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Hospitalizations among employees in the Danish hotel and restaurant industry

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Background: The aim of the present study was to provide a broad picture of the morbidity among employees in the Danish hotel and restaurant industry. Methods: Cohorts of all 20–59-year-old employees in the Danish hotel and restaurant industry in the years 1981, 1986, 1991 and 1994 were formed to calculate age-standardized hospitalization ratios (SHR) and time trends (1981–1997) for many different diagnoses. Results: Both for women and men, significantly higher SHRs were found for infectious and parasitic diseases, neoplasms, diseases in the nervous system and sense organs, diseases of the circulatory system, diseases of the respiratory system, diseases of the digestive system and diseases of the musculoskeletal system among employees in hotels and restaurants than in the working population at large. Furthermore, among women a significantly elevated risk was found for injuries in the lower extremities, injuries in the upper extremities and head injuries, and among men a high risk was found for head injuries and a low risk for ruptures in ligaments and muscles. The trend assessments did not detect any significant changes in SHRs over time. Conclusion: Employment in the Danish hotel and restaurant industry is associated with an elevated hospitalization risk due to many diseases, which may be related to occupation and lifestyle. In line with the official policy of reducing inequality in health, focus should be placed on the health problems in this group.

Keywords: cooks, hospitalization, inequality in health, surveillance system, waiters

People in the hotel and restaurant industry work round the clock to provide customers with food, drinks, shelter, comfort and a long list of unspecified services. They create a good atmosphere and take care of many practical and psychological problems at the same time as they make themselves as invisible as possible. They pay a price in terms of hard deadlines, high temperatures, long working hours, night and evening work, standing work postures for many hours, walking long distances, and carrying heavy burdens in awkward postures. The occupational profile in the industry remains heavily skewed towards non-supervisory positions.[1] Consequently, excessive morbidity has been reported frequently among various groups of employees in this industry.

Mortality studies from the Nordic countries have found a high overall mortality, a high overall cancer mortality, and a high lung cancer mortality among waiters.[2–4] Although the association between the cook occupation and lung cancer is supported by some studies[5–8] but not by others,[9–11] the elevated risk for lung cancer among waiters/waitresses and bartenders has been well established, also after smoking habits have been taken into account.[12] Other studies dealing with cooks report elevated mortality rates for all causes,[2] all cancers,[2] and diseases of the circulatory and digestive system.[2,13–15]

In international studies, hotel and restaurant work has also been associated with increased risks for disability pension,[16] occupational violent crimes,[17,18] grease burns,[19,20] fall accidents due to slippery kitchen floors,[21] respiratory symptoms due to environmental tobacco smoke and cooking fumes[12,22–26] as well as smoke-, diet- and alcohol-related cancer.[5,6,27–38] More people in the hospitality industry than in the general population feel they have poor general health.[39] Thus, many specific health problems have been associated with some of the professions in the industry but a broad picture of the health status is missing, and it is a strange fact that the hotel and restaurant industry has neither been given high priority among researchers nor by the Danish health authorities in spite of the official policy of reducing inequality in health.

The aim of the present study was to provide a comprehensive picture of the morbidity in the Danish hotel and restaurant industry based on hospitalization data. The main strength of the study would be that it is based on national figures comprising all employees and all first hospitalizations during the study period. This means that the number of hospitalizations is sufficiently large to study many specific diseases, and that we have no problems with sampling errors. Studies of this type can be performed only in very few countries in the world, which means that researchers from Denmark (and a few other countries with similar possibilities) have a special obligation with regard to utilization of the available registers.

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MATERIAL AND METHODS

The database

Since the middle of the 1980s a series of cohort studies with regard to hospitalizations among economically active people in Denmark have been performed at the Danish National Institute of Occupational Health. The information base for these studies is the Occupational Hospitalization Register (OHR), which is a research register with individual level data on occupations, hospitalizations, and deaths. All men and women in Denmark aged 20–59 in January 1981, 1986, 1991 and 1994 are included and classified according to their most important occupation in the calendar year preceding the follow-up. The information has been recorded by linkage of the population census of Denmark to the National In-patient Register, the Death Register and the Employment Classification Module (ECM). The ECM contains yearly information on economic activity and a classification of occupation and industry. The occupational code is an extended classification of the International Standard Classification of Occupations (ISCO) 1968 version. The industrial code is a national extension of the International Standard Classification of all Economic Activity (ISIC) 1968 version. The National In-patient Register provides information on more than 99% of all admissions to Danish hospitals and is updated every year. The Personal Identification Number (PIN) from the National In-patient Register was used in the cross-linking procedure and for information on gender, date, and year of birth.

These cohorts have been followed for hospitalizations due to a variety of diseases. In each follow-up period, the outcomes have been first admissions with the studied disease as the principal discharge diagnosis. Each person could therefore never produce more than one case during a particular study. They could, however, appear as cases in two separate studies. For example, if they were hospitalized for ischaemic heart disease both in the period 1981–1985 and in the period 1986–1990 they will appear as cases in both periods. Cohort members were no longer at risk of being admitted to a hospital in Denmark (censored) from the date of first admission with the studied disease, first emigration or from the date of death, whichever came first. Each time a specific study was performed a table with persons at risk, person years at risk, and the number of hospitalizations by occupation, gender and five-year age group was saved and stored in a database. Currently the database consists of information from 75 follow-up studies for hospitalizations in 36 different diagnostic groups.

The validity of the basic information

Age and gender are parts of the PIN and recorded practically without errors. The completeness and accuracy of these data are shown by the fact that the matching of various registers on PIN was 100% complete. A recent thesis showed that 66% of the bus drivers occupied in Greater Copenhagen for more than 6 months in 1980, according to company personnel files, were also classified as employed by a bus company and as a bus driver in the classification of occupations. An additional 30% had either a correct occupational code (bus driver) or a correct industrial code (bus company). It was shown that such misclassifications tend to bias occupational risk ratios slightly towards unity.[40]

The study population

The total number of hotel and restaurant employees in January 1981, 1986, 1991, and 1994 are given in *table 1*. The table also gives the numbers of persons by occupational status according to an official classification system used by Statistics Denmark. People in leading salaried positions were typically supervisors, the other salaried staffs were typically clerks or cashiers, the skilled workers were typically cooks, waiters, waitresses or bartenders and the unskilled workers were typically kitchen helpers, cleaners or room makers. The increasing number of skilled workers together with the decreasing number of unskilled workers, would be the effect of a softening of the educational requirements demanded for a worker to be classified as skilled.

Statistical analyses

Standardized Hospitalization Ratios (SHRs) in the latest available time-period were calculated for 36 different diagnostic groups. The SHR was obtained by dividing the observed number of hospitalizations by the expected number and then multiplying this ratio by 100. The analyses were made both with and without control for occupational status. The expected number without social group adjustment was based on corresponding gender and age-specific hospitalization rates for all gainfully employed people in Denmark, while the expected number with adjustment for occupational status was based on the corresponding status-, gender-, and age-specific rates.

Data on some of the diagnostic groups have been collected for several disjoint time periods. It was therefore possible to evaluate time trends with respect to the SHRs

Table 1 Number of people employed in the Danish hotel and restaurant industry (N), by gender, calendar year and occupational status

Gender	Occupational status	1981 N	1986 N	1991 N	1994 N
Men	Leading salaried positions	1255	1222	1205	1049
	Other salaried staff	2004	1469	1046	986
	Skilled workers	6658	7099	8443	9791
	Unskilled workers	3417	3692	3430	3317
Total		13334	13482	14124	15143
Women	Leading salaried positions	1064	1392	1536	1435
	Other salaried staff	4040	4465	4916	4482
	Skilled workers	1962	3029	8287	9652
	Unskilled workers	22094	24848	17995	11889
Total		29160	33734	32734	27458

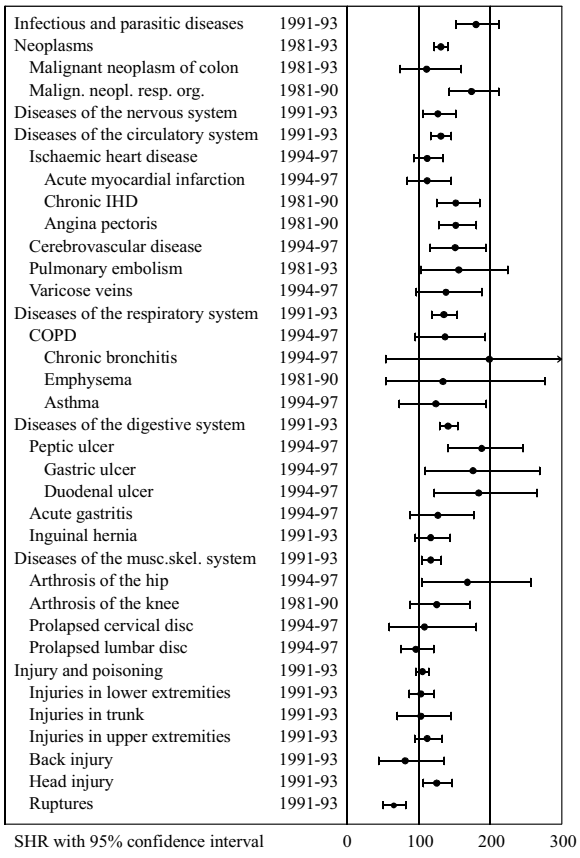

Figure 1 Age standardized hospitalization ratio (SHR) with 95% confidence interval (CI), for a variety of diagnoses, among male employees in the Danish hotel and restaurant industry

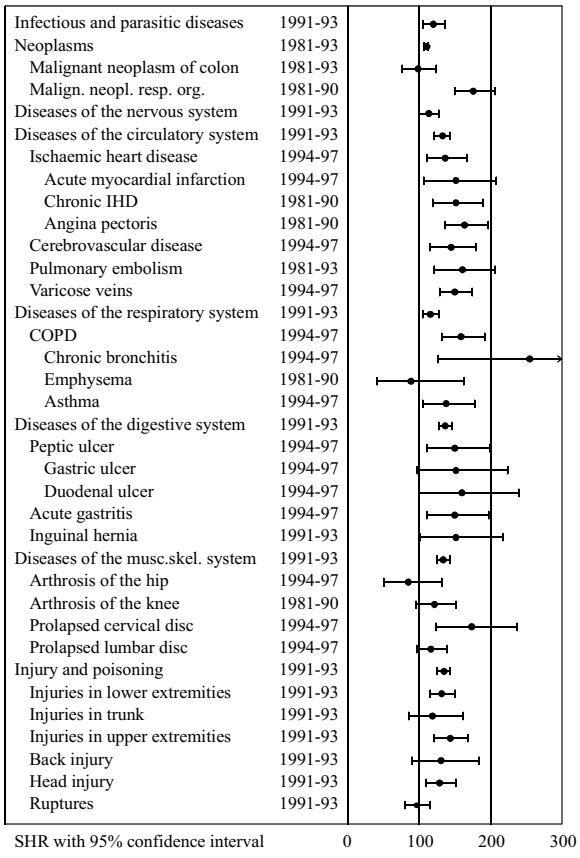

Figure 2 Age standardized hospitalization ratio (SHR) with 95% confidence interval (CI), for a variety of diagnoses, among female employees in the Danish hotel and restaurant industry

for these diseases. Hence, average annual change rates were calculated for SHRs of the diseases: ischaemic heart disease (IHD) (ICD–8=410–414), acute myocardial infarction (ICD–8=410), cerebrovascular disease (ICD–8=430–438), varicose veins of lower extremities (ICD–8=454), chronic obstructive pulmonary disease (COPD) (ICD–8=490–493), chronic bronchitis (ICD–8=491), asthma (ICD–8=493), gastric ulcer (ICD–8=531), duodenal ulcer (ICD–8=532), gastritis (ICD–8=535), arthrosis of the hip (ICD–8=713.00), prolapsed cervical disc (ICD–8=725.01) and prolapsed lumbar disc (ICD–8=725.11). Since hospitalizations are rare in comparison with the number of persons at risk an appropriate way to model time trends of SHRs is by a log-linear Poisson regression with the expected number of discharges as an offset.[41] As time, the distance in years between the midpoints of the follow up periods in each of the cohorts was used. The parameters were estimated using SAS (SAS-institute Inc.), Proc Genmod and the large-sample 95% confidence intervals (CI) were calculated using the estimated standard errors.

RESULTS

Figures 1 and *2* show the SHRs for the latest available time-periods for men and women respectively, without adjustment for occupational status. The indentation of some of the diagnosis labels indicates that the diagnostic group in question is a subset of a larger diagnostic group shown above it. Acute myocardial infarction, chronic IHD and angina pectoris are, for example, subsets of IHD, which in turn is a subset of diseases of the circulatory system. As evident from the confidence intervals given in the figures, significantly elevated SHRs for all of the major disease categories (infectious and parasitic diseases, neoplasms, diseases of the nervous system, diseases of the circulatory system, diseases of the respiratory system, diseases of the digestive system, and diseases of the musculoskeletal system) were found both for men *(figure 1)* and women *(figure 2)*. The SHR for injury and poisoning, as an aggregated diagnostic group, was significantly high among the women but not among the men. When adjusting for occupational status (data not shown), the SHRs for all of the above disease categories were still higher than 100, but the SHR for diseases of the musculoskeletal system was no longer statistically significant among the men, and the SHR for infectious and parasitic diseases was no longer statistically significant among the women.

For the disease categories that were investigated for time trends, *tables 2* and *3* show the age standardized hospitalization ratios by follow-up period, for men and women respectively. The trend assessments did not detect

any significant change in SHR with time. The variations between years seen in the tables, thus, lie within what can be expected from random fluctuation alone.

DISCUSSION

It was found that age standardized hospitalization ratios with respect to diseases in practically all systems and organs of the body were higher among employees in the hotel and restaurant industry than in the working population of Denmark at large. Among women an elevated risk was also found for hospitalizations due to injuries and poisoning. No significant changes in SHR over time were detected. The time perspective was, however, relatively short.

Table 2 Age standardized hospitalization ratios (SHR) with 95% confidence interval (CI) among male employees in the Danish hotel and restaurant industry

Diagnosis	Time period	Number of cases	SHR	95% CI
Ischaemic heart disease	1981–85	163	133	114–155
	1986–90	135	115	98–137
	1991–93	95	130	105–159
	1994–97	117	112	93–134
Acute myocardial infarction	1981–85	97	109	89–133
	1986–90	79	103	82–129
	1991–93	44	102	74–138
	1994–97	54	112	84–146
Cerebrovascular disease	1981–90	166	152	130–177
	1991–93	42	141	102–191
	1994–97	61	151	116–194
Varicose veins	1991–93	35	154	107–214
	1994–97	38	138	97–189
COPD	1981–85	47	114	84–152
	1986–90	52	147	110–193
	1991–93	39	212	151–290
	1994–97	33	137	95–193
Chronic bronchitis	1981–85	25	150	97–221
	1986–90	23	209	133–314
	1991–93	11	230	115–412
	1994–97	4	199	54–509
Asthma	1981–90	53	118	89–155
	1994–97	18	124	73–195
Gastric ulcer	1981–85	48	178	132–237
	1986–90	47	189	139–251
	1991–93	20	179	109–277
	1994–97	21	176	109–269
Duodenal ulcer	1981–85	61	153	117–197
	1986–90	73	217	170–272
	1991–93	27	175	116–255
	1994–97	28	184	122–266
Acute gastritis	1981–85	83	195	155–241
	1986–90	98	191	155–233
	1991–93	42	178	128–240
	1994–97	34	127	88–177
Arthrosis of the hip	1981–85	16	132	75–214
	1986–90	14	96	53–161
	1991–93	17	191	111–305
	1994–97	21	168	104–257
Prolapsed cervical disc	1981–90	27	119	78–173
	1994–97	14	108	59–181
Prolapsed lumbar disc	1981–85	72	93	73–117
	1986–90	84	100	80–124
	1991–93	72	114	89–144
	1994–97	73	96	75–121

Table 3 Age standardized hospitalization ratios (SHR) with 95% confidence interval (CI) among female employees in the Danish hotel and restaurant industry

Diagnosis	Time period	Number of cases	SHR	95% CI
Ischaemic heart disease	1981–85	104	143	118–173
	1986–90	140	151	128–178
	1991–93	82	160	127–199
	1994–97	93	137	111–168
Acute myocardial infarction	1981–85	64	138	106–176
	1986–90	91	174	140–214
	1991–93	42	171	123–231
	1994–97	37	152	107–209
Cerebrovascular disease	1981–90	249	140	123–158
	1991–93	71	143	112–181
	1994–97	80	145	115–180
Varicose veins	1991–93	171	138	119–160
	1994–97	171	150	129–175
COPD	1981–85	141	139	118–165
	1986–90	163	141	121–164
	1991–93	77	124	98–155
	1994–97	108	159	132–192
Chronic bronchitis	1981–85	50	158	114–208
	1986–90	49	154	114–204
	1991–93	19	131	79–205
	1994–97	11	255	127–456
Asthma	1981–90	181	132	114–153
	1994–97	60	138	105–178
Gastric ulcer	1981–85	83	172	137–213
	1986–90	109	202	167–244
	1991–93	39	191	136–261
	1994–97	25	152	98–224
Duodenal ulcer	1981–85	47	130	96–173
	1986–90	75	182	143–228
	1991–93	38	217	154–298
	1994–97	23	160	101–240
Acute gastritis	1981–85	80	157	125–196
	1986–90	145	172	146–202
	1991–93	47	129	95–172
	1994–97	50	150	111–198
Arthrosis of the hip	1981–85	31	116	79–164
	1986–90	42	115	83–155
	1991–93	23	130	83–195
	1994–97	19	85	51–132
Prolapsed cervical disc	1981–90	64	142	110–182
	1994–97	39	174	124–238
Prolapsed lumbar disc	1981–85	180	135	117–157
	1986–90	208	127	111–146
	1991–93	150	140	120–165
	1994–97	117	117	97–140

Studies on the association between occupation and risk of hospitalization often have problems with the choice of reference population (the so-called healthy worker effect), with possible confounding due to social class, and with referral bias due to unequal access to the hospital system. To mitigate the healthy worker effect, the working population was used as the reference population. The problem of confounding due to socio-economic status is complicated.[42,43] Since social class is strongly related to lifestyle and living conditions it can be argued that control for social class may be a way of distinguishing between occupational and non-occupational causes of ill health. On the other hand, such control also removes part of the occupational factors since members of a specific social class share a number of work environment conditions. The SHRs were calculated both with and without control for occupational status, and few changes in the estimates were found after the adjustment. The Danish hospital system is public, treatment is free of charge, and the hospitals are well distributed geographically. Moreover, there have not been any significant changes in access to somatic hospitals during the study periods. In a Danish study of referral bias with regard to IHD it was shown that the only occupational group with (positive) bias was lower grade hospital staff.[44]

The most serious methodological problem in the present study is probably the validity of the information on occupation. Due to a relatively low level of organization membership for employers as well as employees, a high level of labor turnover, a high proportion of immigrant employees, and widespread use of 'black' labor, the validity of the registry on occupation is expected to be poorer than average among hotel and restaurant workers. It is our impression that persons with unregistered affiliation with the industry probably have poorer health than those with a more official and stable affiliation. Thus, the overall consequence for the present study should be that the disease risk of the employees of the hotel and restaurant industry has been underestimated.

How can one explain the excess morbidity? Since it is believed that chance findings as well as methodological flaws can be excluded, three main types of explanation remain: i) lifestyle factors; ii) occupational factors; iii) selection into and out of the industry. With regard to lifestyle factors a number of studies have indicated a high proportion of smokers and a high level of alcohol intake among hotel and restaurant employees.[9,32,35] No knowledge of data on physical (in)activity or obesity has been obtained. Regarding occupational factors with potential significance for health, a large number have been suggested in the literature:[12,16–26,45–55]

- Chemical
  - Polycyclic aromatic hydrocarbons and other fumes;
  - Chemicals in products used for cleaning;
  - Passive smoking (the prevalence of smoking is high in Denmark compared to most other European countries[56]).
- Ergonomic
  - Standing and walking;
  - Bending, lifting, carrying;
  - Repetitive work.
- Accidents
  - High risk of burns;
  - High risk of falling (slippery floors, stairs).
- Psychosocial
  - Violence;
  - Sexual harassment;
  - High emotional demands in work with customers;
  - Shift work, night work;
  - High work pace;
  - Long working hours;
  - Low influence (control);
  - Low job security;
  - Problems with coordination of work and family.

The third possible explanation is special selection into (and out of) the industry. According to representatives of the industry it is likely that persons with a high consumption of alcohol and/or tobacco will prefer employment in the hotel and restaurant industry. This type of industry probably represents opportunities for short-term employment for individuals with, at least periodically, ill health. Thus, selection into the hotel and restaurant industry of persons who have an unhealthy lifestyle or a poor health already before employment cannot be dismissed as a possible explanation contributing to the pattern of diseases observed.

The present study is descriptive and cannot elucidate the relative importance of the possible risk factors discussed above, nor can it explain the gender difference in the pattern of hospitalization, e.g. the clearly higher SHR for injuries among women compared to that among men. It is recommended that focused research be initiated with the purpose of clarifying the role of occupational as well as non-occupational factors for the alarming excess of diseases found in this group. Also, preventive actions should be launched in order to eliminate or reduce the known risk factors with relevance to the poor health of hotel and restaurant workers.

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