Eighteen-year trends in obesity among the elderly

SIR—Obesity is an established risk factor for morbidity and mortality in the population [1, 2]. Research into its association with health among the elderly, however, has produced contradictory findings. While a substantial number of studies have detected no differences in mortality between normal weight and slightly overweight elderly people [2], others have found obesity to be a health hazard among older people [2–4]. As obesity is a risk factor for major public health concerns such as cardiovascular diseases and physical disability [3, 5, 6], it is essential to obtain information on nationwide trends in obesity in order to foresee potential problems and to identify any subgroups with unfavourable risk factor profiles.

Previous studies from industrialised countries have also shown an upward trend in obesity among elderly people [7–11]. Obesity among the elderly has been shown to decline with advancing age [12]. How obesity varies by sociodemographic factors has been largely neglected in studies of elderly people [12]. There is some evidence that those with less education are more likely to be obese than the better educated elderly [9, 12, 13]. Non-married elderly women appear to be slightly more prone to obesity than married women [12], but there are results suggesting that marital status is not related to body size [13].

The aim of this study was to analyse trends and patterns of obesity by age, previous occupation and marital status (body mass index (BMI) ≥30 kg/m²) among Finnish elderly aged 65–79 years from 1985 to 2003.

Methods

The data for this study comprised nine cross-sectional national surveys from Finland conducted every other year from 1985 to 2003, excluding 1991 when no data were collected. Stratified random samples of 300 men and women in each 5-year age group covering the age range 65–79 years were drawn from the population register for each survey. Thus, every round of data gathering involved a total sample of 1,800 persons (900 men and 900 women). The data from 1985 to 2003 included 13,232 persons (6,564 men and 6,668 women), the average response rate exceeding 80% [14].

Measures

BMI was calculated from the self-reported data as weight (kg) divided by the square of height (m²). The limit for obesity was set at BMI ≥30 kg/m².

Age, occupation prior to retirement and present marital status were used as sociodemographic background vari-ables. Three age groups were surveyed: 65–69, 70–74 and 75–79 years. As the information on education had not been gathered before 1993, we used self-reported previous occupation as the indicator of socioeconomic status. Alternatives of previous occupation from which to choose were office employee (including desk and service jobs), industrial employee (including construction and mining), farmer (including those in forestry) and housewife. Marital status was recorded as married, single, divorced and widowed. There were four time periods based on the biennial surveys: 1985–1989 (1985, 1987 and 1989), 1993–1995, 1997–1999 and 2001–2003. Furthermore, cardiovascular diseases, musculoskeletal diseases and chronic bronchitis/emphysema were controlled for in the logistic regression analyses. For the distribution of respondents by background factors as well as a more detailed description of chronic diseases reported, please see Appendices 1 and 2 in the supplementary data available on the journal website (http://www.ageing.oupjournals.org/).

Statistical methods

In stratified random samples, older age groups are overrepresented. Therefore, age-adjustment based on the general population of Finland was performed to form comparable time periods. A logistic regression model was then computed to evaluate differences in obesity between subgroups. Crude and adjusted odds ratios plus 95% confidence intervals were calculated. In addition, interactions of the study period with age, previous occupation and marital status were included separately in the adjusted main effect model to assess continuity/discontinuity of the categories in each variable across time. All analyses were performed with the SPSS 11.0 statistical program.

Results

Obesity increased in both men and women and in all age groups from the mid-1980s to the early 2000s (Figure 1, Table 1). The highest prevalence of obesity was found among 65- to 69-year-old men and women. Obesity increased in all occupational groups too, office employees showing the lowest prevalence. After simultaneous adjustment of age, occupation, marital status and time period, disparities of obesity only slightly narrowed (data not shown). Further adjustment of chronic diseases had practically no impact on these figures. There was considerable variation in obesity by marital status, especially among men, although widowed women seemed to have the highest prevalence. Widowed women in the adjusted model had a slightly higher prevalence of obesity than married women (Table 1). The prevalence of obesity among women was lowest among singles in the last three study periods (Figure 1).

The differences in obesity between sociodemographic groups remained quite similar over time. In absolute percentages, the age, occupational group and marital status-based disparities in obesity changed slightly over time, but
according to the interaction tests (data not shown), these changes were not statistically significant.

**Discussion**

Obesity increased in all age, occupational and marital status groups among Finnish elderly from the mid-1980s to the early 2000s. Oldest respondents and former office employees had the lowest prevalence of obesity. Marital status had no association with obesity among men, but it was slightly more prevalent among widowed compared with married women.

Studies reporting trends in obesity among nationwide elderly populations are scarce. As the participation rate in the present study remained high over the survey years, the trend results given here can be considered representative at the national level.

It is likely that self-reporting biases prevalence figures for obesity slightly downwards, as people tend to shorten with advancing age and therefore over-report their height [15, 16]. It is suggested that people aged 70 years and older tend to overestimate their height by approximately 3–4 cm [16]. Despite the probable upward bias of height in our study, the trend we observed is likely to be valid, since there is no reason to assume that the bias would have changed over time. In addition to height, body composition changes with ageing. Therefore, future guidelines for ideal weight should be reconsidered among elderly people [2, 17].

Although the occupational grouping used in this study is not a traditional indicator of occupational or socioeconomic status, it correlates well with levels of education. According to the study conducted in 2003, about six times more men and three times more women among office employees than
The upward trend of obesity among the elderly is congruent with the trend among the Finnish working age population [22]. Obesity is thus a health burden impacting the entire adult population of Finland, and prevention programmes should therefore also include the older members of society.

A large number of current elderly in Finland are retired farmers still living remote from municipal services. According to previous studies, former farmers have a poorer diet and functional ability than retired office workers [18, 19]. This knowledge, together with the finding that they are more often obese than retired office employees, is important in targeting health promotion activities.

### Key points

- Obesity among 65- to 79-year-old Finnish people has increased from 1985 to 2003.
- Increasing trend of obesity has taken place in all age, occupational and marital status groups.
- Obesity is most prevalent among 65–69 year olds, retired farmers and widowed women.

### Acknowledgements

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**Table 1. Odds ratios with 95% confidence intervals for obesity among men and women**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-adjusted</td>
<td>Adjusted*</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65–69</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>70–74</td>
<td>0.80 (0.68–0.95)</td>
<td>0.76 (0.63–0.91)</td>
</tr>
<tr>
<td>75–79</td>
<td>0.55 (0.46–0.66)</td>
<td>0.51 (0.42–0.62)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office employee</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Industrial employee</td>
<td>1.42 (1.18–1.72)</td>
<td>1.42 (1.17–1.72)</td>
</tr>
<tr>
<td>Farmer</td>
<td>1.38 (1.13–1.68)</td>
<td>1.52 (1.24–1.87)</td>
</tr>
<tr>
<td>Housewife</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Single</td>
<td>1.14 (0.87–1.51)</td>
<td>0.98 (0.73–1.32)</td>
</tr>
<tr>
<td>Divorced</td>
<td>1.10 (0.78–1.55)</td>
<td>0.95 (0.65–1.38)</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.84 (0.66–1.09)</td>
<td>0.84 (0.64–1.11)</td>
</tr>
<tr>
<td>Time period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985–1989</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>1993–1995</td>
<td>1.27 (1.03–1.57)</td>
<td>1.23 (0.99–1.53)</td>
</tr>
<tr>
<td>1997–1999</td>
<td>1.44 (1.17–1.77)</td>
<td>1.47 (1.18–1.83)</td>
</tr>
<tr>
<td>2001–2003</td>
<td>1.79 (1.50–2.18)</td>
<td>1.80 (1.46–2.22)</td>
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*Adjusted for all variables in the model as well as cardiovascular diseases, musculoskeletal diseases and chronic bronchitis/emphysema.

farmers belong to the higher educated category. Furthermore, occupation before retirement is an important indicator among Finnish elderly, as there are still large numbers of former farmers who have poorer functional ability and dietary patterns than those in other occupational groups [18, 19].

Obesity prevalences fluctuated between time periods by marital status. As some of the marital status groups were rather small they are prone to random variation. This may also apply to the trend among housewives, as their representation in the last two time periods was rather small.

Our results accord with findings from various countries indicating a rising prevalence of obesity among the elderly [7, 9, 11]. There is evidence that this trend is related to declining levels of leisure time physical activity [8]. However, statistics from Finland [14] indicate no clear changes in physical activity among the elderly in the past couple of decades. This suggests that other factors lie behind the rise of obesity. One plausible explanation is that less physical effort is needed nowadays to fulfil the demands of everyday life. Daily energy expenditure might therefore have declined over the past few decades. It is also possible that the energy intake of Finnish elderly has increased in recent decades. A recent Finnish study [20] showed increased alcohol consumption among the elderly from the mid-1980s to the turn of the millennium. As alcohol has a high calorific value, this could also be contributing to rising obesity figures.

Our results are also comparable with earlier studies indicating obesity to be more prevalent among younger elderly [12].

As farmers in Finland have a clearly lower level of education than those in other occupational groups, our results accord with previous studies indicating higher BMI among the lower educated [9, 12, 21, 22].

Despite evidence that obesity does not vary by marital status [13], non-married women are suggested to be slightly more susceptible to obesity [12]. Our study lends some support to this, as obesity was found to be marginally more prevalent among widowed than married women.

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**Research letters**

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