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Mortality in elderly men and women in a Swedish municipality

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Abstract

Aim: to analyse the relationship between age, self-rated global health, morbidity, mobility, life satisfaction, marital status, social network and 6-year mortality in elderly men and women living at home.
Method: the study area was a municipality in mid-eastern Sweden with a population of about 21 000. Data from interviews with non-institutionalized people aged 75 years and older in 1986 ($n = 421$) were linked to an individual-based research registry of prescription drug purchases. The elderly subjects were followed for 6 years. Information on mortality was obtained from the national cause of death register. A combined measure of morbidity captured both self-reported symptoms/diseases and prescription drugs.
Results: mortality was higher in men than women ($P < 0.001$). Multivariate analysis was performed using logistic regression analysis. Among elderly men, morbidity-related factors—self-rated global health, heart problems and diabetes mellitus, for example—were the most important predictors of mortality. Among women, the predictors were spread over more domains (morbidity, mobility, social network).

Keywords: *elderly, gender, life satisfaction, morbidity, mortality, prescription drugs, self-rated global health, social network*

Introduction

There are health status differences between elderly men and women [1, 2]: women have more non-fatal health problems and men have a higher mortality. While normal ageing involves a decline in bodily functions independent of disease, the process of ageing includes the effects of disease and environment. Perhaps unlike tomorrow's elders, elderly men and women of today have had different lifestyles, which may be reflected in factors associated with mortality. Elderly men have more often worked outside the home, have had more external contacts and have engaged in more risk-taking behaviours (e.g. smoking, greater alcohol consumption and more and riskier automobile driving). Women, on the other hand, have mainly worked in the home and had more family contacts. Further, they tend to take more preventive actions with regard to their health [1]. To better understand the different processes of late life among men and women, different risk factors of mortality should be analysed.

Epidemiological studies have examined differences in mortality between elderly men and women [3–9], and discussions of gender differences have considered self-rated health [5], marital status [7] and social ties [8]. Other studies have analysed factors associated with mortality in total elderly populations [6, 7, 10–24]. The period of follow-up is important in comparing mortality studies: analyses of gender differences have had follow-up periods of 4 [3, 9], 5 [8], 6 [4] and 7 years [5].

Studies of mortality among elderly men and women have reported common and gender-specific risk factors. Factors reported to be associated with mortality among elderly men are self-rated health [3, 9], number of chronic diseases [8], angina pectoris [8], diabetes mellitus [3], being a former smoker [3], functional status [3, 5, 8], marital status [6, 7] and social network [8, 9]. The corresponding factors for elderly women are self-rated health [3, 5, 9], number of chronic diseases [8], circulatory diseases [5], diabetes mellitus [3], functional status [3, 5, 8, 9], marital status [6, 7] and social network [5, 8].

As morbidity predicts mortality, various methods have been used to analyse the morbidity of a population. These include the number of different self-reported chronic diseases, objectively diagnosed diseases [3, 5, 8] and use of prescription drugs. Information on drug use has been used to assess morbidity patterns of some patient groups (e.g. those with diabetes [25]), or as an indicator for certain diseases

(e.g. depression [26]). Recently, two American studies used automated pharmacy data to measure chronic disease status in total populations [27, 28]. One of these studies observed and analysed the association between chronic disease score and mortality [28].

People living in urban and non-urban environments might have different predictors of mortality, which could result from such factors as different environmental exposures and varying degrees of stress. In an American study of both rural and urban communities, differences were identified in the importance of social ties on mortality [8]. The present study analyses mortality differences in elderly men and women living in a non-urban municipality.

The aim of the study was to analyse the relationship between age, self-rated global health, morbidity, mobility, life satisfaction, marital status, social network and 6-year mortality in men and women over 75 living at home.

Study population and methods

Population

The study area is the municipality of Tierp in mid-eastern Sweden. It includes rural areas and a few small industrial towns. In 1986, the municipality had about 21 000 inhabitants. Twenty-three percent were aged 65 years and older and 11% were aged 75 years or older, compared with 18 and 8% for the same year in Sweden as a whole. Since 1972, all prescription drug purchases as well as diagnoses from health centre visits have been registered for all inhabitants. The individual-based computerized research registry contains data on type of drug, date of prescription, date of purchase and prescribing doctor as well as a maximum of three diagnoses from every visit to a physician at the health centre. Each prescription purchased in 1986 was registered separately according to the pharmacological classification used in Sweden that year [29].

From the community-based elderly population, a random sample aged 75–84 years ($n = 273$) and all residents 85 years or older ($n = 167$) were selected for interview in 1986. The response rate was 94% and 97%, respectively, giving a sample of 421 subjects. The mean age of the total sample was 80.5 years (range 75–103 years). Interviews were done by five district nurses who conducted them outside their own district. The questionnaire consisted of 140 questions on such issues as housing, social contacts, health and disability; each interview took about 1 h. The nurses also evaluated health status. A more detailed discussion of the methods used can be found elsewhere [30]. The elderly subjects were followed for 6 years through the national cause of death register by which mortality could be monitored.

Variables

Besides age, gender and marital status, self-rated global health, morbidity, mobility index, life satisfaction and social network were included in the analysis.

Self-rated global health

The self-rating was phrased: 'How do you perceive your current health status?' with the response alternatives 'good', 'fairly good', 'fairly bad' and 'very bad'. In the analysis, the first and second two response categories were combined.

Morbidity

A combined measure of morbidity accounted for both self-reported symptoms and diseases and prescription drug use. The interviewer read a list of health problems or symptoms, asking whether each item applied to the respondent. This list was based on those complaints for which elderly people most frequently sought medical advice, according to the most senior general practitioner in the municipality. The interviewees were also asked if, at the time of the interview, they were 'having', 'have had', or 'never had' diabetes mellitus, angina pectoris, hypertension (treated) or rheumatism. The responses 'having' and 'have had' were combined in the analysis. Information on prescription items was obtained through the research registry for different pharmacological groups for the year 1986.

From the data on symptoms, chronic diseases and prescription drugs, six morbidity groups were formed. A person was considered to have a particular health problem if he or she had reported a symptom or disease, had purchased at least one prescription drug

Table 1. Morbidity groups, based on self-reported symptoms/diseases and purchased prescription drugs

Morbidity group	Symptom/disease	Drugs
Heart problems	Chest discomfort, swollen legs, angina pectoris, hypertension	Cardiovascular
Diabetes mellitus	Diabetes mellitus	Diabetes mellitus
Respiratory problems	Bronchial problems (prolonged cough, asthma), breathlessness	Respiratory
Abdominal problems	Stomach pains, constipation	Gastrointestinal
Mental problems	Sleeping problems, melancholy, anxiety	Psychotropic
Pain	Pain in back, joints, shoulders, arms or legs; rheumatism	Analgesics

from the pharmacological group in question, or both. The morbidity groups are shown in Table 1.

Mobility index

The index was based on four questions concerning self-reported ability to move around indoors and outdoors, stand up from an armless kitchen chair and get out of bed. A low score represented no mobility problems.

Life satisfaction

The question about life satisfaction was 'how happy are you with life in general?'. There were five response categories: 'very happy', 'fairly happy', 'so-so', 'could be better' and 'unhappy'. The latter three were combined due to low response frequencies.

Social network

There were several questions on social network. Subjects were asked 'How often have you been visited by your children or other relatives during the past two months?'. The seven different response categories on visit frequency—'have no children/relatives', 'daily', 'at least once a week', 'several times a month', 'once a month', 'less than monthly' and 'never'—were combined into three (see Table 3). Questions on membership of a club and close friendships were also included. 'Are you a member of a club or an organisation?' and 'Do you have a friend with whom you can talk intimately?' could be answered yes or no.

Analysis

The younger age group (75-84 years) was a random sample of one-eighth of the community population in this age group. The older group included all individuals 85 years and older in Tierp living at home. Since the procedures of selection were different, we weighted the younger group by a factor of eight in the analyses. All analyses are based on weighted data. However, the number of observations agrees with the actual sample size.

Mortality rate was calculated for each variable. Differences between two proportions were tested by the χ^2 test. The multivariate analysis was performed

Table 2. Concordance between self-reported symptoms/diseases and purchased prescription drugs

		Proportion (%) reporting		
Group	*n*	Disease only	Drug only	Both
Heart problems				
Men	130	13.2	26.0	60.8
Women	169	20.4	6.2	73.4
Total	299	16.9	15.9	67.2
Diabetes mellitus				
Men	33	38.7	0.0	61.3
Women	28	34.3	0.0	65.7
Total	61	37.1	0.0	62.9
Respiratory problems				
Men	82	67.1	10.0	22.9
Women	81	71.9	4.5	23.6
Total	163	69.2	7.6	23.2
Abdominal problems				
Men	68	45.2	27.4	27.4
Women	98	61.9	10.9	27.2
Total	166	55.0	17.7	27.3
Mental problems				
Men	99	34.2	28.7	37.1
Women	148	35.4	16.9	47.7
Total	247	34.8	22.5	42.7
Pain				
Men	120	54.2	7.4	38.4
Women	178	54.5	6.8	38.7
Total	298	54.3	7.1	38.6

Table 3. Number of respondents and mortality rate 6 years after interview by age, self-rated global health, morbidity, mobility, life satisfaction, marital status and social network

	Men		Women	
	n	Mortality (%)	*n*	Mortality (%)
Age in 1986				
75-79[a]	45	46.7	47	40.4
80-84	37	75.7[d]	28	32.1[b]
85-89	87	71.3[d]	104	57.7[c]
≥90	23	91.3[d]	50	78.0[d]
Self-rated global health				
Good/fairly good[a]	182	60.2	207	41.4
Fairly bad/very bad	9	96.7[d]	20	60.9[c]
No information	1	-	2	-
Heart problems				
No[a]	62	41.1	60	28.0
Yes	130	72.6[d]	169	49.0[d]
Diabetes mellitus				
No[a]	159	58.0	201	36.8
Yes	33	75.7[d]	28	80.0[d]
Respiratory problems				
No[a]	110	60.0	148	41.6
Yes	82	64.5	81	45.2
Abdominal problems				
No[a]	124	56.1	131	42.2
Yes	68	77.9[d]	98	43.9
Mental problems				
No[a]	93	53.4	81	30.4
Yes	99	68.3[d]	148	49.5[d]
Pain				
No[a]	72	53.2	51	47.1
Yes	120	67.2[d]	178	41.4
Mobility index				
No difficulties[a]	90	48.7	103	36.3
Some/many difficulties	121	79.3[d]	126	53.9[d]
Life satisfaction				
Very happy[a]	85	52.4	111	35.0
Fairly happy	79	64.7[c]	89	49.5[d]
So-so/unhappy	26	78.2[d]	26	52.7[c]
No information	2	-	3	-
Marital status				
Married[a]	98	58.4	50	30.3
Single	19	72.1[b]	25	16.7[b]
Divorced/widowed	75	66.4[b]	154	54.8[d]
Visits last 2 months by children				
More than once a week[a]	104	63.8	115	40.7
At least once a month	35	62.9	45	66.7 [d]
Seldom/never/have no children	53	58.3	68	25.2[d]
No information	0	-	1	-
Other relatives				
More than once a week[a]	29	64.2	60	37.3
At least once a month	51	51.3[b]	70	41.2
Seldom/never/have no relatives	109	66.8	98	48.4[b]
No information	3	-	1	-

Table 3. *(Continued)*

	Men		Women	
	n	Mortality (%)	*n*	Mortality (%)
Have a confidant				
Yes[a]	117	59.9	156	45.3
No	74	65.1	71	37.6
No information	1	-	2	-
Member of a club/organization				
Yes[a]	103	56.5	135	37.9
No	88	69.2[d]	93	51.3[d]
No information	1	-	1	-
Total	192	62	229	42.8

[a]Reference group.
Statistically significant differences between reference group and comparing group(s): [b]$P < 0.05$; [c]$P < 0.01$; [d]$P < 0.001$.

using logistic regression analysis [31, 32]. The statistical analyses were carried out using the SAS statistics program [33].

Results

Self-reported symptoms or diseases and information on prescription drugs from a research registry were combined (Table 2). The concordance of the information from the two sources varied among disease groups. Two hundred and ninety-nine people were defined as having heart problems, which constituted 68.5% of the total study population. Among men, 130 (66.3% of all men) had heart problems, as did 169 (70.7% of all women) of the women. Of the 299 subjects with heart problems, two-thirds had obtained both prescription drugs and reported having the disease in the interview. Almost equal proportions (16% of men and 17% of women) either reported disease or had purchased cardiovascular drugs.

The diabetes group consisted of 61 subjects, 18.3% of the total population. Similar numbers of men and women were defined as having diabetes: 33 men (22.6%) and 28 women (13.9%). More than 60% of the old people in the diabetes morbidity group reported both having diabetes and having purchased drugs for the disease. Slightly more than one-third reported the disease only.

Of those 163 subjects (39.7% of the population) with respiratory problems, almost 70% stated that they had respiratory symptoms, but only 8% had only purchased respiratory drugs. Less than one-quarter had both obtained prescription drugs and reported symptoms.

Six years after the interview, 259 people had died. The results of the univariate analyses are in Table 3. Mortality was higher in men than women ($P < 0.001$). Among the elderly men, most of the analysed variables predicted mortality, with the exception of respiratory problems, visits by children and having a confidant. Among the women, all but four variables were associated with 6-year mortality. These variables were respiratory and stomach problems, pain and having a confidant.

The results of multivariate analyses of mortality in men and women are shown in Tables 4 and 5. Age predicted mortality among both men and women. Those who perceived their health as fairly or very bad were more likely to die than those who considered their health to be good or fairly good. Among men, those with diabetes, heart problems or stomach problems were more likely to die compared with those without these diseases. Diabetes and mental problems predicted mortality in elderly women. Elderly women who were less mobile were more likely to have died after 6 years than those who reported having no problems. In the multivariate analysis, being divorced or widowed predicted mortality in females. Also, women who were seldom or never visited and women who did not have any children had a lower mortality than those visited at least once a month. Finally, men who were members of a club or organization had a lower mortality than men who were not members.

The multivariate analyses showed that mortality was higher in men and women who felt less than very happy about life in general, compared with those who felt very happy. Separate analyses of life satisfaction, adjusted for age, were also made, in order to determine what factors were associated with these life satisfaction ratings. Being less than very happy with life was associated with several factors in elderly women, the most important being self-rated health. Social network variables were of minor importance. In men, life satisfaction was influenced by considerably fewer factors. Impaired mobility and mental problems had the largest impact on men's life satisfaction.

The strongest predictors of mortality for men were

self-rated global health, age, heart problems and diabetes mellitus. Among women, diabetes mellitus, age and marital status most strongly predicted mortality. No interaction was found between self-rated global health and the morbidity groups (Tables 4 and 5).

Discussion

There were different predictors of mortality in elderly men and women. Morbidity-related factors were the most important predictors in men while in women the predictors were spread over more domains. We also found a higher mortality in men than women, which supports results from other studies [13, 14, 17, 19, 20, 22, 24].

Cardiovascular diseases are more common among men than women but after menopause the incidence tends to equalize. Apart from being the most common causes of death for elderly men and women, these diseases are also important predictors of mortality. For instance, angina pectoris predicted 5-year mortality among elderly men in an American study [8] and cardiovascular diseases were reported to predict 7-year mortality in elderly women in an Australian study [5]. Factors that contribute to men's higher rates of fatal diseases include their higher rate of cigarette smoking and, possibly, the greater prevalence of the type A behaviour pattern. Biological resistance and an earlier diagnosis could partially explain why heart problems were not a predictor among the elderly women in our study. Since women more often visit a physician [1], they probably receive earlier treatment for cardiovascular disease.

While psychiatric symptoms may result from the emotional response to chronic morbidity, mental problems predicted mortality among elderly women in our study, even after adjusting for different physical morbidity groups. However, although we included baseline medical conditions as predictors, it is plausible that patients with mental problems developed physical disease at a higher rate than those without

Table 4. Logistic regression model relating age, self-rated global health, morbidity, social network and life satisfaction to 6-year mortality among elderly men

			95% CI	
	Estimate	OR	Low	High
Intercept	−2.3038			
Age				
75-79[a]				
80-84	1.6550	5.23	3.46	7.92
85-90	1.2084	3.35	1.84	6.09
≥90	2.3370	10.35	2.12	50.41
Self-rated global health				
Good/fairly good[a]				
Fairly bad/very bad	3.1218	22.69	2.92	176.21
Diabetes mellitus				
No[a]				
Yes	1.3580	3.89	2.39	6.33
Heart problems				
No[a]				
Yes	1.5668	4.79	3.22	7.14
Abdominal problems				
No[a]				
Yes	0.6350	1.89	1.21	2.93
Life satisfaction				
Very happy[a]				
Other[b]	0.5457	1.72	1.21	2.46
Membership of a club				
Yes[a]				
No	0.5398	1.72	1.18	2.48

[a]Reference group.
[b]Fairly happy/so-so/unhappy.
OR, odds ratio; CI, confidence interval.

mental problems, with a subsequently higher mortality. Another possibility is that there is a direct relationship between mental problems and mortality. The increased mortality among women with mental problems might relate to depression. Sleeping problems, melancholia and even anxiety may be symptoms of depression [34]. Depression is underdiagnosed in elderly people: depression and dementia have common features that can lead to misdiagnoses [35]. Depression is also more common in women than men [36]. A relationship between depression and mortality has been found [18, 36]; however, contrary results have also been reported [5, 14, 16, 23].

Morbidity was analysed by combining information from self-reported symptoms or diseases and purchased prescription drugs. About one-third of those who had diabetes reported disease only. An earlier study in Tierp showed that more than one-fifth of elderly diabetic patients (aged 65 years and older) were treated with diet only [25]. Among the morbidity groups for which over-the-counter drugs may be purchased (respiratory problems, stomach problems and pain), there were high percentages with disease only. Mental problems had the highest percentage of subjects with prescription drug only, which might be explained by an unwillingness of older people to talk about psychiatric symptoms. For all morbidity groups except diabetes there was a higher percentage of men than women reporting drug prescription only. This may indicate that men are more reluctant to discuss their health problems or that they consider them to be less important.

Life satisfaction is more strongly associated with physical morbidity than with social network [37]. Our sub-analysis confirmed that morbidity was more strongly related to subjective well-being than social

Table 5. Logistic regression model relating age, self-rated global health, morbidity, marital status, social network and life satisfaction to 6-year mortality among elderly women

			95% CI	
	Estimate	OR	Low	High
Intercept	−2.0634			
Age				
75–79[a]				
80–84	−0.3628	0.70	0.46	1.05
85–89	0.5735	1.77	1.05	2.99
≥90	1.8764	6.53	2.88	14.79
Self-rated global health				
Good/fairly good[a]				
Fairly bad/very bad	0.8889	2.43	1.31	4.53
Diabetes mellitus				
No[a]				
Yes	2.1136	8.28	4.73	14.48
Mental problems				
No[a]				
Yes	0.6759	1.96	1.33	2.91
Mobility index				
No difficulties[a]				
Some/many difficulties	0.4428	1.56	1.07	2.26
Life satisfaction				
Very happy[a]				
Fairly happy/so-so/unhappy	0.5582	1.75	1.21	2.52
Marital status				
Married/single[a]				
Divorced/widowed	1.0723	2.92	2.00	4.26
Visits by children				
More than once a week/at least monthly[a]				
Less frequently[b]	−0.8997	0.41	0.27	0.62

[a]Reference group.
[b]Seldom/never/have no children.
OR, odds ratio; CI, confidence interval.

network in both genders. However, the direction of the relationship could not be determined, since our data at baseline were cross-sectional.

Impaired functional status is also, to some extent, related to physical morbidity. Impaired functional capacity mirrors the daily health problems (often musculoskeletal diseases) confronted by elderly women but not elderly men [1]. Mobility has been measured in different ways, and comparisons between studies are difficult. However, functional status has been reported to predict mortality in both elderly men and elderly women [3].

There were also differences between men and women in social network variables. The differences in earlier working life meant that men have had more external contacts and women more family contacts. These different aspects of social network are obviously of varying importance to elderly men and women, since they also affected the processes of late life by predicting mortality differently. Other studies have shown the same tendency. Non-kin social support predicted 4-year mortality among elderly men [9] and emotional support was associated with 7-year mortality in women [5]. Social support and stress theories suggest that women may be more sensitive than men to the effects of less supportive or more stressful family circumstances [38].

This study was conducted in a non-urban, elderly population. The average age of the subjects was about 5 years higher than in other mortality studies. However, the results did not differ much from these other studies. Comparisons of our results with others based on geography (urban *versus* non-urban location) show no striking differences. Larger epidemiological studies, analysing mortality in elderly men and women, will be crucial in determining whether differences exist between urban and non-urban populations.

The average man and woman aged 75 years or older differ in many ways. Elderly women may have more minor complaints, but are likely to have fewer fatal diseases than men. Their social networks also differ. These and other differences may have an impact on late life morbidity, functional limitations and mortality. We found different predictors for mortality between men and women. In men, morbidities were the greatest predictors of mortality. In women, the predictors were spread over more domains. The reasons for these differences may, we believe, include different lifestyles (smoking and alcohol habits, nutrition) and different biological vulnerability. Also, because women take more preventive health actions than men [1], factors other than physical morbidity are important for the mortality of elderly women.

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Key points

- A longitudinal study of people over 75 living at home in a mainly rural area demonstrated gender differences in the risk factors for mortality.
- In men, the strongest prediction of mortality rate were morbidity-related factors such as heart disease and diabetes mellitus.
- Mortality predictors in elderly women also included mobility, being divorced or widowed, mental problems and social networks.

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