

Disability by Occupation in Finland 1986–1990

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Abstract

The present paper describes differences in the standardized disability ratio between occupations in Finland in 1986–1990. Furthermore, it gives an overview of the relationship between occupational disability and mortality. The data are based on the 1985 census records in Finland linked with all disability pensions during the period 1986–1990. The study includes the entire male and female labor force aged 25–54 years in 1985. An indirect standardization method was used to calculate the standardized disability ratio for each occupation. Results indicated clear differences in disability by occupations for both men and women. Among both sexes, the manual workers occupations had higher standardized disability ratios and white-collar occupations had lower ratios than the entire labor force. The disability of male occupations correlated strongly with occupational mortality, whereas among women the correlation between mortality and disability was weaker.

Keywords: disability pensions, occupation, mortality, Finland

Introduction and aims of the study

Occupational mortality statistics were used to describe occupational hazards in different occupations already about one hundred years ago (Fox, Goldblatt and Jones 1985). In Finland and other Scandinavian countries linked record studies based on population censuses and occupational mortality statistics have been carried out since the middle of the 1970s. In addition a homogeneous data base has been established for a total Nordic population of more than 12 million people who were aged 20–64 years around

1971 (Sauli 1979; Marin 1986; Nordic Statistical Secretariat 1988; Lynge, Andersen and Horte 1989). In several occupations the Finnish men had a particularly high excess mortality compared to the mortality in the other countries. In Finland the occupational mortality differences were not as high among women as among men (Nordic Statistical Secretariat 1988).

In the latest study mortality has been followed during the period 1971–1991 (Notkola, Pajunen and Leino-Arjas 1995). Male mortality was highest among the cleaning workers and managers, shoemakers and shoe repairers, laborers, shop supervisors and department chiefs (entrepreneurs) and engine-room crew. Female mortality was highest among the stationary engine and motor power workers (entrepreneurs), messengers and delivery personnel, forestry workers, road transportation workers, other guards (civil duties) and assisting building workers (Notkola et al. 1995).

The linked record studies have also been used to study occupational differences among those retiring on a disability pension in Finland during the period 1976–1980 (Hytti 1988) and the period 1972–1985 (Hytti 1994). According to those studies, a particularly high level of incidence of disability was found for men among assisting building workers and persons in forestry work, mining and quarrying work, construction work and painting and lacquering work. For women, heavy manufacturing work was the group most susceptible to the risk of disability. In addition, Hytti's study (1988) analyzes the relationship between disability and mortality. Among male occupational groups the risk of disability pensions correlated strongly with mortality during the period 1976–1980, while among female occupational groups the correlation was quite weak. Similarly, differences in the incidence of disability pensions between social groups reflected the commonly observed socioeconomic differences in morbidity or mortality in Finland quite well (Lahelma et al. 1993; Valkonen et al. 1993; Perkiö and Notkola 1994; Huttunen and Valkonen 1995).

However, the occupational differences in disability are not necessarily associated with work-related morbidity. According to the legal definition, a disability pension can be awarded to persons aged 16–64 who cannot perform their customary work or other comparable work which with regard to age, occupational skills and other factors can be regarded as suitable and guaranteeing a reasonable income (Social Insurance Institution 1994). The official definition of disability presupposes a clear causative relationship between a health impairment and incapacity for work. In addition, there is at least one study which showed that the differences in retirement on disability pensions also reflected differences in morbidity (Manninen and Notkola 1994).

There is no information about occupational or socioeconomic differences in disability in Finland since 1985. Furthermore, the relationship between occupational disability and mortality in the 1980s has been disregarded up to now. By studying occupational disability differences we can gain new information about work-related health problems in Finland.

The aims of the study were to describe the occupational differences in the standardized disability ratio in Finland in 1986–1990 and to analyze how occupational disability is related to occupational mortality.

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Material and methods

The study is based on longitudinal census data that has been compiled by Statistics Finland by means of linking the census records of individuals for 1970, 1975, 1980,

1985 and 1990 (Statistics Finland 1991). Information on all recipients of new disability pensions granted for an unspecified period (permanently) in 1986–1990 has been obtained from the Social Insurance Institution. This information has been linked to information on census records by means of official personal identity codes.

The data set comprised the entire male and female labor force between the ages of 25–54 years (on December 31, 1985) in the 1985 census and census data combined with the data on pensions for five years following the census. The study population included 978,000 men and 884,000 women at the beginning of the follow-up. The study was restricted to men and women aged 25–54, because those over the age of 55 had the possibility to get other early retirement pensions. All pensioning of the study population in the period 1986–1990 was covered. The number of new male pensioners was 31,700, while females numbered 23,800.

Data on occupations were based on the 1985 census records. Occupational titles have been classified according to the official classification into nearly 400 different occupations. The classification was based on a hierarchically ordered set of criteria. Occupation titles were classified according to one-, two- and three-digit codes, the one-digit code indicating the main occupation, the two-digit code the occupational group and the three-digit code the occupation. The same occupational classification was used for men and women.

For every occupational category a standardized disability pension ratio (SDR) was calculated. To eliminate differences in the age structures of occupational groups, an indirect standardization method was used (Armitage 1980). Among men, the male labor force aged 25–54 years in the 1985 census was used as the reference population, whose incidence of disability pensions was compared to the disability of each occupational group. Among women, the female labor force in 1985 was used as the reference population. The standardized disability ratio by occupation was computed separately for men and women. Standard mortality ratios (SMR) for occupations were calculated for the period 1980–1991 (Notkola et al. 1995).

The standardized disability ratios are presented with 95%-confidence limits. The group is said to have a disability over or below average when the interval does not equal 100.

During the period 1986–1990 over 55,000 new disability pensions were awarded to the study population. The main cause of disability for both men and women was diseases of the musculoskeletal system and connective tissue (Table 1). The second most typical cause among both sexes was mental disorders. Over half of the pensions were awarded on the grounds of these two disease groups. Moreover, the pensions grant-

Table 1. Number of new disability pensions granted for persons aged under 55 years by sex and disease group in 1986–1990.

Disease groups	Men		Women	
	Number	Percent	Number	Percent
Diseases of the circulatory system	5 951	19	1 885	8
Diseases of the musculoskeletal system and connective tissue	9 396	30	8 929	38
Mental disorders	7 387	23	6 677	28
Diseases of the respiratory system	1 094	3	960	4
Neoplasms	1 173	4	1 562	7
Diseases of the nervous system and sense organs	1 957	6	1 412	6
Injury and poisoning	2 629	8	945	4
Other diseases	2 120	7	1 404	6
All causes	31 707	100	23 774	100

ed as a result of diseases of the circulatory system were particularly common among men. For men, the proportion of these diseases was 19 percent, but for women only 8 percent.

Results

Occupational differences in disability

Men

For male occupational groups, particularly high standardized disability ratios (SDR) were found among forestry workers, mining and quarrying workers, deck and engine-room crew, construction workers and dock and warehouse workers. Moreover, some service occupation groups had higher SDRs than the male labor force as a whole. Specifically, in housekeeping and related service supervising work (136, 95% CI 107–171), and building caretaking and cleaning work (114, 95% CI 105–124) that includes caretakers (107, 95% CI 98–117), cleaning workers (188, 95% CI 141–245) and chimney sweeps (208, 95% CI 156–272), workers retired on disability pensions more frequently than average. For more detailed occupations, the SDRs were highest among telephone switchboard operators, kitchen assistants, laborers and rod layers (Table 2).

The SDRs were lowest in planning, administrative and research work in the technical fields, pedagogical work and religious work. Generally, the SDRs were below average in the white-collar occupations.

Women

Male and female occupational groups showed a very similar pattern of retirement. Among female occupational groups, SDRs were also lowest in administrative and academic professions and highest in physically demanding work such as other construction work, forestry work, woodwork, painting and lacquering, other manufacturing work, iron and metalware work, road transportation work, agricultural and horticultural work and chemical processing and related work. An analysis of more detailed occupational classes showed that especially high disability ratios were found in occupations that were not traditional female occupations: concrete-mixer operators and cast concrete product workers, assisting building workers, fitter-assemblers, etc., rubber product workers and insulation workers (Table 2).

In addition to manufacturing and related work, the SDRs among service workers, such as civil duty guards, chart workers, bath attendants, laundry workers and kitchen assistants were higher than in the female labor force as a whole. Moreover, for women, commercial travelers (entrepreneurs) had an increased SDR compared with the entire female labor force in 1985.

Comparison of occupational disability and mortality

Men

The scatter diagram of the standardized mortality ratio (SMR) and the standardized disability ratio (SDR) by male occupations are shown in Figure 1. The SMR values are for 1980–1991 and the SDR values for 1986–1990. The occupations in which the number of deaths or new disability pensions were under ten, were excluded from the data.

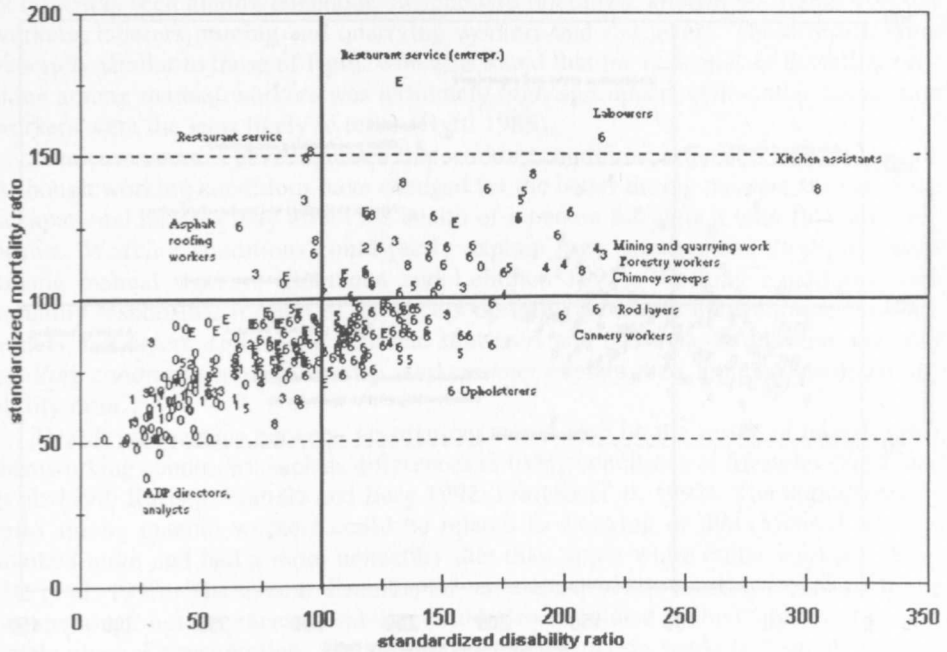
Generally, the high mortality occupations seem to have high disability, while the

Table 2. The increased standardized disability ratios (SDR) by occupation and sex, persons aged under 55. All diseases.

Men				
Code	Occupation 1985	SDR	95% CI	Pensions
	Entire male labor force	100		
	Entrepreneurs (E)	82	80-85	(4100)
	Employees	92	91-94	(23460)
572	Telephone switchboard operators	314	125-650	(7)
812	Kitchen assistants	305	178-490	(17)
34	Forestry workers	217	205-230	(1157)
790	Laborers	216	193-240	(344)
40	Mining and quarrying workers	214	175-261	(101)
692	Rod layers	214	175-258	(106)
832	Chimney sweeps (also entrepreneurs)	208	156-272	(53)
780	Stevedores, etc.	203	176-232	(212)
49	Other mining and quarrying workers	201	158-254	(72)
724	Cannery workers	200	132-292	(27)
633	Smiths	198	128-292	(25)
831	Cleaners	188	141-245	(54)
510	Deck crew	184	150-222	(106)
51	Deck and engine-room crew	183	154-216	(138)
697	Assisting building workers	182	168-197	(643)
511	Engine-room crew	182	124-257	(32)
581	Postmen and sorters	178	122-250	(33)
693	Concrete shutterers and finishers	176	148-209	(135)
41	Well drillers	176	109-270	(21)
725	Butchers and sausage makers	171	142-204	(124)
Women				
Code	Occupation 1985	SDR	95% CI	Pensions
	Entire female labor force	100		
	Entrepreneurs (E)	99	95-103	(2905)
	Employees	92	91-94	(18440)
758	Concrete-mixer operators, etc.	473	259-797	(14)
697	Assisting building workers	418	320-536	(62)
69	Other construction workers	313	249-389	(81)
651	Fitter-assemblers, etc.	278	148-477	(13)
34	Forestry workers	262	119-500	(9)
751	Rubber product workers	250	194-317	(68)
695	Insulation workers	245	98-509	(7)
650	Turners, toolmakers and machine-tool setters	242	190-304	(74)
679	Other woodworking occupations	239	154-353	(25)
725	Butchers and sausage makers	234	175-306	(53)
790	Laborers	228	168-303	(48)
22E	Commercial travelers (E)	219	120-369	(14)
613	Upholsterers	218	141-322	(25)
723	Brewers, beverage makers and kilnmen	217	141-321	(25)
672	Plywood and fiberboard workers	217	180-259	(120)
310	Farm workers	208	181-238	(210)
753	Tanners, fellmongers and pelt dressers	203	138-289	(31)
671	Sawyers	203	155-260	(62)
655	Welders and flame cutters	201	141-279	(36)
634	Molders	222	118-381	(13)

lowest disability ratios were found among low mortality occupations. The correlation coefficient between mortality and disability was 0.72. The occupations of administrative, managerial and clerical work, technical, physical science, social science, humanistic and artistic work and sales work had lower mortality and disability than average,

Figure 1. Scatter diagram between standardized disability ratios and standardized mortality ratios in male occupations.



0 = technical, physical science, social science, humanistic and artistic work, 1 = administrative, managerial and clerical work, 2 = sales work, 3 = agriculture, forestry and commercial fishing, 4 = mining and quarrying work, etc., 5 = transport and communication work, 6 = manufacturing and related work, 8 = service work, 9 = occupation not specified, E = entrepreneurs.

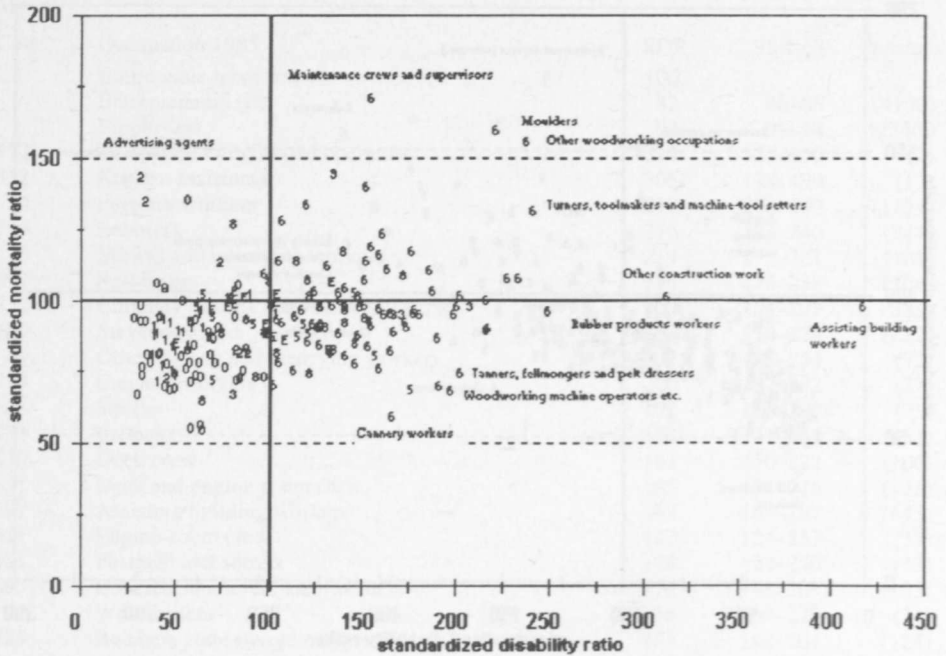
with the exception of other librarians, archivists, museum workers, who had a higher SMR value, as well as a higher SDR, than average. Another exception was physiotherapists, who had low disability, but a higher mortality (nonsignificant) than average.

In service work, kitchen assistants had increased disability and mortality, while restaurant waiters had a high SMR value, but no excess disability. Furthermore, asphalt roofing workers and reindeer breeders and herders and commercial travelers (entrepreneurs) had high mortality, but disability was lower than average. On the other hand, there were some occupations in manufacturing and related work and transportation and communication work, such as cannery workers, upholsterers, rod layers, other woodworking occupations and railway and station personnel, which had high disability, but low mortality.

Women

The scatter diagram of Figure 2 illustrates the relationship between mortality and disability by female occupations. Among women occupational differences in disability were clear, but mortality differentials in different occupations were relatively small. The disability ratios of occupations correlated only slightly with the SMR values ($r = 0.30$). Generally, however, the pattern is the same for both men and women. Mortality and disability tended to be the lowest in administrative, managerial and clerical work, technical, physical science, social science, humanistic and artistic work and sales work. Many occupations of manufacturing work and service work had a higher disa-

Figure 2. Scatter diagram between standardized disability ratios and standardized mortality ratios in female occupations.



0 = technical, physical science, social science, humanistic and artistic work, 1 = administrative, managerial and clerical work, 2 = sales work, 3 = agriculture, forestry and commercial fishing, 4 = mining and quarrying work, etc., 5 = transport and communication work, 6 = manufacturing and related work, 8 = service work, 9 = occupation not specified, E = entrepreneurs.

bility ratio but a lower mortality ratio than average.

There were some occupations which deviate clearly from the other occupations. Especially other construction workers and assisting building workers had particularly high SDRs, but showed no excess mortality during the period 1981–1991. However, in 1971–1991 mortality among assisting building workers was clearly high (Notkola et al. 1995). Furthermore, many other occupations of manufacturing, such as tanners, fellmongers and pelt dressers, woodworking machine operators, cannery workers, motor vehicle and streetcar drivers and other footwear workers had high SDR values but SMR values were under the average. Some occupations among manufacturing workers, such as maintenance crews and supervisors, molders, other woodworking occupations and turners, toolmakers and machine-tool setters had both high SMR values and high SDR values.

On the other hand, female advertising agents, other occupations in the humanities, the physical sciences and the social sciences (include geographers, mathematicians, etc.), beauticians and commercial travelers had high mortality, but their SDR values were lower than for reference women.

Discussion

Over the period 1986–1990, there were clear differences in standardized disability ratios between occupations. The standardized disability ratios for women were highest

among concrete-mixer operators, assisting building workers, fitter assemblers, forestry workers and rubber product workers. For men, a particularly high level of disability ratio was seen among telephone switchboard operators, kitchen assistants, forestry workers, laborers, mining and quarrying workers and rod layers. These results were generally similar to those of Hytti, who also found that the incidence of disability pensions among manual workers was extremely high and upper white-collar occupation workers were the least likely to retire (Hytti 1988).

Numerous studies have indicated that working conditions influence workers' health. Although working conditions have changed for the better during the past decade, some occupational hazards may affect the health of a person for quite a long time after exposure. Working conditions could partly explain high standardized disability ratios among manual workers (Rantanen and Lehtinen 1992). Working conditions were certainly responsible for part of the excess disability at least among chimney sweeps, miners, rod layers, smiths and concrete shutterers and finishers. In addition, the poor working conditions among forestry workers may explain their high standardized disability ratio.

Health inequalities between occupations could also be the result of factors other than working conditions, such as differences in living conditions or lifestyles (Pekkanen et al. 1990; Karisto, Prättälä and Berg 1992; Prättälä et al. 1992). The high disability ratio among manual workers could be related to smoking or diet. Manual workers smoked more and had a more unhealthy diet than upper white collar workers. (Prättälä et al. 1992). The excess disability of male construction workers could partly be occupational, but the excess disability could also be related to their lifestyles, for example alcohol consumption. The mortality of construction workers from alcohol-associated diseases was 83% higher and their mortality from alcohol poisoning was 129% higher than for all men in the labor force during the period 1971–1991 (Notkola et al. 1995).

The occupational differences in morbidity and mortality could to some extent be the result of health-related mobility (Fox, Goldblatt and Jones 1985; Östlin 1989; Dahl and Kjaersgaard 1993; Mannila 1993). Health-related selection can cause underestimates and overestimates of occupational morbidity. The differences in disability can be explained by a process in which workers in poor health moved to occupations low in the social hierarchy or occupations with low physical demand.

An additional analysis of occupational mobility (Notkola et al. 1995) revealed that in some occupations health-related selection seems to be a process which increased the standardized disability ratio. For example, the high standardized disability ratios of male telephone switchboard operators and kitchen assistants were mainly due to health-related occupational mobility from other occupations. Usually, however, the increased disability occupations had high standardized disability ratios both among stable workers (the people who had the same occupation in the 1980 and the 1985 census) and among those who changed their occupation between censuses.

Among male occupations, there was a clear association between the standardized disability ratio and the standardized mortality ratio. However, for women the results showed no clear evidence that retirement was associated with mortality. The results are similar to the results of an earlier study (Hytti 1988).

The weaker correlation between mortality and disability in female occupations compared to male occupations might be due to the smaller number of deaths and disability pensions among women. When the correlation coefficient was weighted by the number of workers, the correlation was slightly better (0.37). Another explanation may be the causes of death and disability. The two most important causes of the new disability pensions were diseases of the musculoskeletal system and connective tissue and mental disorders, both of which are hardly ever causes of death. Many low mortality

female occupations in manufacturing had high disability ratio values for diseases of the musculoskeletal system and connective tissue. On the other hand, some female occupations with a low disability ratio had high mortality for cancer (Notkola et al. 1995.)

On the individual level self-rated health has been shown to predict retirement on a disability pension (Manninen and Notkola 1995). On the other hand, the retired had a higher than average mortality (Notkola et al. 1995). The standardized disability ratio can be considered to be a valuable indicator of health, although all the occupational differences in disability are not necessarily associated with morbidity or mortality.

References

- Armitage, P. 1980. *Statistical Methods in Medical Research*. Oxford: Blackwell Scientific Publications.
- Dahl, E. and P. Kjaersgaard. 1993. Social mobility and inequality in mortality. An assessment of the health selection hypothesis. *European Journal of Public Health* 3:124–132.
- Fox, A. J., P.O. Goldblatt, D.R. Jones. 1985. Social class mortality differentials: artefact, selection or life circumstances. *Journal of Epidemiology of Community Health* 39:1–8.
- Huttunen, J. and T. Valkonen. 1995. Ketkä sairastavat Suomessa ja mitä? (Who are ill in Finland and why?). *Duodecim* 111:17–25.
- Hytti, H. 1988. Ammattiryhmittäiset työkyvyttömyysriskit 1976–1980 (Occupational risk of disability pensions). The Social Insurance Institution T9:32. Helsinki: The Social Insurance Institution.
- Hytti, H. 1994. Työkyvyttömyyseläkkeelle siirtymisen yhteiskunnalliset taustatekijät (Social and societal determinants of the incidence of disability pensions). The Social Insurance Institution M:87. Helsinki: The Social Insurance Institution.
- Karisto, A., R. Prättälä and M.-A. Berg. 1992. Hyvät, pahat ja rumat? Epäterveellisten elintapojen kasautumisesta (The good, the bad and the ugly? Accumulation of unhealthy lifestyles). In: *Terveys sosiologia*, edited by A. Karisto, E. Lahelma and O. Rahkonen, pp. 121–139. Helsinki-Porvoo-Juva: WSOY.
- Lahelma, E., K. Manderbacka, O. Rahkonen and A.-P. Sihvonen. 1993. Ill-Health and its Social Pattern in Finland, Norway and Sweden. *Research Reports* 27. Helsinki: STAKES.
- Lynge, E., O. Andersen and L.-O. Horte. 1989. Mortality: a comparison of within-country differentials based on selected occupational groups reported in a variety of countries. In: *Health Inequalities in European Countries*, edited by John Fox, pp. 163–172. Aldershot: Gower.
- Mannila, S. 1993. Työhistoria ja syrjäytyminen: vaikeasti työllistyvien terveysongelmaisten elämänkulusta (Work career and social marginalization: on the life course of marginal jobseekers with health problems.) *Työpoliittinen tutkimus*, 58. Helsinki: Työministeriö.
- Manninen, P. and V. Notkola. 1994. Maatalousyrittäjien työkyvyttömyyseläkkeelle siirtyminen vuosina 1980–1990 (Farmers' retirement on disability pensions during the period 1980–1990). *Työterveys ja maatalous Suomessa 1992*, edited by P. Susitaival, pp. 181–196. The Social Insurance Institution ML: 133. Helsinki: The Social Insurance Institution.
- Marin, R. 1986. Ammattiryhmittäinen kuolleisuus 1971–1980 (Occupational Mortality in 1971–1980). *Studies of Statistics Finland*, 129. Helsinki: Statistics Finland.
- Nordic Statistical Secretariat. 1988. *Occupational Mortality in the Nordic Countries 1971–1991*. Statistical Reports of the Nordic Countries, 49. Copenhagen.
- Notkola, V., A. Pajunen and P. Leino-Arjas. 1995. Telineet, tehdas vai toimisto – tutkimus ammattiryhmittäisestä kuolleisuudesta ja työkyvyttömyydestä (A Study of occupational mortality and disability differences). *Health* 1995:4. Helsinki: Statistics Finland.
- Pekkanen, J., A. Uutela, L. Kartovaara, J. Tuomilehto and A. Nissinen. 1990. Keski-ikäisten suomalaismiesten koulutus ja sydän- ja verisuonitautien riskitekijät vuosina 1972–1987 (Level of education and cardiovascular risk factors in middle-aged Finnish men in 1972–1987.) *Sosiaalilääketieteellinen Aikakauslehti* 27:61–69.
- Perkiö, M. and V. Notkola. 1994. Maatalousyrittäjien koettu terveydentila, pitkäaikaissairastavuus, työkyky, sairauspoissaolot, lääkarissäkäynnit ja terveyskäyttäytyminen Suomessa vuonna 1992 (Health status, long-term morbidity, ability to work, sick absence, seeing a doctor and health behavior of farmers in Finland in 1992). In: *Työterveys ja maatalous Suomessa 1992: tutkimus maatalousyrittäjien työterveyshuollosta, terveydentilasta ja työssä viihtymisestä*, edited by P. Susitaival, pp. 70–90. *Kansaneläkelaitoksen julkaisuja ML*, 133. Helsinki: Kansaneläkelaitoksen tutkimus- ja kehitysyksikkö.

- Prättälä, R., M.-A. Berg, P. Leino and P. Puska. 1992. Raskaat työt – raskaat tavat. Suomalaismiesten elintavat eri ryhmissä 1978–1990 (Lifestyles in different occupational groups among Finnish men in 1978–1990). Reports of LEL Employment Pension Fund 20. Helsinki: LEL-työeläkekassa.
- Rantanen, J. and S. Lehtinen. (ed.). 1992. Työympäristö ja työterveys Suomessa (Working environment and occupational health in Finland). Komiteanmietintö 1991:43. Työterveyslaitoksen katsauksia 119. Helsinki: Valtion painatuskeskus.
- Sauli, H. 1979. Ammatti ja kuolleisuus 1971–1975 (Occupation and mortality in 1971–1975). Studies of Statistics Finland, 54. Helsinki: Central Statistical Office of Finland.
- The Social Insurance Institution. 1994. Statistical Yearbook of the Social Insurance Institution 1993. A publication of the Social Insurance Institution T1:29. Helsinki.
- Statistics Finland. 1991. Väestölaskentojen pitkittäistiedosto 1970–1985: käsikirja (Longitudinal census data for 1970–1985: handbook). Helsinki: Statistics Finland.
- Valkonen, T., T. Martelin, A. Rimpelä, V. Notkola and S. Savela. 1993. Socioeconomic Mortality Differences in Finland in 1981–1990. Population 1993:1. Helsinki: Statistics Finland.
- Östlin, Piroksa. 1989. Occupational Career and Health: Methodological Considerations on the Healthy Worker Effect. Acta Universitatis Upsaliensis. Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine, 224. Stockholm: Graphic Systems AB.