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by [Leino-Arjas P](#), [Kaila-Kangas L](#), [Notkola V](#), [Keskimäki I](#), [Mutanen P](#)

Affiliation: Finnish Institute of Occupational Health, Department of Epidemiology and Biostatistics, Topeliuksenkatu 41 a A, FI-00250 Helsinki, Finland. Paivi.Leino-Arjas@occuphealth.fi

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Inpatient hospital care for back disorders in relation to industry and occupation in Finland

by Päivi Leino-Arjas, Dr Med Sci,¹ Leena Kaila-Kangas, MSc,¹ Veijo Notkola, PhD,² Ilmo Keskimäki Dr Med Sci,³ Pertti Mutanen, MSc¹

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Objectives The variation in hospital admission rates was studied for back disorders by industry and occupational title among gainfully employed Finns.

Methods Admissions to Finnish hospitals in 1996 among 25- to 64-year-olds, based on the Hospital Discharge Register, were linked with sociodemographic data from the 1995 population census for the following primary diagnoses [International Classification of Diseases, 10th revision (ICD-10)]: all back disorders (M40.0–54.9; N (individual patients) 7253), lumbar intervertebral disc disorders (M51.0–M51.9, N = 3863), and other common back disorders (ICD-10: M47.1–47.2, M47.8–47.9, M48.0, M54.1, M54.3–54.5, M54.8–54.9; N = 2433), with the total occupationally active workforce (same age range and gender) as reference. Age-standardized hospitalization rate ratios (SRR) were calculated.

Results The highest SRR values for hospitalization for any back disorder were found for fishing (SRR 195), “other” mining and carrying (SRR 168), and sewage and refuse disposal (SRR 152) among the men and water transport (SRR 158), wood product (SRR 149) and pulp, paper and paper product (SRR 145) manufacturing among the women. Computer activities (SRR 44) among the men and insurance and pension funding (SRR 49) among the women had the lowest SRR values. The occupations reindeer breeders and herders (SRR 495), agricultural workers (SRR 232), and paper product workers (SRR 205) among the men and plastic product (SRR 233), laundry (SRR 224), and agricultural (SRR 219) workers among the women had the highest SRR values. The lowest SRR values were observed for upper white-collar employees in public administration [men (SRR 40) and women (SRR 61)].

Conclusions Hospitalization rates for back disorders were high for several physically strenuous industries and occupations.

Key terms low-back pain, lumbago, lumbar intervertebral disc disease, spinal stenosis, spondylosis.

Back pain is very common in the working population, although prevalence estimates vary widely depending on the definition of pain. In a nationally representative survey in Finland, a third of the occupationally active respondents, both men and women, reported back pain during the past month, and 14.6% of the men and 12.7% of the women experienced back pain during the past year, diagnosed or treated by a physician (1). The latter figures compare well with those obtained in a Canadian population survey, where 14.5% of the men and 12.5% of the women who worked reported that they had

a chronic back problem diagnosed by a health practitioner (2). In the United States National Health Interview Survey, 17.6% of the employed reported back pain that had lasted for at least a week during the past 12 months (3).

Numerous studies have been published in which the occurrence of back pain has been found to be increased in certain occupations (4). However, there is little comparative information on the risks of back disorders in specific industries or occupations from materials representative of total defined populations (5).

1 Finnish Institute of Occupational Health, Helsinki, Finland.

2 Statistics Finland and the Rehabilitation Foundation, Helsinki, Finland.

3 National Research and Development Centre for Welfare and Health and the Academy of Finland, Helsinki, Finland.

Reprint requests to: Dr Päivi Leino-Arjas, Finnish Institute of Occupational Health, Department of Epidemiology and Biostatistics, Topeliuksenkatu 41 a A, FIN-00250 Helsinki, Finland. [E-mail: Paivi.Leino-Arjas@occuphealth.fi]

In a nationwide Danish survey including 5200 employees, the occurrence of low-back trouble during the past 12 months was studied in 39 categories on the 2-digit level of the International Standard Classification of Occupations (6). Increased risks (women and men combined) were found in building construction work; social, child day-care and psychological work; engineering and structural metal work; and medical and nursing work, whereas categories with decreased risk were enterprise and organizational managerial work; financial planning and accounting work; secretarial and clerical work; and other managerial, administrative and clerical work.

According to health surveys of the Dutch population (pooled surveys of three successive years giving a total of 8700 subjects), "trouble from the back quite often" varied between 12% and 41% in 55 trade and 85 professional classes, construction workers, cleaners, supervisory production workers, plumbers, and drivers among the men and cleaners among the women showing the highest prevalence figures (7).

As back symptoms are very common and usually self-limiting, information on, for example, functional derangement or need for medical care is relevant both regarding the significance of the problem for the subject and the risk factor profile (8, 9).

In the nationally representative Mini-Finland study with a sample of 8000 subjects (10) the occurrence of the low-back syndrome was clinically diagnosed by trained physicians. When studied in five broad occupational groups, among both women and men, the syndrome was the most common among industrial workers and the least common in work related to technology, science, and administration. Among women homemakers also had a low risk of the back syndrome.

Heliövaara (11) investigated hospitalization for herniated lumbar intervertebral disc or sciatica in pooled population samples of altogether 57 000 Finns studied between 1966 and 1972. Incident cases (N = 592) in an 11-year follow-up and their matched referents were examined for occupation at the beginning of the study. The occupational classification used was a modified 1-digit level of the Nordic Standard Classification of Occupations. The risk was lowest for white-collar workers and significantly higher for all other main occupational groups of men. The highest risks were observed for forestry, metal or machine workers and motor vehicle drivers. For women, cleaners and caretakers had the highest risk of hospitalization. The risk was increased also among nurses and related medical workers and agricultural workers.

More recent descriptions of back-related hospital admissions according to detailed classifications by industry or occupation are not available. Our present study describes variation in hospital admissions for back dis-

orders by industry and occupation, separately for women and men, among the 25- to 64-year-old occupationally active Finns during the calendar year 1996. Back disorders were categorized according to the International Classification of Diseases, 10th revision (ICD-10) into all back disorders, lumbar intervertebral disc disorders, and other common back disorders. Our study is unique in that it was not based on a sample but, instead, comprises the whole occupationally active population of an entire nation.

Material and methods

Most Finnish hospitals are financed by groups of communes, with support from the state. Back patients are treated in practically all of them, and surgical treatment is given in regional, central and university hospitals. Data on patients hospitalized due to lumbar intervertebral disc disorders were obtained from the Finnish Hospital Discharge Register, which gathers about 1.2 million discharge records annually and covers all hospitals in Finland. It contains, for example, demographic, clinical, and administrative data, dates of admission and discharge, and primary and subsidiary diagnoses. The discharge files record the patient's unique personal identity code for linkages within the register or to other administrative databases.

The Hospital Discharge Register data from 1996 were linked with information from the 1995 population census by Statistics Finland. The data set was delivered without personal identification codes to the Finnish Institute of Occupational Health. The total gainfully employed population was used as reference. Data on the reference population were received from Statistics Finland in tabulation format. We restricted the analyses to the subjects aged 25–64 years and occupationally active during the last week of 1995 (914 750 men and 868 886 women).

Industry and occupation

The following information was obtained from the population census: age, gender, employment status (gainfully employed, unemployed, on pension, other), industry, and occupation. Industry was classified according to the Standard Industrial Classification (SIC) (12), revised according to NACE (Nomenclature Générale des Activités Economiques dans les Communautés Européennes), revision 1, on the 2-digit level (60 classes). The classification of occupations of the "Longitudinal Data File" of Statistics Finland (13) was used on the 3-digit level (including the few occupations coded by 4 digits). The classification includes 334 occupational titles.

Occupation refers to the activity used by a person to obtain income. Since the 1990 census in Finland, occupation has been determined on the basis of administrative sources. Of the employed population in 1995, 48.0% was employed in the private sector, 30.6% in the public sector (the state and the municipalities), 7.3% by enterprises with the state as the principal owner, and 13.9% as entrepreneurs (14). Information on occupation was derived from registers maintained by employer organizations, the state register on employment, municipalities' employee registers, employment pension registers (entrepreneurs), and the plain language descriptions given in tax returns; in the coding of the occupational title additional information on education, employer, industry, and previous occupation was available (Pekka Myrskylä, Statistics Finland, personal communication). The code was obtained for 80% of the employed population through the use of a computerized algorithm, and the titles of the remaining 20% were coded manually in Statistics Finland by five persons trained for that purpose. No reliability check was made during the 1995 census, but previously it has been observed that 15–20% of the codes (on the 3- and 4-digit levels) vary according to the coding person (Pekka Myrskylä, Statistics Finland, personal communication).

Classification of low-back disorders

The classification of the data from the hospital discharge register was based on ICD-10 (15). All back disorders comprise the codes M40.0–M54.9 (number of individual patients 7253). Lumbar intervertebral disc disorders (codes M51.1–M51.9) were considered as an entity (N = 3863), as were other common back disorders (ICD-10: M47.1–47.2, M47.8–47.9, M48.0, M54.1, M54.3–54.5, M54.8–54.9; N = 2433). Only primary diagnoses were used.

Of all the back-related hospital admissions in 1996 (N = 9875), 50.4% had a code referring to lumbar intervertebral disc disorders, and 31.7% referred to other common back disorders, according to the preceding definitions. Of the admissions, 45.3% were made under the diagnosis *morbositates discorum intervertebraliolum lumbarium et aliorum cum radiculopathia* (M51.1). The frequencies of the other labels within class M51 were 0.75% for *alia dislocatio disci intervertebralis specificata* (M51.2), 2.5% for *alia degeneratio disci intervertebralis specificata* (M51.3), 0.02% for *noduli schmorli* (M51.4), 0.48% for *aliae morbositates discorum intervertebraliolum specificatae* (M51.8), and 1.34% for *morbositas disci intervertebralis non specificata* (M51.9).

The category of other common back disorders combined spondylosis, spinal stenosis, and back-pain syndromes. The frequencies of the detailed diagnostic la-

bels were as follows: *alia spondylosis cum myelopathia* (M47.1) 0.6%, *alia spondylosis cum radiculopathia* (M47.2) 1.8%, *alia spondylosis specificata* (M47.8) 3.4%, *spondylosis non specificata* (M47.9) 1.4%, *stenosis spinalis* (M48.0) 5.6%, *radiculopathia* (M54.1) 0.8%, *ischias* (M54.3) 5.0%, *lumbago cum ischiade* (M54.4) 2.5%, *lumbago* (M54.5) 7.1%, *alia dorsalgia specificata* (M54.8) 0.3%, and *dorsalgia non specificata* (M54.9) 3.2%.

All back disorders comprised the aforementioned plus 53 other diagnostic labels. Of these additional subcategories, the most frequent were spondylosis (M43.0, 0.9%), spondylolisthesis (M43.1, 1.8%), *morbositates disci intervertebralis cervicalis cum radiculopathia* (M50.1, 3.8%), *syndroma cervicocraniale* (M43.0, 0.6%), *syndroma cervicobrachiale* (M53.1, 3.2%), and *cervicalgia* (M54.2, 2.1%). The frequencies of all the other classes were $\leq 0.5\%$ of the back-related admissions.

Statistical methods

Instead of hospital admissions during a calendar year, we studied individual patients admitted to a hospital at least once under each diagnostic category of interest to avoid a situation in which some difficult cases requiring repeated care in the hospital would influence the risk estimates. Age-standardized rate ratios (SRR) by direct standardization (16) were calculated to estimate the differences in the hospital admissions by industry and occupation.

Results

For reasons of data protection we only present occupational groups with at least 10 persons hospitalized during 1996. As to occupations with decreased risk, an additional limitation was due to the requirement of at least some hospitalized cases. If the risk is very low, no persons will perhaps be considered for hospital care.

All back disorders

Altogether 3399 individual female and 3854 male patients aged 25–64 years and belonging to the gainfully employed workforce were hospitalized in 1996 due to any back disorder. Among the men, the largest numbers of patients (table 1) came from the construction sector (N=370), agriculture and related activities (N=337), and land transport (N=323). Among the women, health and social work alone produced a third (N=1039) of the cases.

Table 1. Inpatient hospital care for any back disorder (ICD-10: M40.0–54.9) among the gainfully employed Finns (age range 25–64 years), by gender and industrial class. ^{a, b} [ICD-10 = International Classification of Diseases (10th revision), 95% CI = 95% confidence interval, NACE = Nomenclature Générale des Activités Economiques dans les Communautés Européennes]

	Patients (N)	Age-standardized rate ratios	95% CI
Industry classes with a higher than average rate			
Men			
05 Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	12	195	110–346
14 Other mining and quarrying	15	168	101–281
90 Sewage and refuse disposal, sanitation and similar activities	38	152	110–209
20 Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	112	138	114–167
60 Land transport; transport via pipelines	323	138	123–155
24 Manufacture of chemicals and chemical products	60	137	106–177
40 Electricity, gas, steam and hot water supply	87	132	106–164
01 Agriculture, hunting and related service activities	337	122	109–137
21 Manufacture of pulp, paper and paper products	129	119	100–142
Women			
61 Water transport	19	158	100–249
20 Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	30	149	104–214
21 Manufacture of pulp, paper and paper products	50	145	109–194
85 Health and social work	1039	120	112–128
01 Agriculture, hunting and related service activities	218	120	104–138
Industry classes with a lower than average rate			
Men			
52 Wholesale trade and commission trade except of motor vehicles and motorcycles; repair of personal and household goods	105	80	66–97
80 Education	153	77	65–91
51 Wholesale trade and commission trade except of motor vehicles and motorcycles	13	73	61–86
74 Other business activities	137	64	54–76
31 Manufacture of electrical machinery and apparatus	23	61	40–93
72 Computer and related activities	20	44	28–70
Women			
75 Public administration and defense; compulsory social security	211	86	75–99
80 Education	257	77	68–88
51 Wholesale trade and commission trade except of motor vehicles and motorcycles	68	72	57–92
93 Other service activities	38	69	50–95
92 Recreational, cultural and sporting activities	43	66	49–89
66 Insurance and pension funding, except compulsory social security	13	49	29–85

^a Two-digit level (60 classes) of the Standard Industrial Classification in NACE, revision 1 (12).

^b Industries with at least 10 hospitalized cases in 1996 listed.

Of the 60 classes of economic sector comprised by the 2-digit level of the SIC, nine classes among the men and five among the women had a statistically significantly increased risk of hospitalization due to any back disorder, as compared with the average among the gainfully employed workforce (table 1). For the men, the highest rate ratios were calculated for fishing and activities related to it (SRR 195), “other” mining and quarrying (SRR 168), and sewage and refuse disposal and related activities (SRR 152). For the women, water transport (SRR 158), manufacture of wood and wood products and the like (SRR 149), and manufacture of pulp, paper and paper products (SRR 145) were the industries with the highest risks.

Education and wholesale and commission trade were industrial classes of low risk among both the men and

the women. Apart from education, among the women, there was another large class in the low-risk category, namely, compulsory social security within public administration and defense. For the women the lowest hospitalization risk was observed in the smaller class of insurance and pension funding (SRR 49), and for the men the corresponding category was computer and related activities (SRR 44).

When the rates of hospital admissions due to any back disorder were studied by occupational title (table 2), it was observed that the risk among the men was considerably increased among reindeer breeders and herders (SRR 495), agricultural workers and animal caretakers (SRR 232), paper product workers, auxiliary nurses and hospital attendants (SRR 202), and railway yardmen and signal men (SRR 200). For the women the

Table 2. Inpatient hospital care for any back disorder (ICD-10: M40.0–54.9) among the gainfully employed Finns (age range 25–64 years), by gender and occupation ^{a, b} — occupations with a higher or lower than average rate of hospitalization. [ICD-10 = International Classification of Diseases (10th revision), 95% CI = 95% confidence intervals]

	Patients (N)	Age standardized rate ratios	95% CI
Occupations with a higher than average rate			
Men			
307 Reindeer breeders and herders	10	495	264–926
310 Agricultural workers and animal caretakers	32	232	157–343
757 Paper product workers	10	205	110–382
036 Auxiliary nurses and hospital attendants	14	202	113–362
5502 Railway and station personnel: yardmen, signal men, etc	25	200	134–299
725 Butchers and sausage makers	22	182	119–280
8003 Firemen	22	180	103–314
760 Packing and wrapping workers	17	177	110–287
775 Machine setter operators (not in textile industry) and riggers	49	171	128–228
735 Paper and cardboard mill workers	57	163	126–212
802 Customs and border officers	17	161	100–260
772 Construction machinery operators	75	147	117–185
657 Assemblers, assembly line workers and other occupations in iron and metal work	36	147	106–205
801 Policemen	46	143	107–191
830 Building caretakers	91	141	114–175
540 Motor vehicle and tram drivers	349	140	126–157
030 Physicians	43	137	101–186
340 Forest workers	57	136	105–178
651 Fitter-assemblers, etc	102	135	110–165
673 Construction carpenters	92	132	107–162
655 Welders and flame cutters	72	130	102–165
300 Farmers	279	114	100–130
Women			
752 Plastic products workers	17	233	144–378
8502 Laundry workers	17	224	136–367
310 Agricultural workers and animal caretakers	33	219	154–312
580 Mail carriers and sorters	26	184	123–274
540 Motor vehicle and tram drivers	19	180	113–285
033 Dental care assistants and doctor's and dentist's receptionists	52	169	126–227
8141 Municipal home help	108	161	132–198
036 Auxiliary nurses and hospital attendants	170	158	135–185
781 Warehouse workers	25	149	100–221
831 Cleaners and cleaning supervisors	253	136	119–156
231 Shop personnel and shop supervisors	196	116	101–135
Occupations with a lower than average rate			
Men			
051 Primary school teachers and specialized teachers	90	76	61–94
013 Technicians in mechanical engineering	60	76	59–99
112 Sales management	49	70	52–95
004 Mechanical engineers	40	69	50–95
001 Civil engineers	33	63	45–89
663 Assemblers in electronics and telecommunications	18	56	35–92
012 Technicians in the teletechnical field	12	49	28–87
113 Administration, budgeting and accounting management	12	48	27–85
110 Business management	29	45	30–66
096 ADP directors, analysts and programmers	27	41	28–61
100 Upper white-collar employees in public administration	17	40	24–68
Women			
130 Secretaries	148	79	67–93
051 Primary school teachers and specialized teachers	137	73	62–87
1522 Bank clerks and cashiers	66	68	53–86
840 Hairdressers	26	65	44–96
150 Office clerks	133	63	53–75
1202 Other bookkeepers	36	61	44–85
100 Upper white-collar employees in public administration	20	61	38–97

^a The classification includes 334 occupational titles.^b Occupations with at least 10 hospitalized cases in 1996 listed.

occupations with at least double the average risk were plastic product workers (SRR 233), laundry workers (224), and agricultural workers and animal caretakers (SRR 219).

Occupations with the lowest risk among the women were upper white-collar employees in public administration, bank and office clerks, and bookkeepers, and among the men the corresponding occupations were upper white-collar employees in public administration, ADP personnel, and managers in business and administrative management.

Lumbar intervertebral disc disorders

There were 2211 men and 1652 women hospitalized for lumbar intervertebral disc disorders in 1996. Among the men, the occupations at the highest risk of hospitalization due to these disorders (table 3) were packing and wrapping workers (SRR 230), railway yardmen and sig-

nal men (SRR 209), paper and cardboard mill workers (SRR 190), agricultural workers and animal caretakers (SRR 189), and butchers and sausage makers (SRR 187). Among the women, motor vehicle and tram drivers (SRR 241), warehouse workers (SRR 196), packing and wrapping workers (SRR 189), and agricultural workers and animal caretakers (SRR 184) had the highest rate ratios of hospital admission.

Secretaries, clerks, bookkeepers, and teachers were the occupations of lowest risk among the women, and ADP personnel and directors of enterprises held the corresponding place among the men.

Other common disorders of the low back

Among the 1252 men and 1181 women admitted to a hospital due to common disorders of the low back other than disc disorders, agricultural workers and animal

Table 3. Inpatient hospital care for lumbar intervertebral disc disorders (ICD-10: M51.0-M51.9) among the gainfully employed Finns (age range 25–64 years) in 1996 by gender and occupation^{a,b} — occupations with a higher or lower than average rate of hospitalization. [ICD-10 = International Classification of Diseases (10th revision), 95% CI = 95% confidence intervals]

		Patients (N)	Age-standardized rate ratios	95% CI
Occupations with a higher than average rate				
Men				
760	Packing and wrapping workers	13	230	133–400
5502	Railway and station personnel: yardmen, signal men, etc	15	209	124–352
735	Paper and cardboard mill workers	38	190	137–262
310	Agricultural workers and animal caretakers	17	189	110–324
725	Butchers and sausage makers	13	187	107–329
775	Machine setter operators (not in textile industry) and riggers	28	178	122–259
772	Construction machinery operators	45	155	115–209
801	Policemen	27	147	101–215
653	Sheet metal workers	45	137	101–184
650	Turners, tool-makers and machine-tool setters	47	136	102–184
540	Motor vehicle and tram drivers	183	128	110–149
Women				
540	Motor vehicle and tram drivers	12	241	136–428
781	Warehouse workers	16	196	119–324
760	Packing and wrapping workers	19	189	119–301
310	Agricultural workers and animal caretakers	14	184	106–317
033	Dental care assistants and doctor's and dentist's receptionists	27	169	112–255
036	Auxiliary nurses and hospital attendants	90	171	138–212
8141	Municipal home help	46	149	111–201
812	Kitchen assistants	35	142	101–198
831	Cleaners and cleaning supervisors	120	139	114–168
Occupations with a lower than average rate				
Men				
096	ADP personnel	19	47	29–74
110	Directors of enterprises	18	47	29–76
Women				
130	Secretaries	68	72	57–92
150	Office clerks	63	60	47–78
1202	Other bookkeepers	17	59	37–96
051	Primary school teachers and specialized teachers	53	58	44–77

^a The classification includes 334 occupational titles.

^b Occupations with at least 10 hospitalized cases in 1996 listed.

Table 4. Inpatient hospital care for other common disorders of the low back (ICD-10: M47.1-47.2, M47.8-47.9, M48.0, M54.1, M54.3-54.5, M54.8-54.9), among the gainfully employed Finns (age range 25-64 years) in 1996 by gender and occupation ^a — occupations ^b with a higher or lower than average rate of hospitalization. [ICD-10 = International Classification of Diseases (10th revision), 95% CI = 95% confidence intervals]

		Patients (N)	Age-standardized rate ratios for hospitalization	95% CI
Occupations with a higher than average rate				
Men				
310	Agricultural workers and animal caretakers	16	388	225-669
657	Assemblers, assembly line workers, and other occupations in iron and metal work	15	192	115-322
772	Construction machinery operators	29	173	120-251
673	Construction carpenters	38	171	123-238
340	Forest workers	22	165	108-252
651	Fitter-assemblers, etc	40	163	119-224
830	Building caretakers	34	158	112-223
540	Motor vehicle and tram drivers	124	153	127-184
655	Welders and flame cutters	29	150	103-219
300	Farmers	111	126	102-155
Women				
310	Agricultural workers and animal caretakers	16	304	184-503
580	Mail carriers and sorters	10	237	126-449
8141	Municipal home helps	42	180	131-246
036	Auxiliary nurses and hospital attendants	61	166	128-215
831	Cleaners and cleaning supervisors	97	143	115-177
231	Shop personnel and shop supervisors	75	128	101-162
0912	Social welfare inspectors and other social workers	74	127	100-161
Occupations with a lower than average rate				
Men				
013	Technicians in mechanical engineering	14	56	33-96
Women				
051	Primary school teachers and specialized teachers	43	65	48-89
150	Office clerks	46	64	47-86
1522	Bank clerks and cashiers	21	60	39-92

^a The classification includes 334 occupational titles.

^b Occupations with at least 10 hospitalized cases in 1996 listed.

caretakers had by far the highest rate ratios of hospital care (table 4). The age-standardized risk ratio was 388 for the men and 304 for the women. Among the women also mail carriers and sorters (SRR 237) and, among the men assemblers, assembly line workers, and other occupations in iron and metal work (SRR 192) were at a high risk.

Among the women, teachers and clerks again belonged to the low risk occupations, as did technicians in mechanical engineering among the men.

Discussion

Nationwide record linkage studies are feasible in countries that apply the unique personal identification code system of citizens, and they are meaningful where population statistics are of high standard, as in Finland. The reliability of information in the Finnish Hospital Discharge Register is central to the credibility of descrip-

tive analyses based on it, for example, the present one. The quality of data in the register is generally considered good. The register has been estimated to cover about 95% of all discharges from hospitals (17) and the accuracy of most of the main items has been evaluated to be high when compared with that of the patients' hospital records (18). The introduction of ICD-10 in 1996 does not seem to have had any substantial influence on the frequency of back-related diagnoses. From 1994 to 1995, when ICD-9 was in use, there was a decrease of 4% in the frequency of back-related hospitalizations (labels 720-724). When a conversion of the ICD-10 codes to those of the ICD-9 was made, it was observed that the frequency of the labels 720-724 decreased by 3% from 1995 to 1996. The frequency of code 722 (intervertebral disc disorders) did not change from 1995 to 1996.

The targets of health policy in Finland have been for decades those that should increase the reliability of the Register, namely, universal access to health care, regional equity, and utilization of health care services according to need. Overall, equity in hospital care has been reached to a good extent when evaluated using

information on morbidity and mortality as the criterion of need (19). Some problems have been identified, however, for example, regional variation in hospital admissions (20) and the lower probability of low-income groups to receive surgery relative to those with high income (21).

These inadequacies of the health care system are of a kind prone to lead to underestimates of associations between occupation and hospital use. We studied the effect of regional differences in hospital intake on socioeconomic differentials in hospital use due to lumbar intervertebral disc disorders. It was found that when analyses were geographically limited, the differentials appeared more pronounced (22). Similarly, if the probability of hospital intake for surgery is increased by higher income, the general effect would probably be an attenuation of occupational differences, as the observed risks of hospital admission tended to be high for blue-collar and low in white-collar occupations.

Our analyses revealed obvious differences by industrial class in the risk of back disorders leading to hospital admission in Finland. Some smaller branches of industry, such as fishing among men and water transport among women, were linked with the highest risks, but there were also large classes with higher-than-average hospitalization rates, such as agriculture and related activities, among both men and women, land transport among men, and health and social work — a very large class of activity — among women.

Physical workload, particularly heavy lifting, whole-body vibration and twisted or bent work postures, and psychosocial aspects of work, such as low job control, are considered important environmental risk factors for back pain (5, 23–26). Kelsey (27) suggested that sedentary work may be a risk factor for lumbar intervertebral disc disorders. A recent review (28) of the epidemiologic evidence found no support for sitting as a risk factor for back disorders. Our results, based on the Finnish Hospital Discharge Register, corroborate the existing evidence on work-relatedness. Manual occupations in manufacturing, agriculture, and transport had the highest risk of severe afflictions of the back leading to hospital care, and mostly sedentary clerical and administrative occupations had the lowest risk. Naturally also the prevalence of risk factors outside work (eg, of smoking, obesity or mental distress) may vary by occupation.

Back disorders are sometimes regarded as a menace of particularly modern industrial societies. In our study, in contrast, it was found that fishing was the industry with the highest risk of severe back disorder, as were the most traditional occupations in agriculture and animal care and reindeer breeding and herding. The history of such activities refers to the preindustrial age, the agricultural and even half-nomadic life. It seems possible that earlier periods of human history have seen high-

er back-related morbidity than today. On the other hand, it is conceivable that differences in life-style by occupation or exposures introduced to these ancient occupations in modern times (such as exposure to whole-body vibration due to motor vehicles) are the culprits.

The lists of high- and low-risk industries and occupations differed somewhat for the men and women. This is not a surprising result when the relatively high occupational segregation of the Finnish workforce by gender is considered (29), along with the probable gender-related variation in tasks within an occupational title. However, where there were enough cases for comparison, the rate ratios of hospitalization were often remarkably similar. Of the industries, agriculture, education, and wholesale and commission trade had almost identical rate ratios of admission due to all back disorders among the men and women, as had such occupations as agricultural workers and animal caretakers, motor vehicle and tram drivers, teachers, and upper white-collar employees in public administration.

There is some evidence of an association of back symptoms with objective (eg, radiological) findings of the spine (30–32). However, health care use cannot, nor can indeed any data that comprise symptoms as a component of case definition, refute the possibility that, in heavy work, symptoms are more disturbing than in light work (33).

The exact diagnosis of a back ailment is often difficult. This difficulty is also probable even at the hospital level. Therefore, we first combined all back-related diagnoses into a whole for analysis. However, differentiating between lumbar intervertebral disc disorders and other common disorders of the back, combining spondylosis, spinal stenosis and back pain syndromes, revealed somewhat differing occupational risk distributions. For instance, the hospitalization rates of agricultural workers were clearly more increased in other common diagnoses than lumbar intervertebral disc disorders were. There may be several explanations for this finding. It is possible that the problems diagnosed as disc-related are actually different from the other disorders and reflect partially different combinations of etiologic factors. Another possibility is that occupational mobility contributed to the results. Chances for changing occupation to a less strenuous one when confronted with a severe back affliction differ by, for example, educational background and region and may be particularly sparse for those involved in agriculture as salaried employees. Even some attitudinal factors within health care may play a role; for instance, the diagnostic procedures necessary for intervertebral disc disorder to be revealed may be performed more readily when surgery is considered an immediate option (22).

Similarities were also observed when the two diagnostic classes were compared. Motor vehicle and tram

drivers and construction machinery operators were at high risk of hospitalization for both diagnostic groups among the men, and female teachers and clerks were consistently listed among low risk occupations.

There were some deviations from the overall trend of blue-collar occupations having a high, and white-collar occupations a low, rate ratio of hospitalization. When all back disorders were considered, such groups as physicians among the men and dental care assistants and doctor's and dentist's receptionists among the women were identified as high-risk occupations. The proximity of health services among those occupied within the sector cannot be ruled out as a source of bias with respect to their hospitalization rate. Another contributing factor may be that, in the diagnoses of all back disorders, even those of the cervical spine are included. Such disorders seemed to be increased in some white-collar occupations and in health care, although our material was too small for a reliable analysis.

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