Background: The aim of the study was to describe the relationship between socioeconomic status and mortality in Dutch elderly people. Methods: A prospective follow-up study was performed among 4,878 women and 3,105 men aged 55 years and over living in Ommoord, a district of Rotterdam, The Netherlands. At baseline, data on education, occupation and income were collected. Data on mortality were obtained from the municipal population registry and general practitioners. Relative risks of mortality by indicators of socioeconomic status were estimated after an average follow-up period of 4.1 years. Separate age-adjusted analyses were performed for men and women. Results: The findings in this study indicate that for men (mean age at baseline of 69 ± 9 years), differences in mortality exist for all three indicators of socioeconomic status. Mortality risks were higher for lower educated men, unskilled manual workers and those with a lower equivalent household income. For women (mean age 72 ± 10 years), the relative risks of mortality were also higher for lower educated groups, but lower equivalent household income and occupational status appeared not to be related to mortality. Conclusions: In elderly Dutch people, there are clear differences in mortality across groups of different socioeconomic status. The mechanisms for explaining the apparent inequalities in health among older subjects require further research.

Keywords: aged, mortality, socioeconomic status

There are good data to show that in several Western countries, mortality rates vary by indicators of socioeconomic status. However, evidence for this relationship has mostly been obtained from studies among men younger than 65 years. In view of the increasing number of elderly people in the population, the question arises whether an effect of socioeconomic status persists at older ages. A cumulative effect of a lower socioeconomic status could augment the effect on mortality in the long term. Alternatively, class differences could become less important with ageing. For example, a direct effect of the working environment disappears and the effect of background factors such as age could be more important. Selective mortality could also have played a role: the inequalities at younger ages have removed the vulnerable individuals from the population.

Studies on socioeconomic differences in mortality among elderly people are limited in number, but some of them have shown marked differences in mortality by socioeconomic status. In addition, in most studies only one indicator of socioeconomic status is used, e.g. education, occupation or income. Although these indicators of socioeconomic status share some overlap, each indicator reflects another dimension of the socioeconomic status of a person. A study with more indicators of socioeconomic status could be of importance in indicating the most meaningful indicator of socioeconomic status for this specific age group.

The objectives of the present study were first to describe the differences in total mortality in older men and women by three indicators of socioeconomic status and, second, to assess the independent effects of each indicator of socioeconomic status.

METHODS

Study population

The study population forms a part of the Rotterdam study, a prospective cohort study among 7,983 persons aged 55 years and above, living in one defined geographic area in Rotterdam, The Netherlands. The rationale and design of the study have been described elsewhere. In short, the objective of the Rotterdam study is to investigate determinants of chronic and disabling cardiovascular, neurogeriatric, locomotor and ophthalmologic diseases. All inhabitants aged 55 years and older living in the district of Ommoord were invited to participate.
response rate was 78% (7,983). The study was approved by the Medical Ethics Committee of Erasmus University. Written informed consent was obtained from all participants.

Measurments
Information on socioeconomic status was obtained by trained interviewers who visited the participants between 1989 and 1993 at their homes. Data on education, occupation and income were assessed.

- Education
The participants were asked about all formal education, the number of years of each type of education and whether they had completed it. From this information, the highest level of education attained was defined. This classification was similar to the UNESCO classification\(^{19}\) and contains four categories: i) primary education, ii) lower/intermediate general and lower vocational education, iii) higher general and intermediate vocational education, and iv) higher vocational education and university. Information on education was available for 94.8% of the subjects.

- Occupation
In the Rotterdam study a complete occupational history was obtained including all occupational titles, the number of employees and employment status (self-employment or in employment). For this study, the current occupation (10%) and, from those who were not working any more, their last occupation (80%) was used. A classification according to occupation could be made for 90.6%. This classification, based on the international Erikson-Goldthorpe-Portocarero (EGP) scheme,\(^{20,21}\) distinguishes five levels: i) higher and lower grade professionals, ii) routine non-manual employees, iii) small proprietors, iv) high and low skilled manual workers and v) semi-skilled and unskilled manual workers.

In addition to a woman's own occupation, in some cases the occupation of the head of the household provides a better reference point and was also assessed. Both perspectives have their validity and there is no clear preference for either one.\(^{22}\) For each woman who was living with a partner or was widowed, her partner was assumed to be the head of the household. Among the elderly population in The Netherlands this is plausible. For the other women, divorced or living without a partner, the woman herself was considered to be head of the household. The classification of occupation of the head of the household was done in a similar way as for individual occupation and was available for 89.2% of the female participants.

- Income
Participants classified their household income into 13 pre-coded categories. For persons living in an elderly home some persons gave their factual income, while others indicated just their 'pocket money' (their income minus their contribution for the rate of living in an elderly home). For this reason, those living in an elderly home (n=897) were excluded from the analysis of income.

As more than one person is dependent on the household income in some households, the midpoint of each household income category was divided by the number of persons who were living from that income to the power 0.36.\(^{23}\) The result of this formula provides what is called the 'equivalent household income'. Five categories of equivalent household income were defined (table 1), approximately corresponding to quintiles of the distribution of the population. Equivalent household income was available for 89.0% of the independently living people.

- Mortality
Information about vital status was collected from the start of follow-up until 1 July 1996 from the municipal population registry, from hospital admission data and from computer systems of the general practitioners of the district. In addition, information was retrieved from medical records of participants of general practitioners not linked to this computer system, for instance from participants who moved out of our research district. The individual period of the follow-up was defined as the period between the first home interview until 1 July 1996 or until date of death. During an average follow-up period of 4.1 years (SD 1.3), 793 women (16.3%) and 528 men (17.0%) died.

Data analysis
Relative risks of mortality by the indicators of socioeconomic status were estimated using the Cox proportional hazard regression model. Separate age-adjusted analyses (nine 5 year age groups) were performed for men and women. Indicators of socioeconomic status were included in the model as dummy variables, while for all indicators the 'highest' socioeconomic status was used as the reference group.

Furthermore, simultaneous analyses with indicators of socioeconomic status included in a model were performed. The reduction in deviance owing to inclusion of each indicator to a model including those other two indicators of socioeconomic status in the model was used as an overall statistical test. A 5 year survival probability was calculated using the formula

$$S(t) = S_0(t) \exp \left( \sum b X \right)$$

To assess modification of risk by age, interaction terms of socioeconomic status and age were included in the model. Again, the reduction in deviance was used as a statistical overall test. All analyses were performed using the BMDP package.\(^{24}\)

RESULTS
The general characteristics of the study population are shown in table 1. The population comprised more women than men and the average age in women was higher, 72 (± 10) and 69 (± 9) years respectively. The majority, 83.7% of the men and 50.8% of the women, were living with a partner. Furthermore, the proportion of widowed or divorced women was higher than the proportion of
So economic status and mortality

widowed or divorced men. In general, the indicators of socioeconomic status were distributed unequally for men and women. For instance, the average equivalent household income of men was higher than the equivalent household income of women. Of the men, 27.9% had only primary education while this percentage was 48.3% for women. Women were more likely to be classified, based on their own occupation, as manual workers and were less likely to be classified as professionals.

The mortality data are given by indicators of socioeconomic status in tables 2-4. For men as well as women, the lower educated had a significantly higher mortality risk than those who had higher vocational education or university education. The gradient for women was steeper than for men, probably due to a more selected reference group. Mortality differences between the occupational classes were less pronounced in the older population. In men, only the semi-skilled and unskilled manual workers had a significantly higher mortality risk than the male professionals. For women, neither their own occupation nor the occupation of the head of the household was related to mortality. Equivalent household income was related to mortality among men. In the lower quintiles of income mortality was almost twice as high as in the highest quintile. For women, less pronounced differences were found.

The results of simultaneous analyses with three indicators of socioeconomic status are presented in table 5. These analyses were based on a subgroup of 2,517 men and 3,402 women for whom data on education, own occupation and equivalent household income were available. As the relative risks decreased when adjusted for each other and the reduction of deviance owing to inclusion of each indicator in a model with the other two indicators was not

Table 1 Characteristics of the study population

<table>
<thead>
<tr>
<th>Age (%)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-59 years</td>
<td>16.5</td>
<td>14.7</td>
</tr>
<tr>
<td>60-64 years</td>
<td>20.9</td>
<td>17.2</td>
</tr>
<tr>
<td>65-69 years</td>
<td>21.1</td>
<td>15.6</td>
</tr>
<tr>
<td>70-74 years</td>
<td>16.8</td>
<td>15.7</td>
</tr>
<tr>
<td>75-79 years</td>
<td>12.5</td>
<td>13.2</td>
</tr>
<tr>
<td>80-84 years</td>
<td>7.4</td>
<td>10.6</td>
</tr>
<tr>
<td>85-89 years</td>
<td>3.6</td>
<td>8.3</td>
</tr>
<tr>
<td>90+ years</td>
<td>1.3</td>
<td>4.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status (%)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor</td>
<td>2.6</td>
<td>7.6</td>
</tr>
<tr>
<td>With partner</td>
<td>83.7</td>
<td>50.8</td>
</tr>
<tr>
<td>Widowed</td>
<td>10.4</td>
<td>35.6</td>
</tr>
<tr>
<td>Divorced</td>
<td>3.3</td>
<td>6.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Living situation (%)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living independently</td>
<td>94.0</td>
<td>85.4</td>
</tr>
<tr>
<td>Living in an elderly home</td>
<td>6.0</td>
<td>14.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education in (%)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher vocational education and university education</td>
<td>14.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Intermediate/higher general and intermediate vocational education</td>
<td>35.1</td>
<td>19.2</td>
</tr>
<tr>
<td>Lower general and vocational education</td>
<td>22.5</td>
<td>28.5</td>
</tr>
<tr>
<td>Primary education</td>
<td>27.9</td>
<td>48.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation (%)</th>
<th>Men</th>
<th>Own</th>
<th>Head of household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professionals</td>
<td>33.3</td>
<td>10.8</td>
<td>27.6</td>
</tr>
<tr>
<td>Routine non-manual employees</td>
<td>25.8</td>
<td>43.1</td>
<td>28.5</td>
</tr>
<tr>
<td>Self entrepreneurs</td>
<td>5.1</td>
<td>3.6</td>
<td>5.8</td>
</tr>
<tr>
<td>High and low skilled manual workers</td>
<td>21.6</td>
<td>2.3</td>
<td>19.0</td>
</tr>
<tr>
<td>Semi-skilled and unskilled manual workers</td>
<td>14.2</td>
<td>40.3</td>
<td>19.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equivalent household income (%)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; €1,293 per month</td>
<td>25.9</td>
<td>15.1</td>
</tr>
<tr>
<td>&gt; €998 - €1,293 per month</td>
<td>26.4</td>
<td>20.4</td>
</tr>
<tr>
<td>&gt; €794 - €998 per month</td>
<td>21.7</td>
<td>19.1</td>
</tr>
<tr>
<td>&gt; €549 - €794 per month</td>
<td>16.1</td>
<td>18.4</td>
</tr>
<tr>
<td>≤ €549 per month</td>
<td>9.9</td>
<td>27.0</td>
</tr>
</tbody>
</table>

a: Age n=3,105, marital status n=2,662, living situation n=3,105, education n=3,017, occupation n=2,975 and equivalent household income n=2,609
b: Age n=4,878, marital status n=4,375, living situation n=4,875, education n=4,552, own occupation n=4,257, occupation of head of household n=4,390 and equivalent household income n=3,201.
statistically insignificant, the three indicators share some overlap. Despite this overlap, differences in mortality by equivalent household income and education for men persisted suggesting that these indicators reflect different dimensions of socioeconomic status. Only the effect of equivalent household income remained statistically significant. For women, all reductions in deviance owing to inclusion of other indicators were not statistically significant. The relative risks declined after adjustment for the other indicators in the model and did not remain significant.

To illustrate the differences in mortality risk between the most privileged and most underprivileged persons, the predicted 5 year survival was calculated for a 65 year old unskilled man with primary education only and an equivalent household income below €549 (1,210) and for a 65 year old professional with an academic degree and an equivalent household income above €1,293 (1,2850). The estimated absolute difference in 5 year survival was 9%. The man with the highest socioeconomic status had a 5 year survival probability of 93%, while this probability was 84% for the man with the lowest socioeconomic status.

Whether the effects of socioeconomic differences attenuate with age could not be confirmed in this study. Age-stratified analyses did not show clear patterns (results not

<table>
<thead>
<tr>
<th>Education level</th>
<th>Men</th>
<th>RR</th>
<th>95% CI</th>
<th>Women</th>
<th>RR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher vocational education and university education</td>
<td>11</td>
<td>1.0</td>
<td></td>
<td>38</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Intermediate/higher general and intermediate vocational education</td>
<td>153</td>
<td>1.4</td>
<td>0.9-1.9</td>
<td>71</td>
<td>1.7</td>
<td>0.9-3.2</td>
</tr>
<tr>
<td>Lower general and vocational education</td>
<td>92</td>
<td>1.2</td>
<td>0.8-1.8</td>
<td>120</td>
<td>1.8</td>
<td>1.0-3.3</td>
</tr>
<tr>
<td>Primary education</td>
<td>199</td>
<td>1.4</td>
<td>1.0-2.0</td>
<td>403</td>
<td>2.0</td>
<td>1.1-3.6</td>
</tr>
</tbody>
</table>

Reduction in deviance*: 2.6

* Reduction in deviance owing to inclusion of this indicator to a model with only age variables.

n: number of deaths

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Men</th>
<th>Own occupation</th>
<th>n</th>
<th>RR</th>
<th>95% CI</th>
<th>Women</th>
<th>Own occupation</th>
<th>n</th>
<th>RR</th>
<th>95% CI</th>
<th>Occupation of head of household</th>
<th>n</th>
<th>RR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professionals</td>
<td>119</td>
<td>1.0</td>
<td></td>
<td>46</td>
<td>1.0</td>
<td></td>
<td>122</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine non-manual employees</td>
<td>119</td>
<td>1.1</td>
<td>0.9-1.4</td>
<td>191</td>
<td>1.2</td>
<td>0.8-1.6</td>
<td>161</td>
<td>1.0</td>
<td>0.8-1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small entrepreneurs</td>
<td>32</td>
<td>1.1</td>
<td>0.8-1.7</td>
<td>22</td>
<td>1.1</td>
<td>0.7-1.8</td>
<td>44</td>
<td>0.9</td>
<td>0.7-1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High/skilled manual workers</td>
<td>120</td>
<td>1.1</td>
<td>0.9-1.4</td>
<td>20</td>
<td>1.4</td>
<td>0.8-2.4</td>
<td>117</td>
<td>1.0</td>
<td>0.8-1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi/unskilled manual workers</td>
<td>93</td>
<td>1.4</td>
<td>1.0-1.8</td>
<td>271</td>
<td>1.2</td>
<td>0.9-1.6</td>
<td>140</td>
<td>0.9</td>
<td>0.7-1.2</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reduction in deviance*: 2.6

* Reduction in deviance owing to inclusion of this indicator to a model with only age variables.

n: number of deaths

<table>
<thead>
<tr>
<th>Equivalent household income</th>
<th>Men</th>
<th>RR</th>
<th>95% CI</th>
<th>Women</th>
<th>RR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; €1,293</td>
<td>44</td>
<td>1.0</td>
<td></td>
<td>21</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>&gt; €998 - €1,293</td>
<td>69</td>
<td>1.3</td>
<td>0.9-1.8</td>
<td>41</td>
<td>1.0</td>
<td>0.6-1.8</td>
</tr>
<tr>
<td>&gt; €794 - €998</td>
<td>97</td>
<td>1.7</td>
<td>0.2-2.5</td>
<td>55</td>
<td>1.2</td>
<td>0.7-1.9</td>
</tr>
<tr>
<td>&gt; €549 - €794</td>
<td>89</td>
<td>1.8</td>
<td>0.2-2.6</td>
<td>66</td>
<td>1.1</td>
<td>0.7-1.8</td>
</tr>
<tr>
<td>≤ €549</td>
<td>66</td>
<td>1.7</td>
<td>0.1-2.5</td>
<td>120</td>
<td>1.2</td>
<td>0.7-2.0</td>
</tr>
</tbody>
</table>

Reduction in deviance*: 7.0

* Reduction in deviance owing to inclusion of this indicator to a model with only age variables.
Socioeconomic status and mortality

DISSCUSSION
This study shows differences in mortality risks for older men by all three indicators of socioeconomic status: income, occupation and education. Mortality is higher for lower educated men, unskilled manual workers and those with a lower income compared to the higher socioeconomic status groups. For women in this age group mortality is higher in the lower educated groups, but lower income and occupational level appeared not to be related to mortality. These educational differences remained (though they were not statistically significant) after adjustment for the other indicators. For men, the effect of income on mortality remained after adjustment for the other indicators of socioeconomic status.

To appreciate these findings, some issues need to be addressed. The response rate for the study was high. Still, it is likely that the population represents a relatively healthy cohort as persons with health problems were less able to participate in the follow-up study. In our view this selective participation has hardly influenced the results or, if anything, it has led to an underestimation of the real differences. In addition, exclusion of persons living in an elderly home for the analyses of income might have led to an underestimation of the mortality risk associated with a low equivalent household income. However, the educational and occupational mortality differences among independently living persons did not substantially differ from those living in an elderly home (results not shown).

Table 5 Mortality by education, own occupation and equivalent household income simultaneously, relative risks (RR) and 95% confidence intervals (CI), adjusted for age

<table>
<thead>
<tr>
<th>Indicators of socioeconomic status</th>
<th>Men</th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RR</td>
<td>95% CI</td>
<td>RD</td>
<td>RR</td>
<td>95% CI</td>
<td>RD</td>
</tr>
<tr>
<td>Reference group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher vocational education or university education, professional and highest quintile of equivalent household income</td>
<td>1.0</td>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate/higher general and intermediate vocational education</td>
<td>1.3</td>
<td>0.8-2.0</td>
<td>1.5</td>
<td>0.6-3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower general and vocational education</td>
<td>1.2</td>
<td>0.7-1.9</td>
<td>1.7</td>
<td>0.8-4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td>1.3</td>
<td>0.8-2.0</td>
<td>0.6</td>
<td>1.5</td>
<td>0.8-3.7</td>
<td>-0.1</td>
</tr>
<tr>
<td>Own occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine non-manual employees</td>
<td>1.0</td>
<td>0.8-1.4</td>
<td>1.0</td>
<td>0.6-1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small proprietors</td>
<td>1.2</td>
<td>0.7-2.0</td>
<td>0.7</td>
<td>0.3-1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High and low skilled manual workers</td>
<td>0.8</td>
<td>0.6-1.1</td>
<td>0.6</td>
<td>0.2-1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-skilled and unskilled manual workers</td>
<td>1.0</td>
<td>0.7-1.5</td>
<td>2.1</td>
<td>1.0</td>
<td>0.6-1.6</td>
<td>-0.9</td>
</tr>
<tr>
<td>Equivalent household income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; £5998 – ≤1,293</td>
<td>1.3</td>
<td>0.8-1.9</td>
<td>1.0</td>
<td>0.6-1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; £794 – ≤5998</td>
<td>1.8</td>
<td>1.2-2.7</td>
<td>1.1</td>
<td>0.6-1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; £549 – ≤5794</td>
<td>1.7</td>
<td>1.1-2.7</td>
<td>1.0</td>
<td>0.6-1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ £549</td>
<td>1.8</td>
<td>1.1-2.8</td>
<td>5.4</td>
<td>1.0</td>
<td>0.6-1.8</td>
<td>-0.7</td>
</tr>
</tbody>
</table>

RD: reduction in deviance owing to inclusion of this indicator to a model with age and two other indicators for socioeconomic status.

Information bias with respect to socioeconomic status was minimised by gathering information on socioeconomic status in a standardised way. Some misclassification for occupation may have occurred for persons who stopped working a long time ago, as the classification used is quite recent, while the status of a certain occupation may not have been constant over time and the occupational structure within society is changing. In which direction this might have affected the results is unclear. Furthermore, it has been argued that the last or current occupation does not reflect occupational status accurately, but no commonly accepted alternative method has gained favour. However, in our data, a person's longest held occupation did not substantially differ from the last or current occupation, which confirms other Dutch findings that intragenerational mobility is limited. Additional analyses based on the longest held occupation showed the same mortality differences as the last or current occupation (results not shown). A measure of income which takes into account the size of the household is generally regarded to be more appropriate than just the household income. The choice of the factor of 0.36 in the formula was based on published analyses, but remains quite arbitrary. However, when a factor 0.50 or 0.25 was used instead, the same trends resulted (results not shown). Our results were analysed separately for men and women and adjusted for age because more persons had attained higher education among the younger subjects of our population than among the older subjects. In some studies the results have also been adjusted for marital status. However, one can argue that marital status is not only a confounder but also an intermediary factor because marital status can be predicted by socioeconomic status.
In such cases, adjustment for marital status may actually introduce bias. Nevertheless, adjustment of marital status did not produce substantially different results in our study. In our view, there is no reason to assume that bias could explain the socioeconomic mortality differences found.

In our study, the study population was chosen in one quite homogenous region. The situation thus arises that several intermediary factors, such as neighbourhood conditions, housing conditions or health care services, are similar for everybody. Since these factors also account for the socioeconomic inequalities in health in the total population, part of the socioeconomic differences in health may not be detected in such a setting. The inequalities in mortality would probably be even larger when the socioeconomic groups also varied in these intermediary factors.

Socioeconomic mortality differences have been studied in several countries and generally show the same trends that we observed. Studies on socioeconomic mortality differences among elderly people are more limited in number, but have shown differences according to education in the US, according to social class in England and Wales and in elderly Swedish people and according to several indicators of socioeconomic status in an elderly Finnish population. This limited number of studies have shown the same associations as found in our study.

Reported findings on whether socioeconomic differences in mortality increase or decrease with age are inconsistent. Martelin reported that the differentials attenuate with age. In contrast, Swedish studies reported an increasing difference with increasing age for women, while for men the differences became smaller. However, in the latter study, no formal test of significance was applied to these differences. Among British civil servants socioeconomic differences in mortality persisted beyond retirement age and increased in magnitude with age. Our study did not show a clear pattern of changes with age. However, the follow-up period was relatively short and the number of subjects may be too limited.

Interestingly, in contrast to one previous Dutch study of a 25 year follow-up among middle-aged men, in which mortality differences according to occupational class disappeared at an age above 50 years, we found socioeconomic mortality differences in an older age group.

As a direct effect of socioeconomic status on mortality is not very likely, health-related social mobility and intermediary factors are mentioned in the literature as possible explanations for socioeconomic mortality differences. Health-related social mobility implies that people drift down the social scale because of their health problems or move up because of their good health. In this respect, Fox suggested that a measure representing the situation of years ago would provide a more appropriate indicator of socioeconomic status than a measure which would be measured at death. In our study, most persons completed their education decades ago and had stopped working many years previously. Furthermore, although the measurement of income is based on the current situation, it is not likely to be influenced by health among elderly Dutch people. Hence, health selection is not likely to be important in the explanation of the socioeconomic differences which we found. The remaining mechanism is an explanation through intermediary factors, such as life style factors, material living conditions and psychological stress. The unequal distribution of these factors across groups of different socioeconomic status may explain the socioeconomic mortality differences and needs further investigation. Besides specific factors which are responsible for the socioeconomic inequalities in specific diseases, an additional explanation for the socioeconomic differences in health has been suggested: socioeconomic status is associated with factors which influence someone's general susceptibility to diseases. Apart from the factors at an individual level, processes at the level of the society could also be responsible for the socioeconomic differences in health. For example, understanding of the macroeconomic influences of health could lead to new approaches of intervention.

The apparent differences in impact between the different indicators as found in our study may have several explanations. First, the overlap of the indicators of socioeconomic status in this study population is less pronounced compared to other studies. In our study the Spearman rank correlation coefficients vary between 0.23 and 0.47. Thus, as education is an important determinant of occupational status and occupation a determinant of income, this causal pathway is less pronounced among this elderly population. Second, these indicators represent different aspects of socioeconomic status. Educational level indicates someone's knowledge, ability and willingness to acquire new information. Occupation stands for prestige and occupational hazards and income indicates material living conditions and resources. Each indicator could be associated with different intermediary factors, which could then explain the differences in association with mortality. Thus, our findings among men suggest that material living conditions are important in the explanation of their socioeconomic mortality differences. However, a different explanation for the differences in impact for the different socioeconomic indicators is also possible. In our study population, the indicators education and occupation were based on an individual achievement of years ago and will have been constant for years. Income, on the other hand, may have changed even recently and may be a more accurate indicator of current socioeconomic status. If current socioeconomic status is more important to health than past socioeconomic status, this might explain the greater discriminating power of income. The lack of finding such an association among women might be caused by misclassification of income; it is likely that women have reported household income less accurately as it is mainly based on their husbands.

In conclusion, our results show that mortality differences by socioeconomic status persist into old age. The mechanisms for explaining these inequalities in health among older subjects require further research.
REFERRENCES


Received 16 September 1997, accepted 29 November 1999