

# Characterization of the Swedish work environment and work environment research

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## Labor accidents, work-related disorders and complaints—data sources and statistics

Relevant statistics information is available from several sources, such as Statistics Sweden, the Swedish Work Environment Authority (SWEA), the Ministry of Industry, Employment and Communications, county councils, several research institutes, and the like. The most relevant are (i) the Swedish Information System for Occupational Accidents and Work-Related Disorders (ISA), a department in the Swedish Work Environment Authority that covers officially registered occupational injuries and work-related disorders and (ii) the Work Environment Survey, financed by the Swedish Work Environment Authority and conducted by Statistics Sweden. The latter is based on the respondents' own assessment of exposures, complaints, and disorders.

### Accidents and disorders

The number of occupational deaths among men in Sweden is less than a sixth of what it was in 1965, as illustrated by figure 1. For the women, the low number of occupational deaths has remained constant, except for 1994, when the ferry Estonia sank and the hundreds of victims from the crew and conference participants created a peak in the death rate.

The number of self-reported occupational diseases has remained fairly constant over the past 15 years. The peak in 1993 and uncertain numbers in 2001–2003 (figure 2) are due to changes of the compensation rules.

The factors reported to be associated with occupational diseases in Sweden have not changed much over the past 5 years (figure 3). Ergonomic factors such as monotonous or unusually strenuous movements, manual materials handling, or awkward work postures cause close to 60% of the reports. Organizational and social factors cause between 20% and 25%. Chemical or biological substances or products, noise and vibration, and other factors all cause less than 10% of the reported occupational diseases. The leading diagnoses are musculoskeletal disorders, but psychosocially related diseases show the most rapid growth.

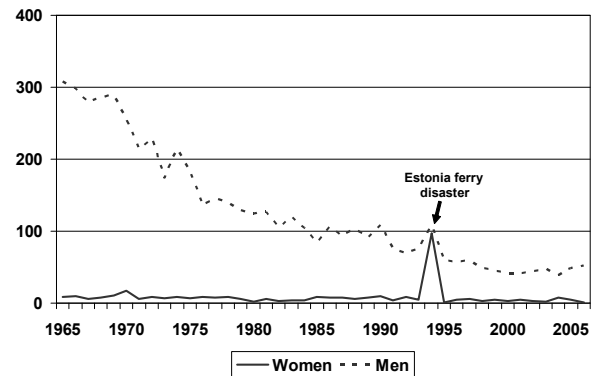


Figure 1. Occupational deaths in 1965–2005 (absolute numbers).

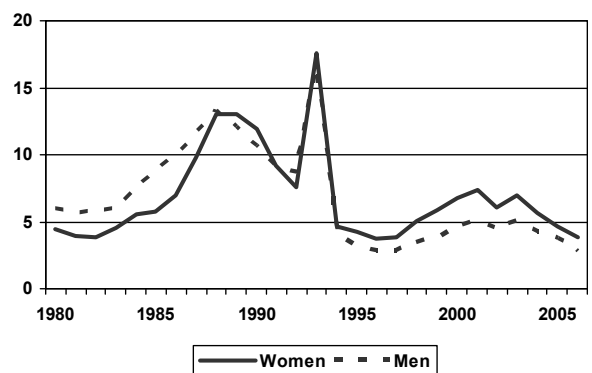


Figure 2. Number of self-reported occupational diseases in 1980–2005 (per 1000 employees).

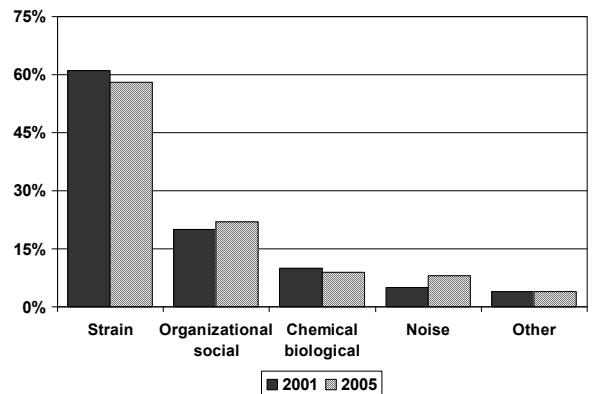


Figure 3. Underlying factors behind reported occupational diseases in 2001 and 2005 (men and women).

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Of the 20 787 occupational diseases reported in 2004, 56% affected women and 44% occurred among men. The rates of reported occupational diseases were 4% per 1000 gainfully employed men and 6% per 1000 gainfully employed women. A breakdown of occupational diseases reported in 2004 by branch of industry shows the highest frequency rate for men in the manufacturing of nonmetallic mineral products (12 cases per 1000 employed). Among women, the manufacturing of transport equipment showed the highest frequency (22 cases per 1000 employed).

### *Work environment survey and complaints*

The Swedish Work Environment Survey, based on interviews with more than 14 000 Swedish employees, takes exposures and the determinants of the work environment into account from two different angles. One angle is based on questions regarding health complaints caused by work. Another angle is based on perceived exposure (ie, whether the interviewees experienced occupational exposures and determinants, such as noise, dust, vibration, or strenuous work positions) during at least one-fourth or half of their worktime during the past year.

The causes of work-related complaints show particularly high figures for strenuous work positions and stress. There has also been an increase in workers experiencing complaints caused by work in front of visual display screens. The numbers of complaints are, on the average, higher for women than for men. For instance, among workers experiencing stress, the complaints of women increased from 7% in 1997 to 12.1% in 2006, compared with 3.7% in 1997 and 7.4% in 2006 for men.

Regarding perceived occupational exposures in the work environment, few notable changes were detected in the 1990s except for the case of environmental tobacco smoke, which had a dramatic decline after 1998—partly due to new legislation.

On the question of whether workers can see or smell chemicals in the air one-fourth or more of the worktime, the overall number declined slightly from close to 30% in 1989 to around 20% in 2001, or 800 000 persons. About 370 000 persons reported such chemicals half their worktime or more. Exposures to detergents and disinfection liquids are especially common (8.3% of all men and 15.5% of all women in 2003, but as many as 66% of all female cleaners).

Dust exposure, or whether workers can see dust in the air, shows two trends. Around 1 million workers could see organic dust one-fourth or more of their worktime in 2003, and this level is no change over that of previous years. For inorganic dust, the number was 625 000 persons in 2001, while 240 000 did so during half or more of the worktime. These numbers show a

slow overall improvement from 20% in 1989 to less than 20% in 2003.

Vibration from handheld machines is a problem area in certain branches. Around 825 000 persons reported such work one-fourth or more of the worktime in 2003, and around 185 000 persons did so one-half their worktime or more. Two of the most problematic sectors showed divergent trends. While such vibration seems to be decreasing among agricultural and forestry workers, there has been an increase among construction workers since 1989. From having had the same level of just under 30% in 1991, construction workers reached more than 40% in 2001.

Around a quarter of the workforce, or 15.8% of women and 30% of men in 2003, experienced noise too loud for normal conversation. This figure has remained stable among men, while women 30 to 49 years of age have experienced a 5% increase since the beginning of the 1990s. Women working as preschool teachers perceive the most noise, 54% in 2003. Among men working as process operators in the wood and paper industry, the corresponding figure was 78%.

### ***Structure of work environment research in Sweden and its actors***

#### *Development of the structure for work environment research*

The evolution of work environment research and its application has been irregular. The early period—during and after World War II—was characterized by research embedded within the Swedish National Institute for Public Health (SNIPH), and the evolution of regional occupational medicine clinics. Over the 1970s and 1980s there was further development of regional attention to occupational health concerns with the development of some occupational medicine clinics, as well as university institutions.

Since the beginning of the 1960s, the structure of government work environment institutions has undergone a series of changes. In 1965 certain units from the Swedish National Institute for Public Health and an institute of work physiology were combined into the National Swedish Institute of Occupational Medicine (NSIOM), which, in 1971, was integrated to become a research department in the National Board of Occupation Safety and Health (NBOSH today SWEA), which was responsible for enforcing workplace regulations. In 1987 this research department was separated from the Swedish National Institute for Public Health to become the Swedish National Institute of Occupational Health (SNIH). In 1995 the Swedish National Institute of Occupational Health was merged with the Centre for Work

Life Research [Arbetslivscentrum (ALC)] and parts of the Work Environment Fund (AMFO) to form the National Institute for Working Life (NIWL). The much broader mandate for this institute somewhat disrupted the growth of traditional occupational health research. The National Institute for Working Life was closed on 1 July 2007 [See more about this institute below].

### *Current structure of Swedish occupational health*

**Swedish Work Environment Authority.** The Swedish Work Environment Authority was formed in 2001 through the amalgamation of the 10 districts of the Labour Inspectorate and the National Board of Occupational Safety and Health. The objective of the Authority is to reduce the risks of ill health and accidents in the workplace and to ensure compliance with work environment and workhour legislation and also, in certain respects, with the Tobacco Act and the Environmental Code with regard to certain issues related to genetic engineering and pesticides. The Authority is also required to furnish advice, respond to inquiries, and publish information. It is also Sweden's "liaison office" with respect to citizens of other EU countries working in Sweden for a limited period (as a "posted worker"). Work environment inspections at workplaces in Sweden are carried out by inspectors from the Authority. Altogether 440 inspectors are stationed in 10 districts, and, between them, they carry out 38 000 inspections annually. However, this capacity has been dramatically weakened in 2007 as the budget of the Swedish Work Environment Authority was cut by almost a third, in line with the political priorities of the current Swedish government.

The lay board of the Swedish Work Environment Authority consists of the director general, as the chairperson, and six members representing general knowledge of worklife, all appointed by the government. The Swedish Work Environment Act is applicable to all areas of worklife, and, out of Sweden's almost 9 million inhabitants, approximately, 5.3 million come under this act. The Authority supplements and articulates stipulations of the Work Environment Act and attends to the transposition of EU legislation into Swedish law. To this end, the Authority issues regulatory amendments and new rules for the work environment. Today, there are some 130 provisions related to technical, chemical, organizational, and psychosocial factors.

**National Institute for Working Life.** The National Institute for Working Life (NIWL) was created in 1995 by a merger between the former National Institute of Occupational Health (NIOH), the Centre for Work Life Research (ALC), and parts of the Work Environment Fund (AMFO) as a national center of knowledge and research for issues concerning worklife. The Institute has since

undergone several reorganizations, particularly when five new local branches were set up and major parts of the former research resources for chemistry, toxicology, aerosols, and lung disorders were outsourced, along with ergonomics, to different universities.

The Institute carries out research and development covering the whole field of worklife, on commission from the Ministry of Industry, Employment and Communications. The goals of the Institute are to contribute to (i) a good worklife with well-functioning work conditions and (ii) increased knowledge of and in worklife. Research and development are concentrated into the following three main areas: the labor market, work organization, and the work environment. Research is multidisciplinary and arises from problems and trends in worklife. The Institute collaborates with its social partners, industry, universities and university colleges, international partners, and with others active in the field of worklife.

The Institute head office is located in Stockholm and it has local branches in Göteborg, Malmö, Umeå, Norrköping, Östersund, and Visby. It has approximately 400 full-time employees and a total budget of 441 million Swedish crowns (2005). In 2001, 55 million were transferred from the Ministry of Industry, Employment and Communications to the Ministry of Education and Research and distributed to the universities that hosted the outsourced disciplines.

*Note:* In 2006, the newly elected government suggested to Parliament that the National Institute for Working Life be closed. The Parliament accepted this recommendation in December 2006, and the Institute ceased to exist on 1 July 2007.

**Local safety work.** "Employers and employees shall co-operate to establish a good working environment" (Work Environment Act, Chapter 3, Section 1). The law makes the employer ultimately responsible for the work environment. But cooperation is also a key factor, and some institutions exist to facilitate local safety work. One is the safety committee (skyddskommitté). Safety committees must be set up in workplaces with more than 50 employees. The unions elect representatives to the committee, which represents all groups at the workplace. The unions (blue- and white-collar unions together) have one representative more than the employer.

The safety committee takes part in the company's work environment activities in a broad sense and provides guidelines on how this work should be carried out. Safety delegates (skyddsombud) are the employees' representatives in health and safety matters. They are elected for a period of 3 years by the local unions at workplaces with five or more employees. If there is

no union at a workplace, a safety delegate is elected among the employees anyway. There are 96 000 safety delegates in Sweden. Large workplaces have several safety delegates, one of whom is elected to be the “chief safety delegate.”

Safety delegates have a legal right of access to all information necessary to fulfill their duties. The employer must allow them the paid time needed for the job and also the necessary training. The local trade union organization may appoint a “regional safety delegate” with the main duty of stimulating safe work practices in small companies without safety committees. There are 2140 such regional delegates.

**Occupational health services.** No law demands that companies provide occupational health services (företagshälsovård). The employer and employees are jointly responsible. The coverage of the Swedish workforce is approximately 75%. Large companies mostly have their own built-in occupational health services, while joint occupational health centers provide services to small and medium-size companies. Traditionally, an occupational health team includes a physician, a nurse, a physiotherapist, an industrial hygienist or safety engineer, and, in some cases, a psychologist. A recent trend is towards larger companies through mergers and voluntary collaboration with local satellite units.

The conditions for Swedish occupational health services changed in the beginning of the 1990s when the subsidies from the government were abolished. For financing, occupational health services are dependent on renewed contracts with public and private enterprises. The former research facilities within some of the larger occupational health organizations have thereby disappeared, and the former involvement in research has more or less ended.

**University institutions and hospital-based clinics of occupational medicine.** The leading employer of occupational health researchers has been the National Institute for Working Life. Other important research centers are the Karolinska Institute (Stockholm), the universities in Gävle, Göteborg, Linköping, Lund, Stockholm, Umeå and Uppsala, the Royal Institute of Technology

(Stockholm), and the Chalmers University of Technology (Göteborg). Some of the universities host outsourced groups from the National Institute for Working Life with, so far, guaranteed funding.

Work environment problems requiring expert studies are referred from occupational health services to clinics for occupational medicine at the regional hospitals (yrkesmedicinska kliniker). Most clinics collaborate closely with departments of occupational and environmental health at the local university. There are clinics for occupational medicine in Göteborg, Linköping, Lund, Malmö, Stockholm Sundsvall, Umeå, Uppsala, and Örebro

**Private research institutes.** There are also some private sector research organizations in the work environment field, for example, STFI-Packforsk AB, the Swedish Environmental Research Institute (IVL), and Industrial Research and Development AB (IVF).

### *Inventory of the Swedish work environment research workforce*

The National Institute for Working Life carried out an inventory of Swedish worklife research in 2005–2006 on the assignment of the Swedish Council for Working Life and Social Research and the Swedish Governmental Agency for Innovation Systems. This inventory was based on a survey sent to all major research institutions involved in different areas of worklife. The National Institute for Working Life prepared questionnaires, which were filled out by 336 Swedish research leaders in worklife sciences. The evaluation of Swedish work environment research used the preliminary report from the exercise of the National Institute for Working Life, as well as computer files containing survey data from the inventory. This is a short overview of the data available from the inventory for the research evaluation.

First, the inventory helped the evaluation secretariat to identify which Swedish research groups were active in the relevant disciplines (ie, groups engaged in research on ergonomic, physical, biological, and chemical health risks). Out of the total 336 groups, 70 groups remained. The list of the 70 research leaders was subsequently used when a request for research material was sent out from the International Evaluation Group.

Second, data from the questionnaires of the selected 70 groups were analyzed. These data showed, for example, that the number of research personnel working in selected areas of work environment research represented about 570 full-time equivalents, out of the total 1500 in worklife research. When only postdoctoral researchers are counted, the approximate total was 250 full-time equivalents. Table 2 shows the division of research groups and full-time equivalents between the different

**Table 2.** Research groups and personnel distributed over the selected work environment research areas.

| Research area                        | Full-time equivalents | Research groups |
|--------------------------------------|-----------------------|-----------------|
| Physical health risks                | 92                    | 16              |
| Chemical and biological health risks | 136                   | 25              |
| Strain ergonomics                    | 166                   | 15              |
| Combinations                         | 174                   | 14              |
| Total                                | 568                   | 70              |

areas of work environmental research. The “combination group” is comprised of those who carry out research in two or more of the selected areas.

The gender balance in the selected research areas proved to be even, 51% women and 49% men. However, when distributed over professional categories (figure 4), clear gender differences became visible with more women in the lower professional categories and a male dominance in the postdoctoral categories. Among the women in the postdoctoral categories almost 45% (40 of 93) were employed by the National Institute for Working Life, as were less than a third of the men in this category (45 of 152).

The most common faculty background of the research staff in the selected areas was health sciences, natural sciences, and technology studies. In the ergonomics groups and combination groups, it was also common to have a background in behavioral sciences or other social sciences.

A comparison of the research leaders' age structure showed that the average age was rather high. As illustrated by figure 5, only one of the research disciplines, chemical and biological health risks, had any research leader under 40 years of age. Most were between 55 and 59 years of age, and 23% was more than 60 years of age.

The largest research institutions, counted as the number of full-time equivalent research personnel, are listed in table 3. The National Institute for Working Life was clearly the largest institution, the Karolinska Institute being the second largest. After the National Institute for Working Life and Karolinska, the old traditional universities were the largest, with the exception of the Gävle University College, explained by the move of the musculoskeletal center from the National Institute for Working Life to Gävle in 2003.

A summary of the reported sources of funding shows that Swedish work environment research has relied, to a large extent, on public-sector funding. Around two-thirds of the total research funding has derived from different government institutions, and 40% of the total comes from state-funded research councils, such as the Swedish Council for Working Life and Social Research. Other public-sector sources are, for example, the National Institute for Working Life and the country councils. An insurance company owned by the labor market partners (Afa) has increased its support to work environment research. Different types of funding from the private sector and EU grants are small in comparison.

The survey also inquired about how the research groups saw the social benefits of their research. According to the responses to this open question, the benefits could be categorized into the following five categories: practice and exposure limit guidelines (23%), training and communication (20%), measurement methods

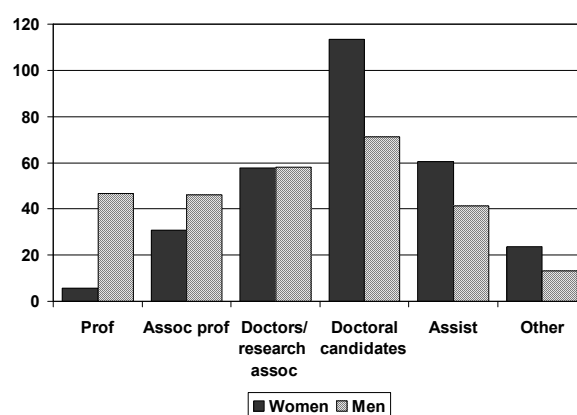


**Figure 4.** Distribution of professional categories according to gender in the selected research groups. (Prof = professors, Assoc = associates, Assist = assistants)

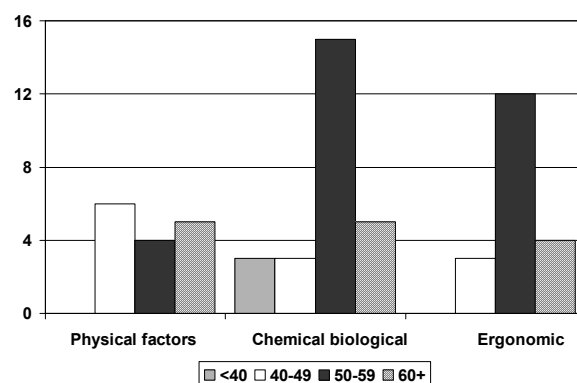


**Figure 5.** Age structure of Swedish research leaders in different work environment fields.

**Table 3.** Largest research environments according to the rank of the total research personnel and postdoctoral personnel (full-time equivalents).

|                                               | Full-time equivalents |
|-----------------------------------------------|-----------------------|
| Total (including assisting staff)             |                       |
| 1 National Institute for Working Life         | 167                   |
| 2 Karolinska Institute                        | 57                    |
| 3 Linköping University                        | 39                    |
| 4 Göteborg University                         | 35                    |
| 5 University College Gävle                    | 31                    |
| 6 Lund University                             | 26                    |
| 7 Swedish University of Agricultural Sciences | 12                    |
| 8 Örebro Country Council                      | 11                    |
| 9 Uppsala University                          | 11                    |
| 10 Umeå University                            | 10                    |
| Postdoctoral personnel                        |                       |
| 1 National Institute for Working Life         | 85                    |
| 2 Karolinska Institute                        | 42                    |
| 3 Lund University                             | 33                    |
| 4 Linköping University                        | 15                    |
| 5 Göteborg University                         | 14                    |
| 6 University College Gävle                    | 7                     |
| 7 Örebro Country Council                      | 7                     |
| 8 Swedish University of Agricultural Sciences | 6                     |
| 9 Umeå University                             | 6                     |
| 10 Uppsala University                         | 5                     |

and products (20%), prevention (20%), and scientific knowledge (14%).

The final survey questions looked into the researchers' views on future research and knowledge needs. As indicated by table 4, traditional work environment issues appeared to dominate. Consequences from societal changes in recent years also seem to have

had an effect on priorities, as well as the relationship between work and leisure time. Contributions to improved work conditions and individual differences in sensitivity and vulnerability were also frequently mentioned. The researchers had a tendency to mention ideas for future research close to their on-going research.

**Table 4.** Prioritized research areas by work environment research groups (number of responses by priority area).

| Priority area                                                                                                                                        | Number of responses |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Analysis of new risks or deeper knowledge of old risks                                                                                               | 35                  |
| Consequences of combined exposures                                                                                                                   | 7                   |
| Studies of differences in individual sensitivity (primarily of physical exposures)                                                                   | 4                   |
| Attitudes towards work and its consequences, along with the relation between work and leisure time and the significance of recovery, rest, and sleep | 22                  |
| Limitations to work ability and possibilities to work, as well as rehabilitation and issues concerning return to work                                | 8                   |
| Questions around the organization and design of occupational health activities                                                                       | 7                   |
| Consequences of national or international rules in the area of the work environment                                                                  | 3                   |

## *International evaluation of Swedish work environment research*

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The evaluation of research on the work environment focused on evaluating whether Swedish contributions to work environment research met international standards in quality, quantity, and relevance. The approach to this evaluation was organized into seeking a response to the following questions:

- Does work environment research address gaps in international research and significantly enhance the knowledge base or mainly repeat research that has been carried out elsewhere?
- Does work environment research pay adequate attention to engaging with the international research community?

- Do efforts in work environment research include knowledge distribution and knowledge implementation in addition to knowledge development?
- Does the research and its transfer provide a good basis for policy decisions, strategies, and activities to promote a good work environment?
- Does the structure in the support of work environment research appear appropriate and optimal?

The original international evaluation report has been somewhat edited for this supplement to make it more accessible to an international readership. Most of the relevant background information has been provided

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