mainly including architects, engineers, physicians, and lawyers); middle-ranking professionals with a middle university degree (including nurses and school teachers), auxiliary workers (non-manual workers without a university degree), skilled manual workers, unskilled manual workers (men), cleaning workers (women), and manual police and fire workers (the latter were exclusively men). To analyse the specific causes of death, occupational categories were grouped as non-manual (high-level professionals, middle-ranking professionals, and auxiliary workers) and manual (skilled, unskilled, cleaning workers, and manual police and fire workers). The underlying cause of death was coded with the International Classification of Diseases, Ninth Revision (ICD-9).2

We studied those causes of death with sufficient cases.

Hazard ratios (HR) of death and 95% CI were derived from Cox proportional hazards models. The reference category was high-level professionals and non-manual groups. The dependent variable was the rate of mortality and as independent variables we included occupational category and age at the beginning of follow-up. We fitted separate models for males and females with the SPSS package.

Results

There were 835 deaths during the study period, the commonest cause of death being cancer among both males and females and in all occupational categories except in male high-level and middle-ranking professionals (where cardiovascular disease was the commonest cause). Cardiovascular diseases were the second group. The mean age at the beginning of follow-up was higher for skilled and unskilled manual workers in males and cleaning workers in females (Table 1).

Table 1 shows HR and 95% CI by sex and occupational category for all causes of death and for cancer and cardiovascular mortality. For total mortality among males, auxiliary workers (HR = 1.30, 95% CI: 0.96–1.77), skilled manual workers (HR = 1.29, 95% CI: 0.95–1.77), unskilled manual workers (HR = 1.46, 95% CI: 1.07–1.98), and police and fire manual workers (HR = 1.42, 95% CI: 1.08–1.87) had higher risk of death than high-level professionals. The HR of cancer mortality were higher for all occupational categories except middle-ranking professionals compared with high-level professionals. Conversely, the risk of cardiovascular mortality was lower for all occupational categories compared with high-level professionals.

Among women, for all causes of mortality, only police workers had higher mortality (HR = 5.63, 95% CI: 1.89–16.7), whereas auxiliary workers had the lowest HR (HR = 0.51, 95% CI: 0.25–1.05). Regarding cancer mortality, all the categories except police workers had lower HR than high-level professionals. For cardiovascular mortality, middle-ranking professionals and police manual workers had the highest HR.

The HR for manual versus non-manual workers for total mortality was 1.29 for males (95% CI: 1.09–1.52) and 1.07 for females (95% CI: 0.77–1.49). Among men, whereas manual workers had lower cardiovascular mortality (HR = 0.85, 95% CI: 0.63–1.15), cancer mortality was higher among manual social classes (HR = 1.51; 95% CI: 1.16–1.97). No association between manual occupational category and mortality was found among women (Table 2). Hazard ratios for other causes of death did not reach statistical significance, although it was high for digestive disease (HR = 1.61, 95% CI: 0.86–3.00) and injuries (HR = 1.63, 95% CI: 0.74–3.62) in males.

Discussion

We have found social class inequalities in mortality among men but not among women. Males of all occupational categories except middle-ranking professionals had a higher risk of mortality for all causes and for cancer diseases than those of high-level professionals. However, the association between cardiovascular

Table 1. Person years of follow-up, median age at the beginning of follow-up, number of deaths, and age-adjusted hazard ratios (HR) (all causes, cancer and cardiovascular causes) by occupational category. Males and females

<table>
<thead>
<tr>
<th>Occupational category</th>
<th>Person-years</th>
<th>Median age</th>
<th>All causes</th>
<th>Cancer</th>
<th>Cardiovascular</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No. deaths</td>
<td>HR</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-level professionals</td>
<td>12,143.2</td>
<td>39</td>
<td>64</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Middle professionals</td>
<td>7,214.9</td>
<td>36</td>
<td>20</td>
<td>0.64</td>
<td>0.37–1.08</td>
</tr>
<tr>
<td>Auxiliary workers</td>
<td>12,538.1</td>
<td>42</td>
<td>114</td>
<td>1.30</td>
<td>0.96–1.77</td>
</tr>
<tr>
<td>Skilled manual workers</td>
<td>11,880.5</td>
<td>48</td>
<td>108</td>
<td>1.29</td>
<td>0.95–1.77</td>
</tr>
<tr>
<td>Unskilled manual workers</td>
<td>9,377.1</td>
<td>52</td>
<td>115</td>
<td>1.46</td>
<td>1.07–1.98</td>
</tr>
<tr>
<td>Police and fire manual workers</td>
<td>39,630.6</td>
<td>38</td>
<td>261</td>
<td>1.42</td>
<td>1.08–1.87</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-level professionals</td>
<td>4,780.1</td>
<td>33</td>
<td>12</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Middle professionals</td>
<td>14,739.7</td>
<td>31</td>
<td>29</td>
<td>0.88</td>
<td>0.45–1.73</td>
</tr>
<tr>
<td>Auxiliary workers</td>
<td>15,769.5</td>
<td>31</td>
<td>20</td>
<td>0.51</td>
<td>0.25–1.05</td>
</tr>
<tr>
<td>Skilled manual workers</td>
<td>7,720.5</td>
<td>37</td>
<td>22</td>
<td>0.92</td>
<td>0.46–1.87</td>
</tr>
<tr>
<td>Cleaning manual workers</td>
<td>19,422.7</td>
<td>48</td>
<td>65</td>
<td>0.69</td>
<td>0.37–1.28</td>
</tr>
<tr>
<td>Police manual workers</td>
<td>1,633.1</td>
<td>24</td>
<td>5</td>
<td>5.63</td>
<td>1.89–16.7</td>
</tr>
</tbody>
</table>
mortality and occupational category was in the opposite direction. Among women, for all causes of mortality, only police male workers had higher mortality.

Previous follow-up studies of mortality carried out in Barcelona based on the population census found similar results for cancer deaths in both sexes. According to them, in men the excess of mortality was mainly accounted for by social inequalities in cancer of mouth and pharynx, oesophagus, stomach, larynx, and lung cancer (cancers related to alcohol consumption and smoking). In women breast cancer was directly associated with social class inequalities in cardiovascular disease mortality are lower in southern Europe than in northern Europe for males and also for females. In order to exclude a misclassification in causes of death, we compared cases with and without cause of death and cases with poorly categorized causes of death (ICD-9: 780–799) among occupational categories and we did not find any differences.

Different explanations could be hypothesized for our results. First, high-level professional male civil servants were mainly physicians (42.4%), architects (14%), and lawyers (12.1%) and, during this period, most of them had also a private job outside the local council, thus probably being exposed to overwork. This overwork could explain the high cardiovascular mortality in this group. However, this is speculation that deserves further attention in future studies. Second, given that the population analysed in this study only includes workers whose health status ought to be better than that of the general population, social class differences may be lower than those found in the general population. Third, the ‘diffusion theory’ of the epidemic of ischaemic heart disease states that the rise started in the upper social classes of high income countries and then spread to other populations and began to diminish in higher social classes, reversing the gradient; these changes being mainly due to changes in behaviours. It is possible that the mortality gradient by social class had not yet changed in this Barcelona cohort. We know that in our city, the change in the gradient of smoking by social class occurred in the mid 1980s among occupational categories and we did not find any differences.

As far as we know this is the first longitudinal study of social inequalities in health carried out in Spain with the important advantage of including men and women, as well as manual and non-manual occupational categories. One of its main limitations is that it only includes a cohort of workers, thus excluding the unemployed, and so it probably understimates the inequalities in mortality because unemployment is higher in manual categories and unemployed people tend to have poorer health. Other limitations are the small number of deaths which occurred during these years, thus limiting statistical power for the study of the specific causes of death. Some 10% of cases were lost to follow-up, although they had different characteristics to the people followed, we do not have any reason to think that these people were lost because of their health. However, this study does allow us to analyse social inequalities in mortality in a southern European urban area in a cohort not affected by the bias of cross-sectional studies such as selection bias.

Acknowledgements

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KEY MESSAGES

- We have studied a cohort of the civil servants of the Municipality of Barcelona aged >15 years who worked in the period 1984–1993.
- Males of all occupational categories, except middle-ranking professionals, had a higher risk of mortality for all causes and for cancer than those of high-level professionals. However, the association between cardiovascular mortality and occupational category was in the opposite direction.
- Among women, for all causes of mortality, only police manual workers had higher mortality.

References