Mortality among female manual workers

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Abstract

Study objective—The aim was to determine whether female manual workers have higher mortality than other women.

Design—This was a retrospective cohort study in which mortality was compared with that of the general female population. Main outcome measures were standardised mortality ratio (SMR) and 95% confidence intervals (CI).

Setting—Reykjavík region.

Participants—Participants were 18 878 women, the cumulated members of a pension fund for manual workers between 1970 and 1986.

Main results—A healthy worker effect was observed in the total cohort. The study was then restricted to those who had contributed to the pension fund any time after reaching 20 years of age, and a 10 year latency period was instituted. When analysing subcohorts by duration of employment the standardised mortality ratios for all causes of death and all cancers increased with longer employment time up to 10 years. However, the ratios were low in the group with over 10 years of employment. Those who began contributing to the fund in 1977 or later had higher mortality than those who began earlier. There was an excess of lung and bladder cancer in the total cohort and in all the subcohorts except in the group with over 10 years' employment. Mortality from accidents and suicides was in excess in all the groups.

Conclusions—Mortality is high among some groups of female manual workers. A deficit was found among those with the longest employment. Differences in mortality have widened in recent years. An excess of suicides shows that women in this group have, for some reason, less will to live than other women.

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According to studies from the Nordic countries and the USA, where women were classified by their own occupational status, economically active women had lower mortality rates than those who were economically inactive or housewives.^{6 7}

In the Nordic study,⁶ which was based on material gathered at census, the results were presented with standardised mortality ratios. The overall mortality was generally higher among manual workers than among other economically active women. This is in accordance with former studies where the husband's occupation has been the criterion for determining the occupational and social class of the couples.^{1-3 5-10} The study by Roman *et al* showed that occupational mortality among women in various professions has many of the same associations formerly observed for men.² An alternative approach showed wide differences in mortality among women. High mortality was associated with manual occupations, living in rented housing, and the lack of a car in the household. The authors concluded that other measures than those based solely on occupation were necessary. . . "to reflect the relation between a woman's life circumstances and mortality".⁹ Studies of class differences in women's mortality have shown that the lower classes have higher mortality.¹¹ To our knowledge this is the first study of mortality among female manual workers based on data collected from pension fund records. No mortality study has been done on an occupational cohort of Icelandic women. The aim of this study was to see if a cohort of female manual workers, defined by their own occupation, had higher mortality than other women.

Methods

This is a retrospective cohort study. The study population comprised 18 878 women who contributed to a pension fund for unskilled manual workers in Reykjavík any time during the period 1970-1986. According to Icelandic law it is obligatory for all wage earners to pay 4% of their salary to their respective union's pension fund. The employer has to pay a further 6%, and is responsible for collecting and forwarding both contributions to the fund. The follow up time was until 1 December 1989. Any payment to the pension fund during a particular calendar year was considered a whole year of employment. The difference between the first and last year of payment to the fund was set as employment time, regardless of the amount paid to the fund.

The payments each year were converted by the fund into points, with 100 points representing an entire year of full time work. The total points

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Most occupational studies have been made on men. The participation of women in the work force has been sporadic and limited and therefore it has been difficult to classify them by occupation. Since social classification has traditionally been defined by occupation this has resulted in problems in assigning them to social classes. Thus since the beginning of this century married women have been classified by their husband's occupation, single women by their own.¹ The increasing economic activity of women during the last decades has led to criticism of this approach.²⁻⁵

Table 1 Observed and expected number of deaths, standardised mortality ratio (SMR), and 95% confidence intervals among 18 878 female manual workers.

Cause of death (ICD, 7th revision)	Observed deaths	Expected deaths	SMR	95% Confidence intervals	
				Lower	Upper
All causes (001–E985)	727	963.52	0.75	0.70	0.81
Malignant neoplasms (140–205)	275	330.87	0.83	0.74	0.93
of stomach (151)	19	25.47	0.75	0.45	1.16
of large intestine (152,153)	21	24.42	0.86	0.53	1.31
of rectum (154)	6	7.00	0.86	0.31	1.87
of pancreas (157)	19	20.54	0.93	0.56	1.44
of trachea, bronchus and lung (162,163)	61	55.53	1.10	0.84	1.41
of breast (170)	38	59.19	0.64	0.45	0.88
of cervix (171)	5	10.76	0.46	0.15	1.08
of uterus (172)	6	8.64	0.69	0.25	1.51
of ovaries (175)	25	25.85	0.97	0.63	1.43
of kidney (180)	9	11.96	0.75	0.34	1.43
of bladder (181)	10	6.37	1.57	0.75	2.89
of brain (193)	10	12.29	0.81	0.39	1.50
Other neoplasms	46	62.85	0.73	0.54	0.98
Cerebrovascular diseases (330–334)	68	100.68	0.68	0.52	0.86
Ischaemic heart disease (420)	145	207.28	0.70	0.60	0.82
Respiratory diseases (470–527)	58	94.21	0.62	0.47	0.80
Unknown causes (795)	8	5.72	1.40	0.60	2.76
Accidents, poisonings and violence (E800–E985)	68	65.57	1.04	0.81	1.31
Suicides (E963, E970–E979)	24	17.83	1.35	0.86	2.00
All other causes	113	164.91	0.69	0.58	0.83

accumulated by each member of the fund reflect the amount of work performed. Thus it could be seen that part time work was common in this group as a whole.

According to a study from 1990 among the members of the union concerned,¹² 68% of the women were cleaners, 14.5% kitchen maids, 9.7% “general manual workers”, 3.9% worked in the fishing industry, and 3.9% in the food industry. Nearly 70% worked half time or less, and 19.7% worked full time. In Iceland the participation of women in the work force has increased considerably during recent decades. In a study on living conditions in Iceland from 1990¹³ 71% of women aged 16 to 75 years had some paid job and about 40% worked part time. The study population doubled during the first seven years, reaching a peak in 1982 and then decreasing. Through date of birth and the personal identification number the study population was record linked with the national register, the register of deceased and the register of cause of death, all kept by the Statistical Bureau of Iceland. Vital status was ascertained for everyone in the cohort. Information on cause of death was obtained from the death certificates. In the study group 727 had deceased. Two of the subjects had died abroad. Their certified cause of death was obtained from official authorities. The death certificate of one woman who died in a hospital in Reykjavik was missing. Her cause of death was ascertained from hospital records.

Several different revisions of the *International classification of diseases* have been in use during the study period.¹⁴ The certified causes of death were reclassified according to the seventh revision, as the Cancer Register in Iceland uses this revision¹⁵ and this revision has been used in former mortality studies in Iceland.¹⁶ The expected number of deaths was calculated on the basis of person-years of observation within five year categories during respective single calendar years of the study period, multiplied by the cause and calendar year specific death rates for Icelandic women. The ratio between observed and expected numbers, the standardised mortality ratio, was calculated with 95% confidence intervals (95% CI), assuming a Poisson distribution.

First the whole cohort was analysed, with and without latency, according to cause of death. Further analysis was restricted to those who had contributed to the pension fund any time after the age of 20 years though they might have begun before. This was done to omit youngsters working during their school holidays as manual workers, which is very common in Iceland. Summer holidays in Icelandic schools last for three months and are used by most teenage students to work at temporary jobs. After this restriction the cohort was divided according to cumulated years of employment and analysed for selected causes of death. To determine whether there was any variation with regard to the selected causes of death when examined on the basis of the time when employment began, this subcohort was subsequently divided into two further subcohorts, those hired before 1977 and those hired that year or later. Both these analyses were done with the requirement of 10 years' latency to eliminate the effect of selection into subgroups with different duration of employment.^{16 17} Latency was calculated from the year of first contribution to the fund.

Results

In the total cohort there were fewer deaths than expected (table 1). There was a deficit of all malignant neoplasms with the exception of cancer of the lung and bladder which showed an excess. There was a deficit of cerebrovascular disease, ischaemic heart disease, and respiratory diseases, but an excess of accidents and suicides. When latency of 10 years was instituted (not shown in the table) the standardised mortality ratios were:

Table 2 Observed (Obs) and expected (Exp) numbers, standardised mortality ratios (SMR) and 95% confidence intervals (95% CI), according to duration of employment among those who contributed to the pension fund after 20 years of age, with the requirement of 10 years latency.

Causes of death (ICD, 7th revision)	Duration of employment (years)							
	≤5 (n=4681)		6–10 (n=2577)		>10 (n=2415)		Total (n=9673)	
	Obs (Exp)	SMR (95% CI)	Obs (Exp)	SMR (95% CI)	Obs (Exp)	SMR (95% CI)	Obs (Exp)	SMR (95% CI)
All causes	243 (243.84)	1.00 (1.00–1.00)	137 (125.22)	1.09 (0.93–1.28)	96 (150.43)	0.64 (0.53–0.78)	476 (519.49)	0.92 (0.84–1.00)
Malignant neoplasms	80 (65.52)	1.22 (0.97–1.52)	50 (35.39)	1.41 (1.05–1.86)	43 (58.27)	0.74 (0.53–0.99)	173 (159.18)	1.09 (0.93–1.27)
Trachea, bronchus, and lung	19 (11.46)	1.66 (1.00–2.59)	11 (6.45)	1.71 (0.85–3.05)	9 (11.90)	0.76 (0.35–1.44)	39 (29.81)	1.31 (0.93–1.79)
Breast	10 (10.92)	0.92 (0.44–1.68)	7 (5.52)	1.27 (0.51–2.61)	6 (9.89)	0.61 (0.22–1.32)	23 (26.33)	0.87 (0.55–1.31)
Cervix	0 (1.32)	–	1 (0.65)	1.54 (0.04–8.57)	0 (1.25)	–	1 (3.22)	0.31 (0.01–1.73)
Ovary and adnexa	2 (4.75)	0.42 (0.05–1.52)	5 (2.68)	1.87 (0.61–4.35)	7 (4.91)	1.43 (0.57–2.94)	14 (12.34)	1.13 (0.62–1.90)
Bladder	4 (1.61)	2.48 (0.68–6.36)	1 (0.89)	1.12 (0.03–6.26)	1 (1.13)	0.88 (0.02–4.93)	6 (3.63)	1.65 (0.61–3.60)
Cerebrovascular diseases	32 (28.91)	1.11 (0.76–1.56)	12 (14.84)	0.81 (0.42–1.41)	9 (13.90)	0.65 (0.30–1.23)	53 (57.65)	0.92 (0.69–1.20)
Ischaemic heart disease	57 (61.37)	0.93 (0.70–1.20)	29 (31.44)	0.92 (0.62–1.32)	19 (32.73)	0.58 (0.35–0.91)	105 (125.54)	0.84 (0.70–1.01)
Respiratory diseases	26 (34.74)	0.75 (0.49–1.10)	14 (16.60)	0.84 (0.46–1.42)	8 (14.48)	0.55 (0.24–1.09)	48 (65.82)	0.73 (0.54–0.97)
Accidents, poisoning, and violence	13 (8.44)	1.54 (0.82–2.63)	8 (4.42)	1.81 (0.78–3.57)	8 (7.33)	1.09 (0.47–2.15)	29 (20.19)	1.44 (0.96–2.00)
Suicide	3 (2.39)	1.26 (0.26–3.67)	3 (1.24)	2.42 (0.50–7.07)	3 (2.70)	1.11 (0.23–3.25)	9 (6.33)	1.42 (0.65–2.70)
All other causes	35 (44.86)	0.78 (0.54–1.09)	24 (22.53)	1.07 (0.68–1.58)	9 (23.72)	0.38 (0.17–0.72)	68 (91.11)	0.75 (0.58–0.95)

for all causes 0.92, all neoplasms 1.09, cerebrovascular diseases 0.92, ischaemic heart disease 0.84, respiratory diseases 0.73. The excess of accidents and suicides was slightly higher than in table I, at 1.34 and 1.44 respectively.

When the analysis was restricted to those who paid to the pension fund any time after reaching 20 years of age, and with 10 years latency required, the results were as shown in table II. Here the cohort was divided according to duration of employment into three groups having 1–5, 6–10 and >10 years of employment. Regarding all causes, all malignant neoplasms, and accidents there was a gradient in the standardised mortality ratios in the first two groups. In the group with the longest duration of employment there was a deficit of most of the selected causes of death, although an excess of accidents and suicides was found. In the total subcohort the standardised mortality ratios for all causes and all neoplasms were near unity; on the other hand an excess of accidents and suicides was observed.

When the cohort was analysed according to the year first hired, with no regard to the duration of employment, the results were as shown in table III. The standardised mortality ratios were in all instances higher in the group hired in 1977 or later.

Discussion

Mortality was high in some subgroups among these female manual workers. Accidents and suicides were in excess in all the groups. This is in accordance with findings in studies on unskilled workers and low social classes.^{1–3 5–10} We are well aware of the complexity of assigning women to social class, occupation being only one of the factors.⁹ The fact that the majority of the group were part time workers, as is common among Icelandic women, and could have had other paid jobs at the same time, does not help in this regard. No information was available about the employment of cohort members before 1970. The marital status of the women is unknown to us. The lack of such data is one of the weaknesses of the study. On the other hand we have information from the fund on their payments, an indirect measurement of amount of work, the time when first hired, and duration of participation in the fund.

Comparison of the results of this study with other studies on women should be undertaken with caution. Different methods have been used

to classify women and most studies on female manual workers have been based on information gathered at census. We have speculated as to how women in this cohort would answer census questions on occupation, bearing in mind that the majority of them work part time at jobs held in low esteem.

Using all Icelandic women as a comparison group invites the healthy worker effect¹⁸ which is partly eliminated in the Nordic census study by excluding those economically inactive before the comparison.⁶ By omitting those who only worked before reaching 20 years of age, students, who hardly belong to the manual workers group, were excluded. In many studies on men the healthy worker effect decreases with longer follow up.^{11 19} In this study on women there was a deficit among those with the longest duration of employment. It has been pointed out that the healthy worker effect is perhaps of a different nature among women than men; women who are in poor health are more likely to stay at home or leave work.^{5 7 20} The deficit among those having the longest employment could indicate a protective factor associated with the stability of mind and behaviour enabling these women to hold the same occupation for a long time; or perhaps it could be the result of a selection process: only the stronger workers are able to continue more than 10 years. These results point to the question that Fox and Adelstein²¹ raised several years ago: how much does the mortality of an occupational group reflect the work environment and how much the way of life?

In other studies we have seen high standardised mortality ratios among those having the shortest employment time.¹⁶ One could hypothesise that something in the lifestyle of workers with a short duration of employment could endanger their health.

The high mortality for cancers related to smoking, ie, cancer of the lung and bladder, suggest excessive smoking in this group, as has been found in other studies among female manual workers.⁸ In light of this, the deficit of respiratory diseases in all the groups is noteworthy.

In further analysis of the subcohorts, the excess of all the selected causes among the group which had worked for one up to 10 years indicates that female manual workers in Iceland fit into the pattern of inequality in health found in other societies.^{1 6 8 9}

The higher mortality ratio of those first hired in the year 1977 or later is in accordance with the findings of other studies, ie, that inequality in health has increased over time.^{10 11} According to the previously mentioned studies of McDowell and Waldron *et al*, part of the explanation is to be found in the increased participation of women in the work force.^{5 20}

The increased risk of accidents and suicide in all the cohorts is worthy of attention. Although the numbers are small this points to distress and to self destructive forces among these women. In a study on women in Britain² suicide rate was found to be high among labourers and unskilled workers.

Mortality from suicide among Nordic women varied between occupational groups; however, higher rates were observed among white collar workers. The suicide rate among female cleaners varied between countries but generally it was not

Table III Observed (Obs) and expected (Exp) number of deaths, standardised mortality ratios (SMR) and 95% confidence intervals (95% CI), according to start of employment among those who contributed to the pension fund after 20 years of age, with the requirement of 10 years latency.

Causes of death (ICD, 7th revision)	Start of employment (calendar years)					
	1970–76 (n=6853)			1977–79 (n=2820)		
	Obs (Exp)	SMR (95% CI)		Obs (Exp)	SMR (95% CI)	
All causes	447 (506.76)	0.88 (0.80–0.97)		29 (12.73)	2.28 (1.53–3.27)	
Malignant neoplasms	154 (153.61)	1.00 (1.00–1.00)		19 (5.57)	3.40 (2.05–5.33)	
Trachea, bronchus, lung	34 (28.64)	1.19 (0.82–1.66)		5 (1.17)	4.27 (1.39–9.97)	
Breast	22 (25.22)	0.87 (0.55–1.32)		1 (1.12)	0.89 (0.02–4.97)	
Cervix	1 (3.12)	0.32 (0.01–1.79)		0 (0.10)	–	
Ovary and adnexa	12 (11.89)	1.01 (0.52–1.76)		2 (0.45)	4.44 (0.54–16.05)	
Bladder	6 (3.50)	1.71 (0.63–3.73)		0 (0.13)	–	
Cerebrovascular diseases	53 (56.67)	0.94 (0.70–1.22)		0 (0.98)	–	
Ischaemic heart disease	101 (123.30)	0.82 (0.68–1.00)		4 (2.25)	1.78 (0.48–4.55)	
Respiratory diseases	48 (64.77)	0.74 (0.48–0.89)		0 (1.04)	–	
Accidents, poisoning, violence	26 (19.35)	1.34 (0.88–1.97)		3 (0.84)	3.57 (0.74–10.44)	
Suicide	8 (6.05)	1.32 (0.57–2.61)		1 (0.27)	3.70 (0.09–20.64)	
All other causes	65 (153.83)	0.42 (0.33–0.54)		3 (3.09)	0.97 (0.20–2.84)	

high.⁶ Among white collar women in the USA there was a deficit of suicides.^{22 23} A relationship has been found between growth in the female labour force and suicide.^{24–26} Seeking the “reasons”, Barraclough *et al* found that the majority of those who committed suicide were mentally ill.²⁷ Durkheim linked low social integration with suicide.²⁸

In conclusion, mortality among female manual workers was high for all neoplasms in the groups with employment time of less than 10 years. A deficit was seen in the group with longer employment. Those who were recruited during the latter half of the study period had higher mortality than those hired earlier. Accidents and suicides were in excess in all the groups. These women appear to have, for some reason, less will to live than other Icelandic women.

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