

melanoma skin cancer caused 34 deaths. In Sweden, the annual average of cancer cases was around 33,000 (1990–2004). The data, documented by national cancer registers, confirm the significant numbers of skin cancer cases which are diagnosed every year in European countries. It has been estimated that approximately 90% of all non-melanoma skin cancers can be attributed to UV exposure [2]. An increase in skin cancers cases is predicted for the fair-skinned European population. The increase may concern people aged over 65 in particular [6].

It seems probable that occupational skin diseases caused by the UV radiation process are being under-registered, taking into account the considerable differences in registration of occupational diseases in various EU countries, gaps in registration of exposure, and the scientific evidence of adverse effects of exposure to UV radiation on human health. Data on occupational diseases are probably underestimated and the problem is even bigger than the numbers show. More cases of cancer (and other diseases related to UV radiation) could be occupational in origin.

CONCLUSIONS

Exposure to UV radiation (solar or artificial) can lead to serious health consequences. Adverse effects of exposure mainly concern the eyes, skin and immune system. The health consequences of UV radiation exposure are so serious that it is considered to be one of the major emerging physical occupational safety and health risks. A comparison between the overall number of diseases attributable to UV radiation and the number registered as occupational diseases can lead to the conclusion that the numbers of people suffering from registered occupational diseases are underestimated. It is likely that a large number of reported diseases might be due to occupational exposure. It means that registers of occupational diseases and work-related diseases in EU countries do not give a realistic picture of the burden of diseases following occupational exposure to UV radiation, especially solar radiation. This can lead to the conclusion that the system of monitoring and reporting should be improved in order to provide reliable valuable data for preventive measures. Exposure limit values are established for artificial sources only. A European Directive on minimum health and safety requirements regarding the exposure of workers to the risks arising from exposure to optical radiation from artificial sources was adopted in 2006 (*Directive 2006/25/EC of the European Parliament and of the Council of 5 April 2006 on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation) (19th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)*). This Directive relates only to UV radiation emitted by artificial sources – workers exposed to solar UV radiation are not specifically included. The framework Directive is applicable to the latter category of workers.

People and the environment will be exposed to higher intensities of UV because of the consequences of depletion of the stratospheric ozone. This applies not only to occupational exposure, but also to exposure during leisure time. Long-term preventive measures should also take into account childhood exposure. Increased solar UV radiation exposure is considered so serious that it is one of the urgent topics under consideration by the World Health Organisation. European experts have also identified occupational exposure to UVR as one of the most important physical risks in the working environment [7].

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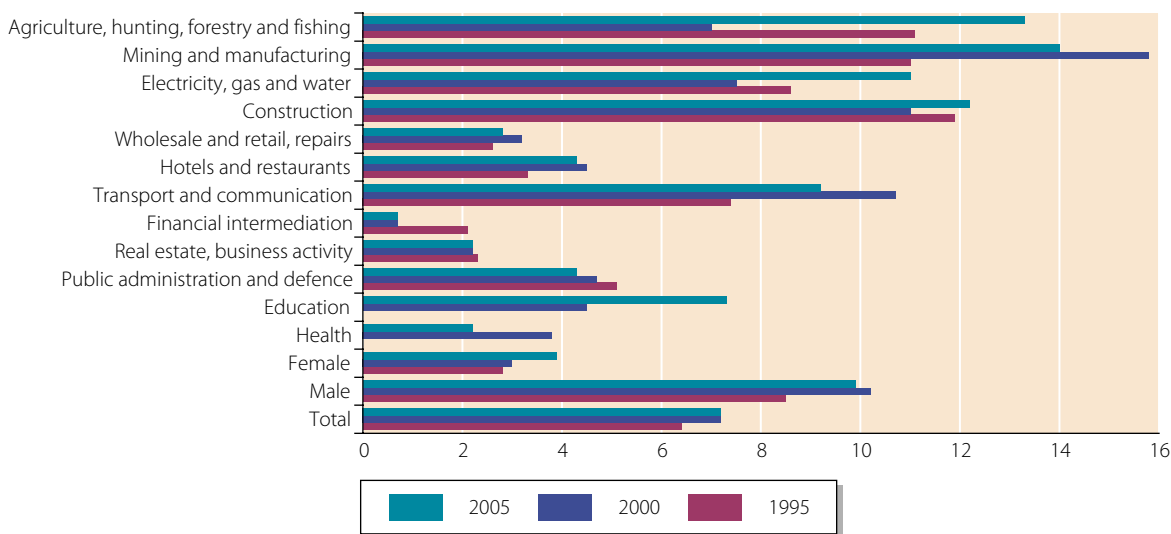
HEARING IMPAIRMENT

INTRODUCTION

Between 1990 and 2000 there was a slight increase in exposure to loud noise in the workplace in the EU [1]. The percentage of workers exposed to loud noise all, or almost all, of the time increased from 10% (in 1990 and 1995) to 11% (2000) while exposure for at least 25% of the time increased from 27% (1990) to over 28% (1995) to 29% (2000) of all workers in the EU [2]. In 2005, 30.1% of EU-27 workers reported exposure to noise. There were significant differences in the levels of exposure between countries, ranging from 28% in Romania and Bulgaria, through 28.7% in the EU-15, to 38.8% in the 10 new Member States [3].

Workers who report high exposure to noise also report higher rates of hearing problems. There are significant differences between economic sectors (see Figure 1). Mining and manufacturing, construction and transport and communication report hearing problems more often than the average. Except for communication and transport, these sectors also report higher rates of exposure to noise. Blue-collar workers report the highest rate of hearing problems. This group is also significantly more exposed to noise due to the various processes and machinery involved. Considering sectors where occupational exposure to noise is a problem, it is understandable that men report experiencing hearing problems more than twice as often as women. It is particularly significant that employees on apprenticeships or other training schemes reported more hearing problems in 2000 than in 1995. Self-employed workers report the least hearing problems.

Figure 1: Percentage of workers with self-reported hearing problems



Source: EWCS, European Foundation

CAUSES OF HEARING IMPAIRMENT

Noise-induced hearing impairment can be caused by a one-time exposure to a noise impulse (more than 140 decibels (dB(C)), or by exposure to high-intensity (more than 85 decibels (dB(A)) sounds several hours each working day over an extended period (several years). Exposure to these harmful sounds damages the sensitive hair cells of the inner ear. For every 10dB(A) increase in the noise level the sound appears to be twice as loud, but the risk of hearing damage rises tenfold. That means that if exposure to 85dB(A) can be tolerated for eight working hours daily, at a level of 95 dB(A) an acceptable exposure time would be just 48 minutes per day [5]. See also Topic 'Exposure to noise at work'.

Recent studies indicate that some industrial chemicals, including organic solvents, chemical asphyxiants and heavy metals also have ototoxic (damaging to the hearing) potential on their own, and can increase the damage caused by noise. Combined exposure to solvents and noise can occur, for example, in metal and textile manufacturing. Research into the synergistic effects of chemical and noise exposure is continuing [6].

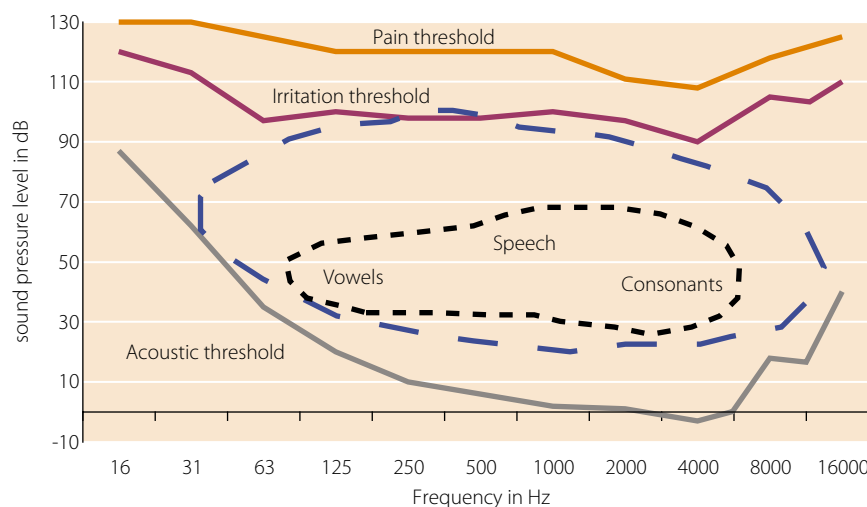
TYPE AND DEGREE OF HEARING IMPAIRMENT

Hearing impairment caused by excessive noise is sensorineural: noise damages the hair cells, affecting the pathway from the inner ear to the auditory nerve and the brain. It is always bilateral, but there may be differences in the level of impairment between the ears of an individual. Sensorineural hearing impairment also affects understanding of speech, or ability to hear clearly (see Figure 2) [7]. This type of hearing impairment cannot be medically or surgically corrected.

Noise-induced hearing impairment is often accompanied by tinnitus, or ringing in the ears. While tinnitus may have other causes besides noise-induced hearing impairment, in most cases it is associated with exposure to noise: assessment by audiologists shows that a high proportion of male workers exposed to loud noise suffer ringing in the ear.

There are three levels of severity of the loss across a range of frequencies (3,000 or 4,000 Hz) (see also Figure 3): mild loss (20 to 39 dBHL (decibels hearing level)), moderate loss (40 to 69 dBHL) and severe loss (70 to 94 dBHL). Profoundly deaf people, who cannot hear sounds quieter than 95 dB, communicate by sign language or lip reading.

Figure 2: Frequency-dependent acoustic field [7]



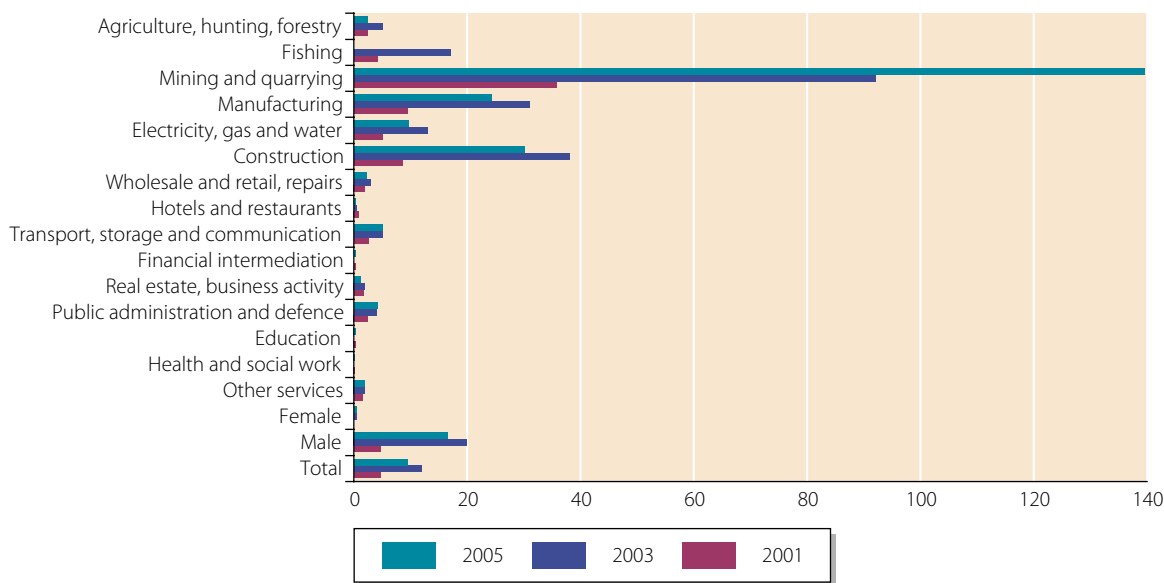
OCCURRENCE OF HEARING IMPAIRMENT IN THE EU

Noise-induced hearing impairment is still one of the most prominent and most recognised occupational diseases in the Member States of the European Union. According to a study by Eurogip [8], the cost of hearing impairment due to noise represents about 10% of the total cost of compensation for occupational diseases (period 1999/2001). The position of the disease in the classification in terms of recognition and cost may, however, be different: in 2000, hearing impairment ranked first among the diseases most commonly recognised in Germany and second in Denmark, but its ranking in terms of cost in these countries was third and fourth respectively. The global cost of occupational noise-induced hearing loss is unknown. European countries use different thresholds of hearing

impairment as the base for recognition as an occupational disease, and for compensating for it. The cost of noise induced deafness in 2000 in individual EU member states varied between EUR1 million and EUR300 million – depending on the recognition and compensation system [9].

The trends of recognised incidence of hearing impairment differ depending on country and recognition policy. While in some countries figures are decreasing slightly, they are more or less stable and even increasing in other countries. The highest numbers of cases are registered in the age groups 40–54 and 55–60. Figure 3 shows the incidence rate for EU-12/11/25 countries from 2001 to 2005 for the various industry branches. The numbers of recognised cases of hearing impairment in individual sectors correspond in principle with self-reported cases presented in Figure 1.

Figure 3: Incidence rate (per 100,000 full-time workers) for hearing impairment for 12 (2001), 11 (2003 without Ireland) and 25 (2004 – with New Member States) EU countries



Source: EODS, Eurostat

In 2001, in the New Member States, 9% (compared with 7% for EU-15 in 2000) of workers reported hearing impairment, with the range from 5 to 11.8%. As in the EU-15, numerous factors (especially employment rates and social security arrangements) influence the number of recognised cases [11]. However, in 2005 the differences between the Member States were more pronounced: 5.9% of the workers in the EU-15 reported hearing problems, compared with 13.5% in the 10 New Member States and 9.7% in Bulgaria and Romania [3].

HEALTH AND SAFETY CONSEQUENCES OF HEARING IMPAIRMENT

Hearing impairment can be a serious risk at the workplace, as well as a psychological problem for the individual affected. It is particularly important in work situations requiring communication of risks using audio warning signals (for example moving machinery), where inability to hear can lead to accidents: impaired ability to hear sounds is confounded by reduced speech intelligibility (inability to hear sounds of affected frequency). Background noise, common in transport or the manufacturing environment, is an additional factor increasing the risk.

Irrespective of hearing impairment, noise – even below the levels usually associated with hearing damage – can cause other non-auditory negative changes in the body. Reactions to sudden or loud sounds include a rise in blood pressure, heart and breathing rates, muscle tension and hormone release. Impulse noise of high level can rupture the tympanic membrane, causing intense pain; fortunately, the membrane can heal. Short-duration, high-

intensity, intermittent noises are perceived by most people to be more annoying than steady noises having the same overall energy.

Compared with the general working population, workers with a hearing impairment more often experience mental or physical fatigue (51% vs 31%), leading to stress-related health problems [6].

FUTURE RESEARCH NEEDS

In the modern workplace, risk factors seldom occur on their own. Therefore further investigations are needed to assess the combined effects of noise and other physical factors, such as vibration. Interactions between noise and chemicals are also under investigation. Considering reports of detrimental effects of noise on embryos, resulting in hearing impairments of the babies, a holistic approach to risk assessment indicates the need to establish a framework for protecting pregnant workers in particular [12].

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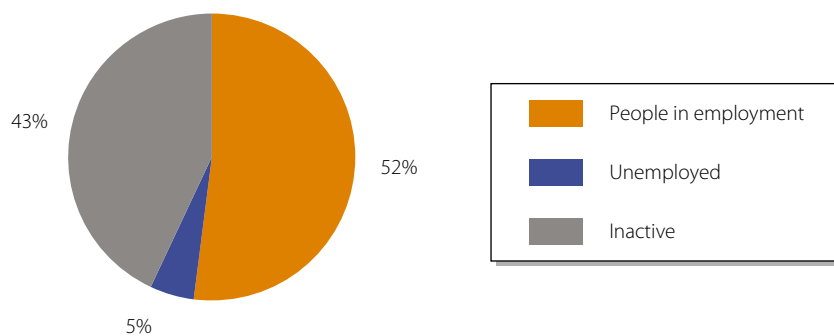
LABOUR MARKET CHANGES: THEIR IMPACT ON OCCUPATIONAL SAFETY AND HEALTH

The changing face of the European labour market has many implications for occupational safety and health. In order to map these implications, it is essential to identify the demographic, social and economic developments that impact on the labour market. Identifying these trends, and keeping pace with them in the context of occupational safety and health, requires a holistic, long-term approach.

GENERAL OVERVIEW

About half of the total EU population aged 15+ is employed (Figure 1). According to the results of the Labour Force Survey (2004), 194.5 million people (out of a total population of 377.5 million) [1] held a job or were involved in a business activity.

Figure 1: Employed people in the total population of EU-25 (2004), aged 15+



Source: LFS, Eurostat

The main characteristics of the employed population (2004) are as follows [1]:

- Gender: 44% women
- Age:
 - 10.6% – people under 25
 - 10.9% – people between 55 and 64
- Employment status:
 - 17.7% in part-time jobs
 - 82.3% in full-time jobs
- Employment rate, EU-25, people 15-64: 63.3%

MAIN CHANGES

Changes in the EU labour force reflect the continent's social, demographic and economic transformation [2]. The main changes are listed below.

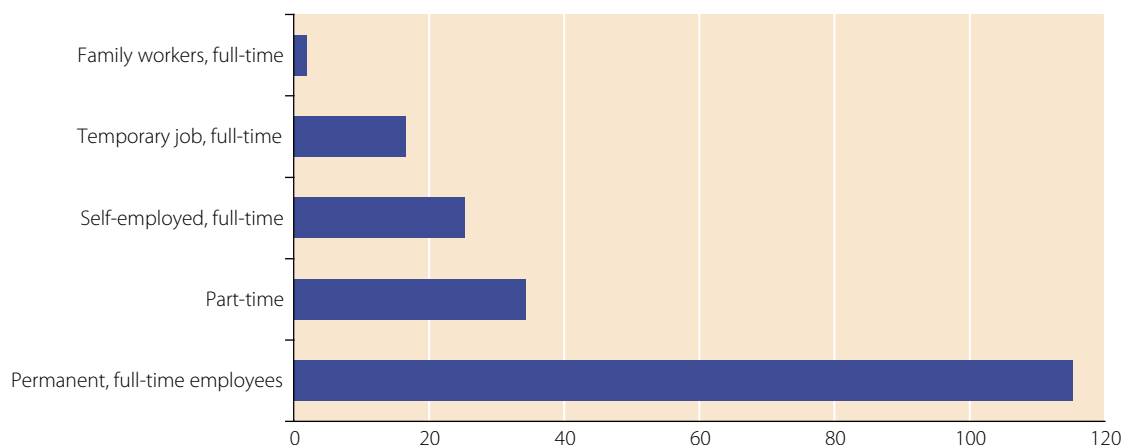
- The population of the EU is estimated to have increased by 2.3 million (0.5%) in 2004, mainly due to net migration. This increase was the largest in more than 30 years. In the first quarter of 2005, 63.2% of the EU-25's working-age population (15–64 years) held a job or were involved in a business activity, compared to 62.6% a year earlier.

- The workforce is steadily ageing: the employment rate of older people (55–64 years) was 41% in 2004, up by 4.4% from 2000. For some countries it was higher than 50% [1]. This means that Europe faces the challenge of retaining older workers in employment.
- There are now continent-wide measures to prevent the exclusion of workers with disabilities from work.
- Although the EU workforce is still predominantly male, more women are joining the workforce. This means there is an increasing need to ensure a good work-life balance among European workers [3].
- There is an increasing need for the workforce to be better educated, partly because of the growing complexity of work processes resulting from the development of information technology.
- Increasing migration and greater mobility of the population are also having an effect on the EU, with workers migrating to countries with more employment prospects. From an occupational health point of view, this diversification of the EU workforce brings new risks.

EMPLOYMENT STATUS

Changes in the labour market also relate to the subject of employment status. Figure 2 shows the number of people employed in 2004, by employment status [1].

Figure 2: Number of people employed, by employment status, millions (EU-25, 2004)



Source: LFS, Eurostat

Although the majority of people employed are in the 'permanent job' (employee, full-time) category, the other categories, i.e. part-time workers, the self-employed, workers with temporary contracts, and family workers, constitute about 40% of the total number of people in employment. Temporary employment is a fast-growing phenomenon; however, there are large national differences: the proportion of employees working on temporary contracts ranges from 2.7% in Estonia to 34.4% in Spain. In part-time employment considerable gender differences are observed: it is much more common among women than men. Of the 34.3 million part-time workers, 78% are women. The latest EU labour market data show that the share of part-time employees – and of temporary contracts, too – is increasing. The share of part-time employment in relation to total employment increased between the first quarter of 2004 and the first quarter of 2005. For men it grew by 0.6% to 7.5%, while for women it rose by 1% to 32.6%. In the same period the share of temporary contracts also increased. This is recognised as a positive stimulus for the increase in the EU employment rate [4].

Occupational health and safety in relation to employment status

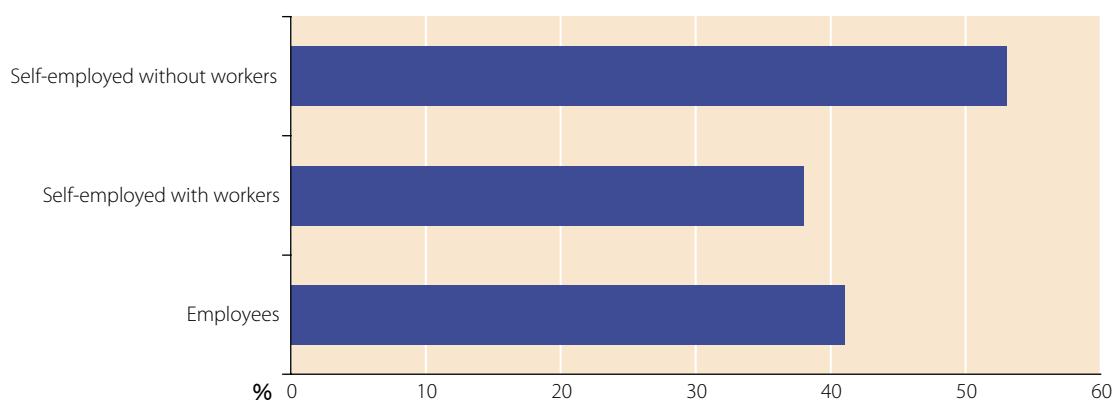
Many sources point out that job status affects working conditions and workers' health [5]. A report on part-time work in Europe indicates that there are fewer opportunities for training and career progress in this sector [6]. The salary levels and social security benefits are often lower and jobs are typically monotonous. Part-time employment often comes at the beginning or at the end of one's working life, especially for men. This means that it is often connected with specific problems of young and older workers. Not all part-time workers are satisfied with their status. On the other hand, the report reveals a higher level of general satisfaction with working hours and better opportunities to achieve a positive work-life balance. Part-time workers are less exposed to a number of hazards and to poor ergonomic conditions and are less likely than full-time workers to report job-related health problems [6]: shorter exposure times and longer recovery periods may be significant contributing factors.

According to data on temporary agency work, people employed on temporary contracts also have less access to training and to participation in long-term competence development than workers with permanent contracts [7]. Some data indicate that the incidence of occupational accidents among temporary workers is higher than among other groups of employees. They also have less job control in terms of the order of tasks, pace of work and work methods; they also have low job demands, and are less informed about risks at work. Temporary agency workers report higher levels of dissatisfaction but a lower level of stress than permanent employees. Other positive aspects such as flexibility, and the opportunity to do different kinds of work, are also mentioned.

Self-employed workers are not a homogenous group so it is difficult to generalise conclusions about them [8, 9]. The results of a survey carried out by the European Foundation for the Improvement of Living and Working Conditions in the EU-15 in 1998 suggested that the self-employed were, in general, satisfied with their status. However, research shows that working conditions for the self-employed often differ quite radically from those in permanent jobs with full-time contracts, particularly in relation to longer working hours and the pace of work. In the case of self-employed people, their working conditions are often dependent on the direct demands of people who may not be employees of their company, such as customers, passengers, pupils and patients. The results of a survey carried out in acceding and candidate countries [10] indicate that self-employed people, particularly those working alone, are more exposed than employees to carrying heavy loads and to painful postures. They also reported the highest levels of health at risk due to their work (Figure 3).

This was confirmed in 2005 among workers of the EU-27: the self-employed still perceive that their health is at risk because of work more often than employees: 35.5% vs. 27.3%, with an average of 28.6% [11].

Figure 3: Reports of health at risk due to work, for employees and the self-employed



Source: EWCS, 2001 (Acceding and Candidate Countries)

CONCLUSION

The effect of employment status on occupational safety and health is complex. Most members of the EU-27 workforce are still employed as permanent, full-time workers, but the share of other types of employment is increasing. The increase in part-time working and self-employment, recognised as a stimulus for job creation, have many negative aspects in the context of occupational health and safety (less access to training, including health and safety training, and poorer career prospects). Gender and age differences are important (see also Topics 'Gender' and 'Age'). Changes in work processes and work organisation also result from the changing contractual relationships. Within companies, working relationships become more diverse and individualised. These processes lead to an increasing feeling of job insecurity among workers [12].

The positive occupational safety and health aspects of the latest labour market trends include greater flexibility, which helps to improve the work-life balance. However, workers' appreciation of this factor can vary depending on their individual needs and on the workplace. It should also be mentioned that some part-time workers or workers with temporary contracts are not satisfied with their employment status. The feeling of being an outsider or a second-class worker, reported in some studies [6], confirms that part-time or temporary work does not meet the needs and expectations of the whole working population and requires further investigation in the context of occupational safety and health.

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NANOTECHNOLOGIES

INTRODUCTION

Nanotechnology refers to technologies that involve the creation and manipulation of materials to develop materials and products of the nanometre size to exploit their new physico-chemical properties. In the past few years there has been a rapid growth in technologies involving nanomaterials. Governments and businesses worldwide have invested substantially in research and development of new materials and products on both national and international levels [1, 2, 3, 4, 5]. Inherently multi-disciplinary, nanotechnologies bring together the expertise of physicists, chemists, biologists, materials scientists, mechanical and electrical engineers as well as medical and cognitive researchers [6].

Due to the new properties of the new materials and products, nanotechnologies are widely seen as potentially beneficial in many diverse areas. While the potential benefits of nanomaterials have been welcomed, concerns have been expressed about their potential negative health and environmental effects, and not only in the field of occupational health and safety. Workers in nanotechnology-related industries potentially may be exposed to the novel properties of materials and products causing health effects that have not yet been fully explored [2, 3, 4, 7]. Due to these concerns nanotechnology is one of the priorities for occupational safety and health research in the EU-27 [8].

DEFINITION

The term 'nanotechnology' was first used by the Japanese researcher Norio Taniguchi in 1974 to refer to the ability to engineer materials precisely at the nanometre level [4]. However, there is still no international consensus on the definition [6].

Generally, though, nanotechnologies operate on materials of tiny dimensions [9]. The prefix 'nano' is derived from the Greek word for dwarf. One nanometre (nm) is equal to one-billionth of a metre. As an illustration, a human hair is 80,000 nm wide on average and a red blood cell is approximately 7,000 nm wide [2, 3, 4, 6, 10, 11].

Nanotechnologies encompass the design, characterisation, production and application of structures, devices and systems by utilising materials that have at least one dimension of less than 100 nm. So far the production includes the fabrication of:

- nanotextured surfaces (one dimension on the order of the 100 nm length scale);
- engineered nanotubes (two dimensions on the order of the 100 nm length scale); and
- spherical engineered nanoparticles (three dimensions on the order of the 100 nm length scale) [6].

There is a variety of techniques that may be used to manufacture nanostructures with various degrees of quality, speed and cost. They can be grouped in two categories – the 'bottom-up' and the 'top-down' techniques:

- bottom-up molecular manufacturing involves the building of structures atom-by-atom or molecule-by-molecule. Chemical synthesis, self-assembly and positional assembly can be used in this method.
- top-down techniques can be described as ultra-miniaturisation and result in smaller and smaller devices [4, 11, 12].

At this small size and due to an increased relative surface area and quantum effects, materials can behave very differently from the way they behave when they are in a larger form, and can demonstrate specific novel physical and chemical properties. They can, for example, change properties such as size, weight, volume, speed, strength,

hardness, durability, colour, efficiency, reactivity or electrical characteristics. This feature enables the development of new materials and devices with higher performance indicators and increased functionality [2, 3, 7, 11].

USE

In the widest sense, nanotechnologies have been used for decades in the field of semiconductors, and even longer in the field of chemicals. Many nanotechnologies are still in the pre-competitive stage. However, nanoscale materials are increasingly being used, or at least widely seen as having huge potential, in diverse areas to create new materials and devices with novel properties [2, 3, 4, 7].

Table 1: Some of the key applications of nanotechnologies [3, 4, 12, 13, 14].

Fields of application	
Information and Communication Technology	<ul style="list-style-type: none"> ■ nano-electronics ■ information storage ■ computer chips ■ CDs ■ mobile phones ■ displays ■ high-resolution screens
Biomedical Technology	<ul style="list-style-type: none"> ■ drug development ■ medical imaging ■ cancer treatment ■ sunscreens ■ prostheses ■ implants ■ personal health testing kits ■ cosmetic application
Environmental Technology	<ul style="list-style-type: none"> ■ water decontamination
Energy Technology (Production and Storage)	<ul style="list-style-type: none"> ■ solar cells ■ batteries ■ fuel cells ■ fuel additives ■ catalysts
Manufacturing Technology	<ul style="list-style-type: none"> ■ composites ■ clays ■ paints ■ chemical coatings ■ cutting tools
Transport, Aviation and Space Travel	<ul style="list-style-type: none"> ■ fuels
Technology	<ul style="list-style-type: none"> ■ catalysts ■ lighter and stronger materials ■ water purification
Agriculture and Nutrition	<ul style="list-style-type: none"> ■ seed improvement ■ sensors ■ freshness indicators ■ novel foods
Security and Military Technology	<ul style="list-style-type: none"> ■ sensors ■ military battle suits

HEALTH EFFECTS

As nanotechnology is a relatively new branch of industry, and new applications of this technology are still appearing, there are no official data on the numbers of workers employed in the field. However, considering the rapid growth of the industry, employment in nanotechnology will also grow to reach a predicted 10 million jobs worldwide in 2014. This will account for 11% of jobs in manufacturing. If the population and the occupational structure in the EU remained unchanged, that would mean almost six million workers [15].

While the (potential) applications and benefits of nanotechnologies are many, there is concern about the effects nanoparticles may have on human health, as well as their environmental impact.

Because of their small size, nanoparticles can enter the body in three ways, via:

- the digestive system (ingestion);
- the respiratory tract (inhalation);
- the skin (direct exposure).

Once in the body, nanoparticles can translocate to organs or tissues of the body. Such translocation is facilitated by the propensity of nanoparticles to enter cells, to cross cell membranes and to move along the nerves. Under certain conditions some nanoparticles can even cross the blood-brain barrier. The basis of toxicity of nanoparticles is not yet fully understood; however it appears that it is based on their ability to cause inflammatory reaction and remain undetected by the natural protective mechanisms of the body. They can also modify protein structure, changing their function or stimulating an auto-immunological reaction. They may also induce the development of cancers [2, 4, 5, 6, 10, 11, 15, 16].

Factors that can alter the risk of nanoparticles penetrating into the body include:

- the mass, surface area or number of particles (more material, a higher surface area or a higher number of particles can mean higher risk of human exposure);
- whether the material is dry powder or in solution (loose powders can easily be dispersed, increasing the risk of exposure, while those in solution are much more contained; however if splash occurs they can be absorbed through the exposed skin or respiratory tract, if respirable droplets are created in the process of pouring or stirring);
- the degree of containment (the degree of exposure);
- the duration of exposure (longer exposure will result in a larger personal dose) [4, 10].

Workers in nanotechnology-related industries have the potential to be exposed to nanomaterials with novel properties at levels exceeding ambient concentrations. To realistically assess the health and safety implications of working with nanomaterials, further research is needed. The current state of knowledge and available monitoring technology makes it very difficult to conduct a reliable risk assessment. Until a clearer picture emerges, the limited evidence available suggests that employers should take a precautionary approach when potential exposure to nanoparticles may occur [2, 5, 17].

Besides potential health effects, ethical concerns are being raised over nanotechnologies: a two-way process of public dialogue has to be initiated, and various aspects relating to research and development (e.g. the allocation of money, evaluation and monitoring procedures) have to be considered before the work proceeds much further. Last but not least, ethical issues such as human dignity (or integrity), autonomy, the obligation not to harm and to do good, as well as fairness and justice, have to be taken into account [6].

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OCCUPATIONAL DISEASES

INTRODUCTION

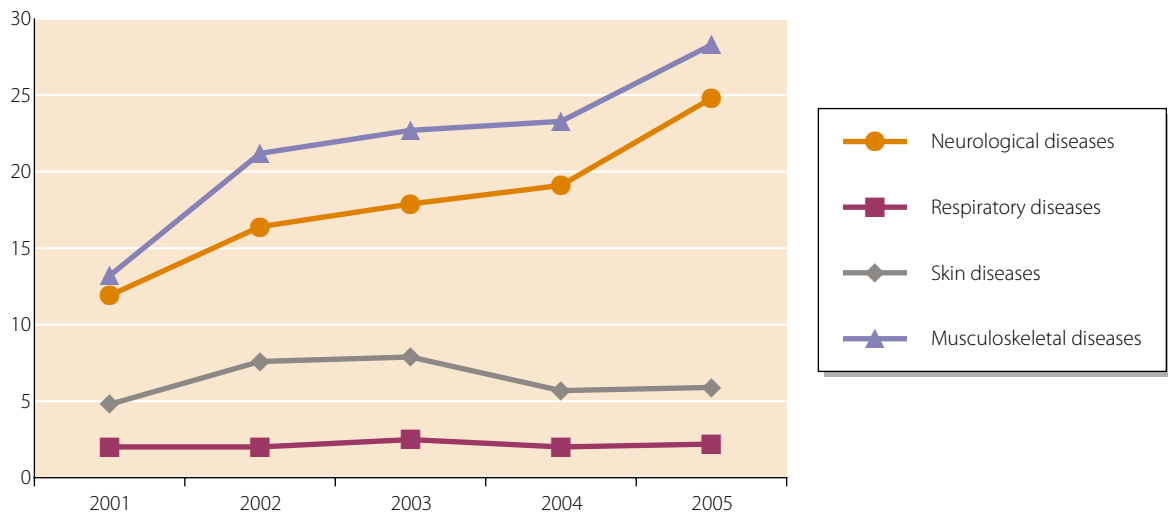
The concept of occupational disease is characterised by its relation to a national system of recognition and compensation. Typically, such recognition requires clear evidence that work is the cause of the disease, or contributed significantly to its development. As recognition and compensation schemes vary from one country to the next, collection of data on occupational diseases in the EU is a challenge [1]. The Labour Force Survey conducted in 1999 revealed that 5.4% of the workforce believe that they suffer from a health disorder caused or aggravated by their current or past employment [2].

Eurostat has collected data on occupational diseases first as a pilot project (1995 data) and later as continuing activity (2001–05) [3, 4]. The number of Member States providing data was 12 in 2001 and 11 in 2002–03. Since 2004, New Member States are gradually being included. Although collection was primarily restricted to those diseases that are recognised in all EU member states, the trends reported in the European Occupational Diseases Statistics (EODS) so far have been heavily influenced by the data collection process. Still, the statistics appear to give consistent results concerning risk occupations and economic activities.

MUSCULOSKELETAL PROBLEMS ARE THE MOST COMMON

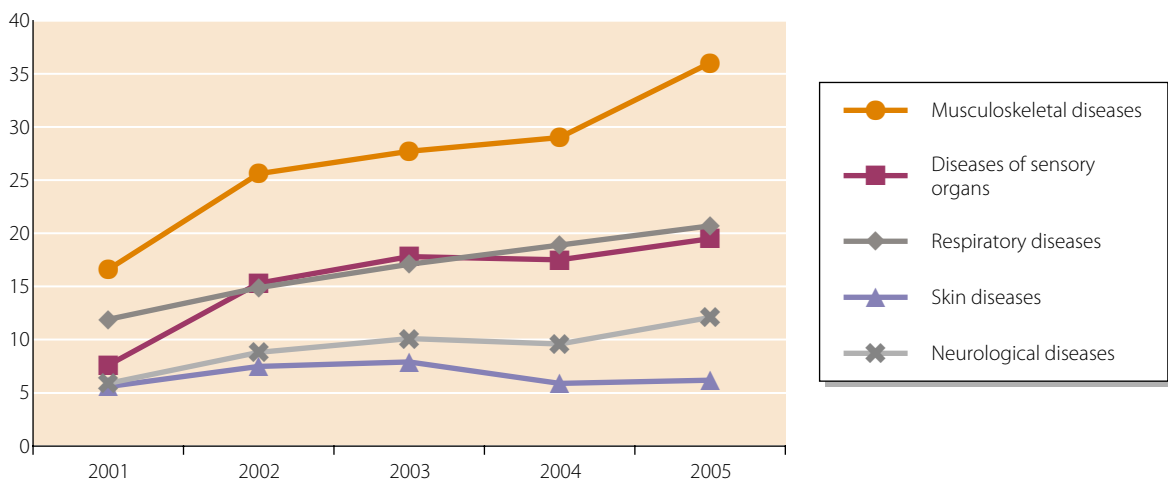
Only a limited number of diseases are recorded at the European level (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003H0670:EN:HTML>). A wider concept of work-related diseases can be used in estimating the magnitude of health problems attributed to work, see for example, occupational and environmental cancer <http://osha.europa.eu/data/links/occupational-and-environmental-cancer-prevention-conference-presentations/>. As noted, EODS data include a subset of occupational diseases recognised in the Member States. A total of 83,159 new cases were reported in 2005 [5]. Among these, musculoskeletal diseases have consistently formed the largest category among both men and women (figures 1 and 2; 31,658 in 2005). The other largest disease groups are roughly the same for both sexes with the exception of diseases of sensory organs, which rank third among men, just after respiratory disorders. This category consists almost exclusively of noise-induced hearing loss, which is reported separately in another section of the Outlook (Topic ‘Hearing impairment’). In 2005 data collection, the most commonly reported diseases were: hand or wrist tenosynovitis (inflammation in tendons), hearing loss, lateral epicondylitis (‘tennis elbow’), contact dermatitis (skin inflammation), carpal tunnel syndrome (nerve compression in the wrist), Raynaud’s syndrome (‘vibration white finger’), mesothelioma (cancer), and asthma. (For more information see Topic ‘Work-related musculoskeletal disorders’ (WMSDs))

Figure 1: Incidence rate of selected occupational diseases (per 100,000 employed) 2001–2005 by disease group, women



Source: EODS, Eurostat

Figure 2: Incidence rate of selected occupational diseases (per 100,000 employed) 2001–2005 by disease group, men



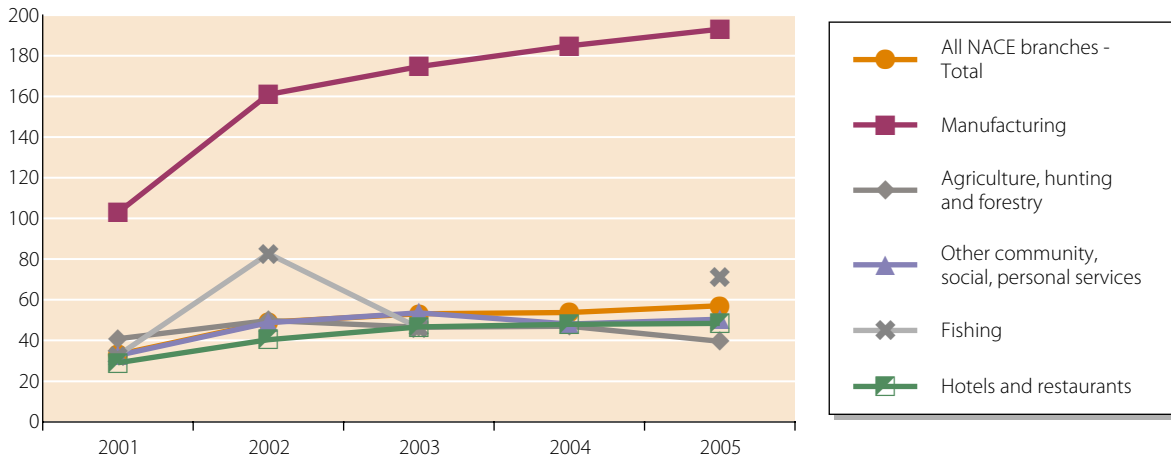
Source: EODS, Eurostat

Mining has the highest incidence of occupational diseases

When occupational diseases are examined by economic activity, mining and quarrying is associated with the highest incidence rate, almost without exception. Its rate may be as much as 20 times that of the next highest branch. This makes it impractical to show mining along with the other branches in graphical illustrations, since its inclusion obscures the differences between the others. The rapid reduction in the size of the mining sector also means that its incidence rates are somewhat inflated. (For more on trends on economic activities, see Topic 'Labour market changes: their impact on occupational safety and health')

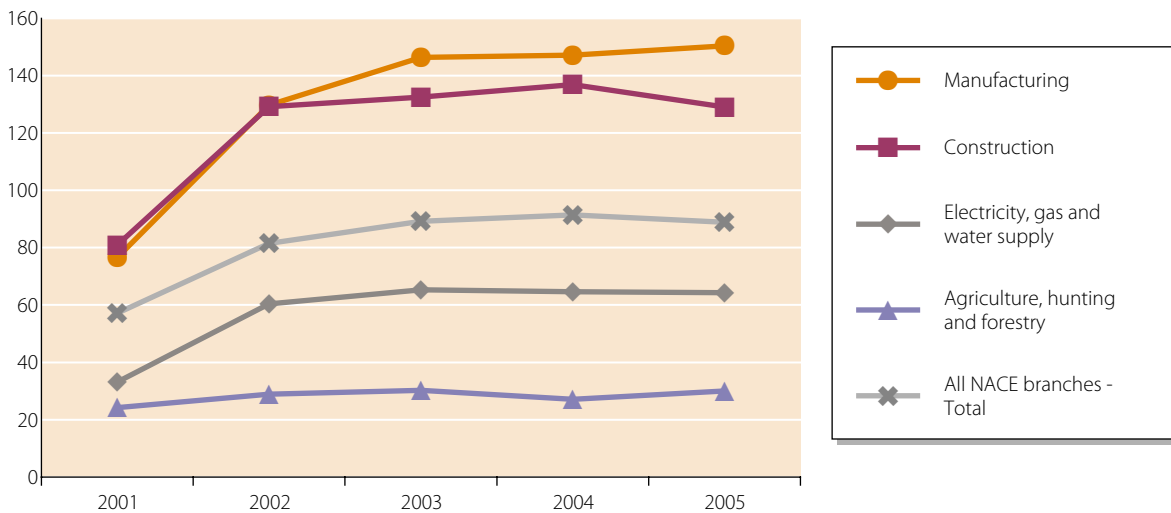
With that in mind, figures 3 and 4 show the other occupational branches that have higher than average incidence rates.

Figure 3: Incidence rate of occupational diseases (per 100,000 employed) in selected economic activities (NACE) 2001–2005, women



Source: EODS, Eurostat

Figure 4: Incidence rate of occupational diseases (per 100,000 employed) in selected economic activities (NACE) 2001–2005, men



Source: EODS, Eurostat

Employment in the manufacturing sector seems to be correlated with occupational diseases for both men and women at about the same rate. Otherwise, branches with the highest incidence rates are different for the sexes. As different diseases are to some degree associated with different sectors and activities, a more detailed analysis is presented below.

ANALYSIS OF SOME MAJOR DISEASES

Generally, the pattern of men's incidence rates follows that presented in Figure 3 (keeping the status of mining in mind). This also applies to one major musculoskeletal disease, lateral epicondylitis. The disease involves damage to extensors of wrist or fingers and it is largely due to repetitive work. Among both sexes, it is most common in mining and manufacturing (Table 1). The other above-average industry branches among women include a variety of tasks, including cleaning, food preparation, table waiting, and farm work. In 2005, there were 14,155 new cases registered.

Table 1: Incidence rate (cases/100,000 employed) of lateral epicondylitis by sex and economic activity (NACE) in 2005; only NACE branches with above-average incidence rate.

Women		Men	
Activity	Rate	Activity	Rate
Mining and quarrying	141	Mining and quarrying	187.1
Manufacturing	40,4	Manufacturing	28.4
Real estate, renting and business activities	9,4	Fishing	50.6
Agriculture, hunting and forestry	7,6	Construction	22.4
Hotels and restaurants	9,6		
All NACE branches – Total	11,1	All NACE branches – Total	14.1

Source: Eurostat (EODS)

Another disease caused primarily by repetitive work or exaggerated posture is carpal tunnel syndrome. This is categorised as a neurological disease, since it involves compression of the median nerve in the wrist. The risk activities are mostly the same as for lateral epicondylitis, and the differences between the two diseases may result from nature of the work tasks in specific activities. The number of new cases in 2005 was 17,395.

Table 2: Incidence rate (cases/100,000 employed) of carpal tunnel syndrome by sex and economic activity (NACE) in 2005; only NACE branches with above-average incidence rate.

Women		Men	
Activity	Rate	Activity	Rate
Mining and quarrying	186,5	Mining and quarrying	220.4
Manufacturing	69,1	Manufacturing	17.6
Real estate, renting and business activities	14,5	Electricity, gas and water supply	5.7
Hotels and restaurants	15,4	Construction	13.2
		Fishing	15.3
All NACE branches – Total	22,5	All NACE branches – Total	10.3

Source: Eurostat (EODS)

Contact dermatitis is a skin disease caused by contact with – among other things – metals, detergents, rubber and plants [6, 7]. This variety is reflected in the branches where women's employment is higher (Table 2). The one with the highest incidence, Other community, social, and personal service activities, includes laundries, drycleaners, and hairdressing and beauty salons. There were 5,778 new cases registered in 2005, among 5,873 cases of skin diseases.

Table 3: Incidence rate (cases/100,000 employed) of contact dermatitis by sex and economic activity (NACE) in 2005; only NACE branches with above-average incidence rate

Women		Men	
Activity	Rate	Activity	Rate
Other community, social, personal service activities	20.3	Mining and quarrying	26.1
Manufacturing	18.7	Manufacturing	17.3
Hotels and restaurants	10.6	Construction	14.4
Health and social work	9.7	Fishing	9.6
Agriculture, hunting and forestry	9.1		
All NACE branches – Total	8.4	All NACE branches – Total	8.3

Source: Eurostat (EODS)

Occupational asthma is most common in some of the same branches as contact dermatitis (Table 4), and some of the causes are also the same. In agriculture, the most common causes are animal dandruff, flours, and mould spores. Flour dust is also a major cause of asthma in food manufacturing [6, 7]. The number of new cases of asthma in 2005 was 1,471 – 12% of all respiratory diseases (11,928 cases).

Table 4: Incidence rate (cases/100,000 employed) of occupational asthma by sex and economic activity (NACE) in 2005; only NACE branches with above-average incidence rate

Women		Men	
Activity	Rate	Activity	Rate
Agriculture, hunting and forestry	4,3	Mining and quarrying	5.2
Manufacturing	3,6	Manufacturing	3.9
Other community, social, personal service activities	1,9	Agriculture, hunting and forestry	3.2
Health and social work	0,8	Extra-territorial organisations	14.2
All NACE branches – Total	1,1	All NACE branches – Total	1.5

Source: Eurostat (EODS)

COSTS OF OCCUPATIONAL DISEASES

Calculating the costs of occupational diseases in the EU is problematic. One way to do this would be to add up all forms of compensation paid by insurance companies. This, however, would be quite inaccurate, since some Member States pay these from the general health insurance and compensation schemes vary. A comprehensive assessment would include all costs of all work-related ill-health. This would require specification of all direct and indirect costs as well as determining what proportion of all health problems is related to work. Both approaches have been used, both inside and outside the EU [8, 9, 10, 11]. To illustrate the difference between the approaches, one study found that recognised occupational diseases cost Germany EUR1.2 billion in 2000 [9]. Another study cited a cost of at least EUR28 billion in Germany as a result of work-related ill-health in 1998 [8]. A simplistic extrapolation of the latter number, using employment figures for the EU-25 from 2000, would put the cost of work-related ill-health at a minimum of EUR145 billion. This extrapolation is based on several unfounded assumptions, but it gives some idea of the range of the cost of occupational diseases in the EU as a whole.

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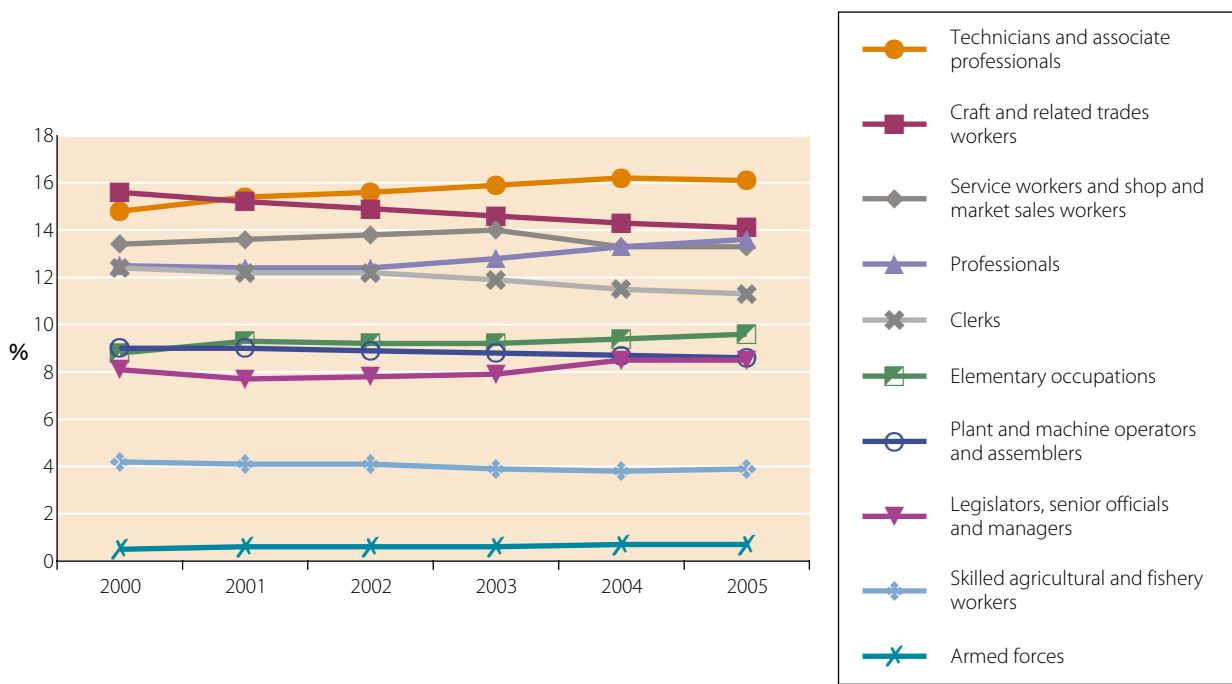
OCCUPATIONAL STRUCTURE

INTRODUCTION

The occupational classification used in the EU combines two aspects: tasks performed during the work and skill level required to perform those tasks [1, 2]. As a result, the classification is partly hierarchical and at the general level describes the social make-up of the community. The general categories do, however, consist of a variety of occupations, and these may have experienced different trends within any given time period.

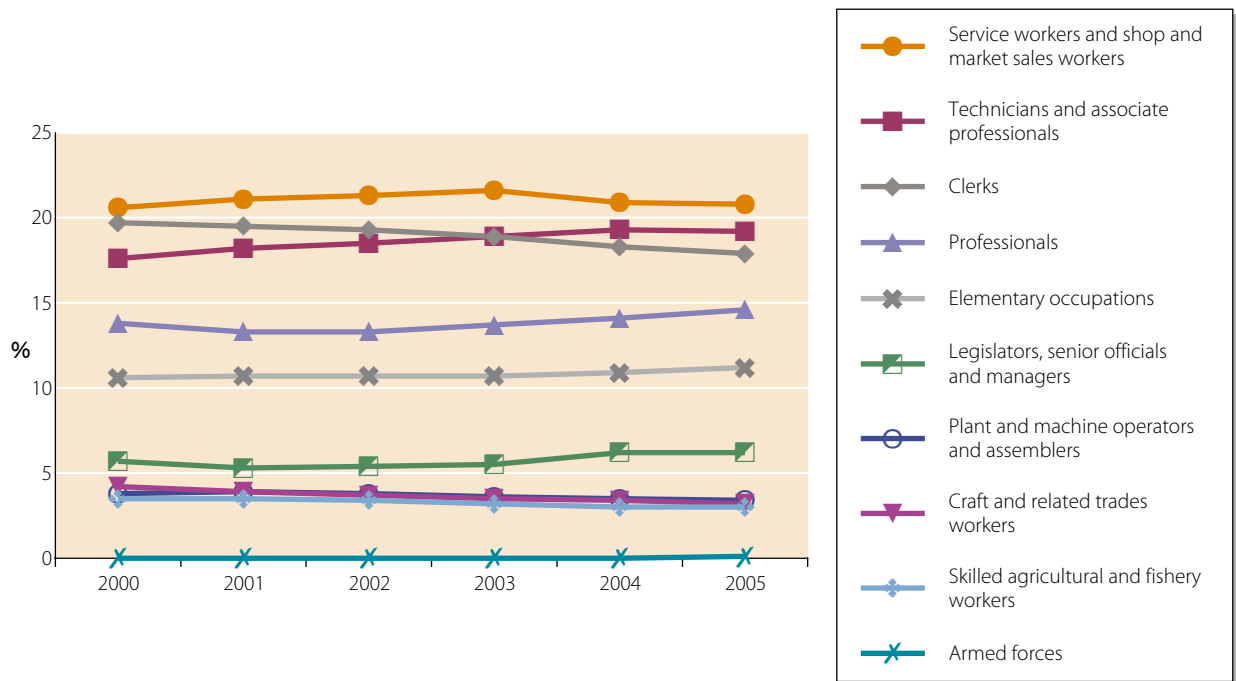
Changes in overall occupational structure are typically not rapid. Figures 1–3 illustrate these changes for the EU-25 in 2000–2005 [3]. Although the changes are small and the distributions of occupations are different for men and women, some similarities in trends are evident. First, certain ‘traditional’ large occupational groups have become – in relative terms – smaller. These include clerks among women and craft and related trade workers among men. Second, the categories Professionals and Technicians and associate professionals have been growing. Third, the proportion of workers in Elementary occupations has also increased. These trends are clearer for EU-15 with data covering a longer time span – since 1997.

Figure 1: Proportions of occupational categories in EU-25, 2000–2005



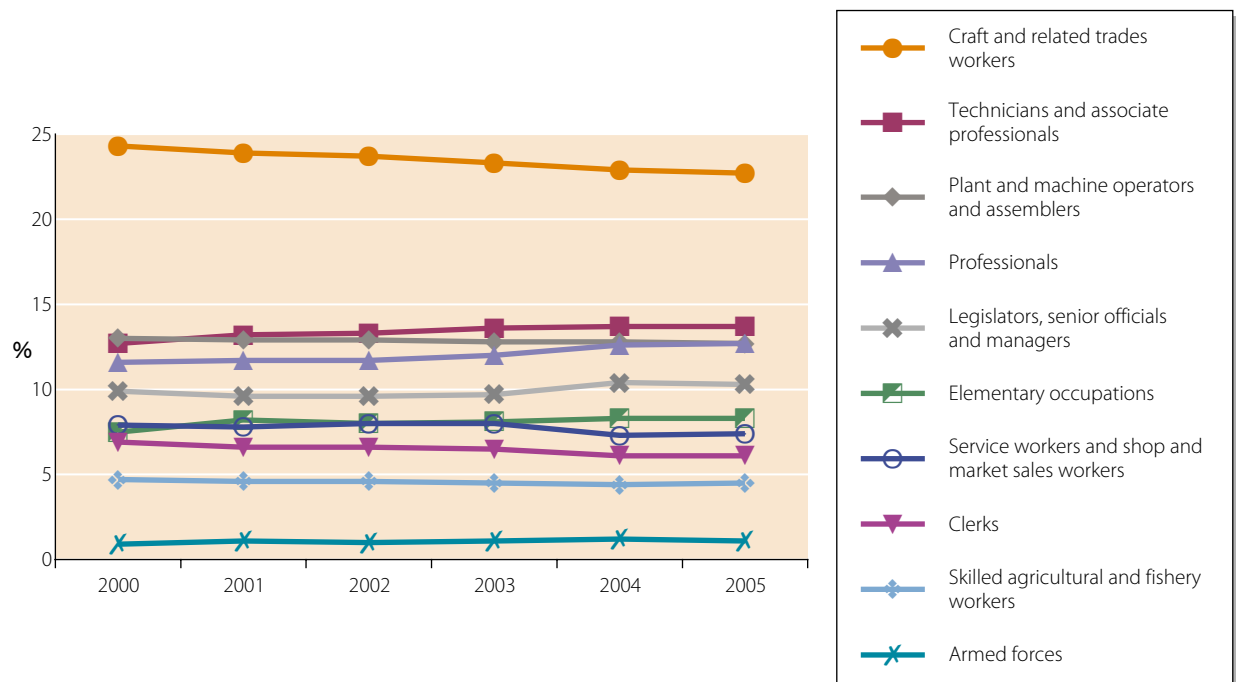
Source: LFS, Eurostat, 2000-2005

Figure 2: Proportions of occupational categories in EU-25 2000-2005, women



Source: LFS, Eurostat

Figure 3: Proportions of occupational categories in EU-25 2000-2005, men



Source: LFS, Eurostat

The first two trends are compatible with a ‘post-industrial’ or ‘knowledge’ society. It is questionable whether the third trend fits that perspective, since ‘elementary occupations’ require low-level skills and are highly labour intensive. This, however, may also be the case, since the increasing group of professionals may require an increasing amount of personal services [4].

GENERATIONAL EFFECTS

Even well-educated young people do not typically start their careers in top positions. Therefore, a comparison has been made between two occupational groups that have grown and may serve as entry positions to the workforce. Results are broken down by sex and age and they are shown in Figure 4. Large structural changes may happen through generational replacement rather than occupational mobility. The results shown in Figure 4 seem to support that proposition. With one exception, age categories line up as expected in 2004: the ratio is higher for younger categories. In general, the trends among women are increasing, indicating that women are making continuing progress toward occupations at higher skill levels. Trends among men, however, remain flat. This indicates that while some traditional men’s occupations in the middle have declined, the male workforce has become increasingly split between the top and bottom categories [4].

Figure 4: Ratio of technicians and associate professionals to elementary occupations in EU-25 2000-2004 (2nd quarter), by sex and age



Source: LFS, Eurostat

The one exception from a clear age pattern in Figure 4, men between 25 and 29, raises some concern, because it suggests that young men may not be keeping up with economic development. A similar analysis of higher professional positions confirms that this is not caused by these young men moving quickly into these positions, either (Figure 5). In contrast, young women have been increasingly moving to the higher positions. In fact, the age effects are almost complete opposites for men and women. If there were no generational shift, a reverse age effect would be expected, because it typically takes time to advance to a higher position. This is basically the case for men in Figure 4. The women’s pattern indicates a clear generational replacement process and reflects their previous difficulties in advancing to higher professional positions. Those would appear to be more open to women now, but this benefit is restricted to younger women.

Figure 5: Ratio of professionals to elementary occupations in EU-25 2000-2004 (2nd quarter), by sex and age



Source: LFS, Eurostat

CONCLUSIONS

Occupational safety and health problems

Technicians and associate professionals is a diverse collection of occupations. Some large groups included in this category are accountants, nurses, sales representatives, and technicians in various fields of engineering. Hence, possible work-related safety and health problems and adverse working conditions facing these workers are equally diverse. A European survey reveals that working conditions among this group are generally favourable [5]. There are some factors, however, that may adversely affect employees from these groups: (1) Their work pace is quite often induced by direct customer demand, (2) their working hours are quite often irregular, and (3) they report stress often [5, 6]. (See also Topics 'Work-related Stress', 'Labour market changes: Their impact on occupational safety and health' and 'Employment structure by activity'). One should also note that although one suspected risk factor of musculoskeletal disorders, computer work, is quite common in this category [5, 7], this is not really noticeable in occupational disease statistics [8] (see also Topics 'Occupational diseases' and 'Work-related musculoskeletal disorders (WMSDs)').

Elementary occupations is a somewhat smaller collection of occupations of low socio-economic status. Some large groups included here are farm labourers, cleaners, building caretakers, and freight handlers. In contrast to associate professionals, workers in these occupations face a variety of adverse working conditions [5]. Among those are repetitive hand/arm movements, monotonous tasks, and mismatch between worker skills and job demands. The poor working conditions are also evident in occupational disease statistics: workers in elementary occupations have relatively high rates of incidence of carpal tunnel syndrome, hand or wrist tenosynovitis, and dermatitis [8].

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PANDEMICS

INTRODUCTION

Infectious diseases are a threat to public health in countries the world over, regardless of their level of social and economic development. Social, technological and environmental factors encourage the emergence of new diseases and the return of old diseases. One of the consequences of the intensification and acceleration of international exchange is that, when a new disease appears in China, as in the case of severe acute respiratory syndrome (SARS), it is soon on our doorstep in Europe. In an era of globalisation, epidemics are international sanitary emergencies, and the threat of pandemics is a major concern for public health.

In that context, any new infectious disease emerging (or re-emerging) anywhere in the world should be examined systematically with regard to pandemic threat in terms of occupational risks, occupational health and, from a wider perspective, its consequences for businesses.

DEFINITION OF “PANDEMIC”

There is no single universal definition of the term “pandemic”. Etymologically it comes from the Greek words “pan” (all) and “demos” (people). An internet search reveals numerous informal definitions of the term (source: Google) which can be summarised as follows:

- an epidemic (an outbreak) of an infectious disease, and
- an agent infecting a large number of people, and
- an agent occurring over a very wide area (throughout an extensive region, country or continent, or even throughout the world).

The term “global epidemic” is often used as a synonym for pandemic.

While there is no reference in these definitions to the severity of the disease, it can be assumed that a high level of severity is implicit. The term pandemic is applied to outbreaks of infectious diseases spreading very quickly in a large population over a wide area and to situations of high prevalence of endemic infectious diseases as well. So the term covers a number of various epidemic situations that need different public health approaches as well as different occupational health risk assessments, on the basis of public health data.

Examples are often given to help explain the definition of a pandemic: bubonic plague (the “black death”) in the Middle Ages, the influenza strain (the “Spanish flu”) that killed millions of people across the world in 1917–1920, AIDS and viral hepatitis B and C, malaria, dengue fever, and more recently SARS, avian flu, and above all the threat of a severe flu pandemic due to the forecast appearance of a new highly pathogenic strain of human influenza virus. Some of these examples, representing various types of pandemics, will be developed in this paper to illustrate occupational health general approaches. These examples are preceded by a brief summary of the public health approach.

Diseases such as smallpox or anthrax caused by the use of biological agents for terrorist purposes or as biological weapons are not taken into consideration in this paper.

PUBLIC HEALTH APPROACH

Information sources at national and international levels are improving on account of better organisation and networking. The World Health Assembly approved new International Health Regulations in May 2005 [1, 2]. The

former regulations, first agreed upon in 1969, have been recognised as inadequate in meeting the challenge of globalisation and have contributed little to survey and control of newly emerging infectious diseases such as SARS and avian influenza. The new regulations are based on the experience and lessons of the past 30 years and reflect internationally accepted good practices. They aim for a more efficiently coordinated international response to the spread of infectious diseases. They are particularly focused on developing the ability to detect the emergence of new diseases or new variants of diseases.

Prior to these new regulations, the World Health Organisation (WHO) alert, survey and control system for SARS was an interesting example: it was based on collecting information not only from government sources but also from a network of collaborating centres, non-governmental organisations, specialised laboratories and epidemiologists.

So, in implementing new regulations, public health authorities everywhere in the world should improve their specific capacity to identify, assess, notify and control public health events of national or international concern. Information, data, recommendations and guidelines published by the WHO are available on the WHO website [3]. Concerning Europe, specific data and information are available on the WHO European Region website [4].

At the European Union level, activities such as review of national preparedness plans against the highly pathogenic flu pandemic and provision of practical guidance are coordinated by the European Centre for Disease Prevention and Control (ECDC) [5]. Data concerning the most worrying infectious diseases and emerging diseases are collected by several specialised national and international networks and are available on the Eurosurveillance website [6]. National data and guidance are also provided at European country level.

Another important source of information is the website of the US Centers for Disease Control (CDC) [7].

Collecting and analysing public health data, analysing public health guidelines and plans for managing occupational health risks, and reviewing companies' preparedness for a pandemic are the first steps of occupational risk assessment.

OCCUPATIONAL HEALTH RISK ASSESSMENT AND PREVENTION

Risk assessment basis for all workplaces: the transmission chain

Any infectious disease emerging anywhere in the world should be examined systematically with regard to occupational risks, in particular when there is the threat of a pandemic. Information and data collected through public health sources should be analysed (avoiding, or at least verifying, media information). If necessary, complementary information is searched for and specific workplace surveys organised.

Examining the epidemiological (or transmission) chain is an interesting tool for initial biological risk assessment, especially for infectious risk [8, 9], whatever the workplace. It also helps companies to implement preventive measures as well as to ensure compliance with the Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work [10].

The first step is to identify the reservoir(s) of the infectious agent, then the way(s) it can get out of the reservoir(s), by which route(s) it can be transmitted, and finally what is (are) the entrance(s) into the host, i.e. in this particular case the worker at the workplace. The same approach can be used to determine preventive measures: preferably acting directly on the reservoir to reduce the risk at the source, but failing that to break the transmission chain at the earliest possible stage.

This approach enables answers to be found for the main questions concerning occupational risk: Where? Who? When? How? These facts enable one to identify necessary preventive measures, anticipate and organise their implementation, and provide up-to-date relevant information. This should be adapted according to the evolution of the threat. In the case of a highly pathogenic infectious disease, if knowledge of the transmission route(s) is insufficient the precautionary principle should be applied.

Regarding a pandemic risk, two categories of workers are of particular concern: healthcare workers (HCWs) and workers travelling to high risk areas. Another category of concern is workers in contact with animals, in cases where the pandemic affects, or originates from, animals.

Following this approach, the ECDC has conducted a risk assessment for avian influenza viruses (excluding H5N1) in relation to human health, and developed guidelines for both occupational and public health exposures.

Healthcare workers (HCWs)

As soon as the transmission of a new disease from human to human is documented, or even suspected, the protection of HCWs is a priority from the occupational health as well as the public health perspective. When responding to the needs of contagious patients, HCWs are exposed to a high risk during virulent epidemics of infectious diseases. For example, during the SARS outbreak, according to different sources, HCWs accounted for 21% to 57% of total cases reported, and deaths have also been reported [11]. Many other infectious diseases may affect HCWs, and some of them, such as HIV infection, hepatitis and multidrug-resistant tuberculosis, have killed HCWs. There are ethical discussions about HCWs' duty of care during epidemics of virulent infectious diseases. It is suggested that healthcare employers have a reciprocal ethical duty of informing, protecting and supporting healthcare staff [12], as well as a legal obligation [10] to do so.

On the other hand, protection of HCWs is of public health concern: the integrity of the healthcare system has to be preserved in order to be able to cope with epidemics in the population. Another aspect is that infected HCWs could contribute to the spread of the epidemic disease inside and outside hospital settings.

Thus, the healthcare sector has to be prepared to tackle any emerging infectious disease and to protect its own workers. This would include putting in place occupational infectious diseases risk assessment and risk management programmes. This protection of HCWs should be integrated into the fight against nosocomial (hospital-acquired) infections.

A number of guidelines have been published, listing numerous prevention measures. It is essential that workers receive training and information as soon as they are assigned to a work station (a good understanding is necessary to obtain compliance with new behaviour). This training and information provision should be done at all hierarchical levels, and be renewed on a regular basis. Infectious risk prevention measures should be generalised. In a pandemic threat context, it is necessary to insist on including adequate respiratory protection among these prevention measures [13, 14]. There is often some confusion between surgical masks and respiratory protective devices. Medical or surgical masks, worn by HCWs, protect the patient and protect the HCWs against droplets (if the masks are impermeable). But disposable filtering respiratory protective devices for particles (FFP1, FFP2, FFP3) protect against airborne infectious agents as well as droplets [13].

Workers travelling to high risk areas

Another priority is the education and protection of workers travelling (missions abroad in an area affected by an emerging infectious disease, airline staff, etc.). Here also there are two objectives: protecting the worker and preventing the spread of the disease into a non-affected area by a contaminated traveller. For example, for travellers

to regions affected by avian influenza outbreaks, prevention relies essentially on providing workers with information (places to avoid, food hygiene, hand washing, etc.) and on sanitary precautions in case of suspected exposure. Guidance has been published and is available from several websites [3, 6, 7].

Workers in contact with animals

In the case of a zoonotic pandemic, workers in contact with animals should be informed about risks and protection should be organised for them as soon as the transmission from animal to humans is documented or even suspected. Livestock breeders, transport workers, abattoir workers, holding yards workers and veterinarians are among the main categories of workers concerned. Preventive measures should be planned to reduce the likelihood of zoonotic disease leading to livestock depopulation.

EXAMPLES OF DIFFERENT TYPES OF PANDEMICS

HIV and other bloodborne pathogens

In the 1980s the emergence of acquired immunodeficiency syndrome (AIDS) aroused many fears at the workplace, most of which were not rational and sometimes led to the exclusion of affected people. Analyses of epidemiological data have shown that there was no risk of transmission in most workplaces. These analyses have enabled the focus to be placed on the occupational risk of transmission, essentially in the healthcare sector after accidental exposure to contaminated blood. With the identification of the virus (HIV) and the availability of biological diagnostic tests, it was possible to come up with a better assessment of risk and prevention measures. Exposure circumstances are the same as for hepatitis B and hepatitis C viruses. Regarding the chronic carriage of these viruses in the population, the prevention strategy is essentially based on the concept of universal precautions (same precautions for every patient, in every healthcare setting) and the use of safety devices.

HIV infection is a typical example of an endemic infectious disease, highly prevalent worldwide, transmissible but not epidemic at the workplace, with a low transmission rate after accidental occupational exposure.

Malaria and other diseases transmitted by mosquitoes

Malaria and other diseases transmitted by mosquitoes, such as dengue, also fit the definition of pandemic. They remain limited to geographic areas where the mosquito vector is widespread. As far as European workers are concerned, only those travelling are at risk. These diseases need a vector to be transmitted. Their spread is limited by the vector's ecology. However, dengue-affected areas are expanding, and climatic change could allow the vector to colonise new areas, even in Europe, in the future.

Severe acute respiratory syndrome (SARS)

The outbreak of this newly emerged infectious atypical lung disease in South East Asia in 2002-2003 is a good example of a pandemic spreading very quickly and proving very difficult to control. The etiologic agent has been identified as a coronavirus, different from human and animal coronaviruses already known. Analysis of numerous cases in different parts of the world has shown that transmission is essentially through droplets containing the virus, and likely to occur after close contact with ill people. The virus can also be spread after contact with a contaminated surface or fomite (inanimate object which is likely to transport infectious organisms); airborne spread is also possible. According to the WHO, more than 8,000 cases occurred during the outbreak and nearly 10% of those infected died. Faced with clusters of a new acute respiratory disease, the WHO issued an alert quite early. Wide dissemination of information to the public concerned, implementation of control measures with isolation of patients and suspected

cases, protection of HCWs as well as sanitary precautions for people travelling, all contributed to limiting the spread of the disease and stopped the outbreak relatively quickly.

Avian flu, seasonal flu and pandemic flu

The agent causing avian influenza, commonly called avian flu or bird flu, has numerous sub-types defined by combination of proteins (HxNy). The actual pandemic in avian fauna is due to a H5N1 virus highly pathogenic for birds, with a low rate of transmission from birds to humans and in fact no documented transmission from human to human according to WHO's data. In terms of occupational health, those at risk are workers in contact with avian fauna, including poultry: breeders, farmers, veterinarians, transport and abattoir workers, but also those involved in culling activities and laboratory workers. Prevention programmes should be set up to protect such workers. Providing relevant information is a first step in such programmes.

The threat of a human pandemic will come about in the event of mutation of the virus or the emergence of a reassortant virus (a new flu virus produced in cells co-infected with different strains), highly pathogenic and easily transmissible from human to human, as in the case of the Spanish flu pandemic in the last century. This type of flu pandemic is distinct from seasonal flu.

WHO has published a global influenza preparedness plan to prevent and limit the spread of the disease if it appears [15]. It draws up recommendations for national measures before and during pandemics. At European level and at national level, preparedness plans have been published and are available on relevant websites. All these plans are periodically reviewed if necessary.

On the basis of veterinary and public health data, a preparedness plan for workplaces should be set up including occupational risk assessment and anticipated prevention measures (such as availability of adequate respiratory protective devices) as well as the preparedness of businesses to maintain vital economic activity. Relevant information should be provided and updated as necessary.

CONCLUSIONS

To combat emerging infectious diseases and the threat of pandemic, anticipation and preparedness are necessary in the occupational health as well as the public health context.

Analysing public health data using the transmission chain approach should facilitate the setting up of prevention programmes in accordance with public health plans, and contribute to reducing occupational risks at the workplace.

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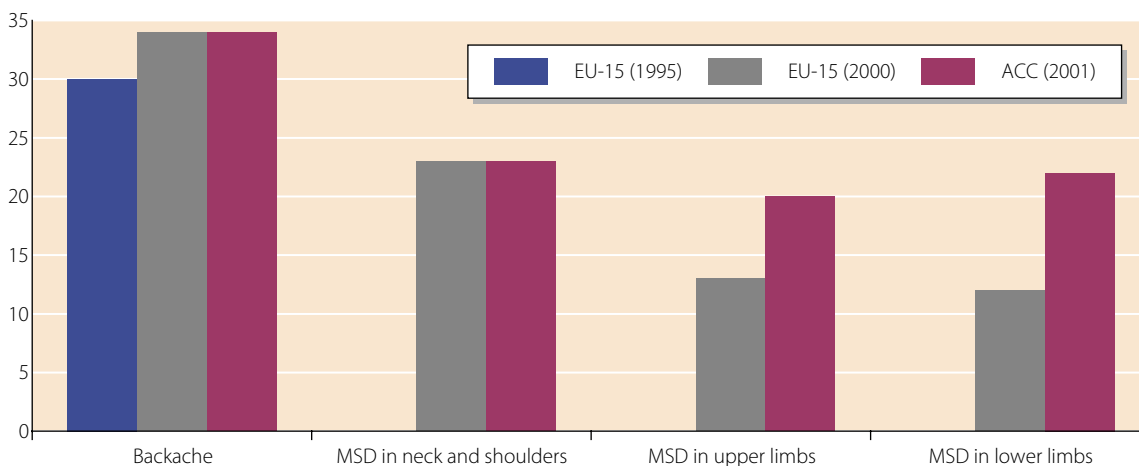
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PSYCHOLOGICAL AND ORGANISATIONAL FACTORS LEADING TO WORK-RELATED MUSCULOSKELETAL DISORDERS (WMSDs)

INTRODUCTION

Work-related musculoskeletal disorders (WMSDs) include back, shoulder and neck pain as well as upper and lower limb disorders and are caused or reinforced by physically and psychologically stressful work environments [1]. In 2000, one-third of workers in the EU-15 as well in the ACCs (accessing and candidate countries) were of the opinion that their work negatively affected their health by causing back pain, and almost one-fourth of both groups shared this opinion concerning neck and shoulder pain. In addition in 2000, more than 10% of EU-15 workers suffered from WMSDs in upper and/or lower limbs. However, regarding the workers of the ACCs, percentages of these last two categories were almost twice as high than the percentages of the EU-15 workers in 2000 (see also Figure 1) [2, 3]. The initial results of the Fourth European Working Conditions Survey indicate some improvement: 24.7% of the EU-27 population complain of backache, while 22.8% report muscular pains [4].

Figure 1: Percentages of workers who reported on different kinds of MSDs in the EU-15 in 1995



(N = approx. 15,800, statistics only available for backaches) and in 2000 (N = approx. 21,700) as well as in the ACCs in 2001 (N = approx. 12,000) [2]

Backache remains the most prevalent complaint [2, 5]

Since WMSDs lead to sick leave, they have a negative impact on productivity. About 0.8% of European workers suffer from working conditions that give rise to 14 days or more of absence from work due to WMSDs during the average year. Between 2001 and 2003, the incidence rate of WMSDs rose from 11 to 21 cases per 100,000 workers among women and from 14 to 26 among men [6]. Although precise figures do not exist, estimates from European countries of the economic costs of all work-related ill-health range from 2.6% to 3.8% of Gross National Product [7].

In order to reduce the occurrence of MSDs preventive activities have been undertaken, such as the improvement of physical/ergonomic conditions at work. However, as such activities have not substantially reduced the number of workers suffering from MSDs [8], it has become obvious that MSDs have to be explained in a multifactorial way. It is now acknowledged that besides physical/ergonomic factors, psychological/organisational factors play a role in the development of work-related MSDs [9]. Thus, workers who receive high exposure to the combination of both kinds of factors are more likely to report MSDs than workers highly exposed to one or the other type of risk. Whereas

physical/ergonomic variables play a more important role with regard to the development of upper extremity disorders, psychological/organisational factors are the major contributors to back and lower extremity pain [10]. Psychological/organisational factors lead to MSDs in the neck rather than in the shoulder region [11]. While occupational physical/ergonomic and psychological/organisational factors are associated with the occurrence of negative health effects such as MSDs, individual factors predominantly determine whether the persons affected will go on sick leave [12].

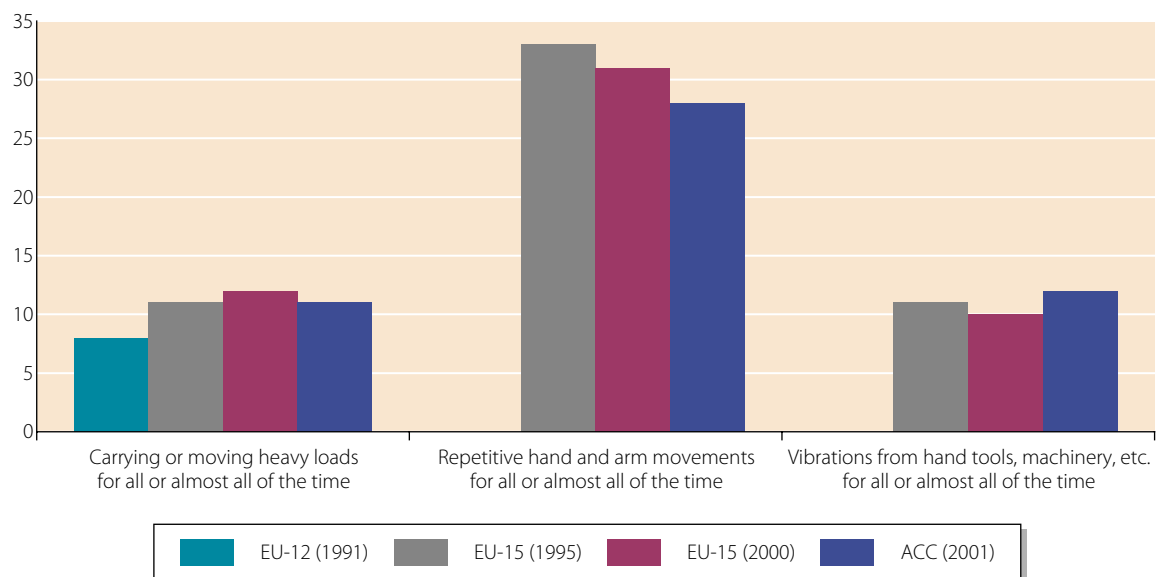
PHYSICAL AND ERGONOMIC FACTORS LEADING TO MSDs

Adverse physical/ergonomic working conditions contribute to MSDs [13]: Heavy physical work, lifting and carrying, static muscular strains, short, monotonous and repetitive work, awkward postures, exposure to vibrations and lack of activity are regarded as classical physical/ergonomic factors leading to the development of work-related MSDs [14].

In 2000, 31% of the workers in the EU-15 and 28% in the ACCs had to perform repetitive hand or arm movements for all or almost all of their work time. Moreover, about one in 10 workers in the EU-15 and in the ACCs carries or moves heavy loads and/or is exposed to vibrations from hand tools, machinery, etc. for all or almost all of their work time (see also Figure 2) [2, 3]. In 2005, 62.3% of the EU-27 workforce was exposed to risks resulting from repetitive hand or arm movements, and 35% reported carrying or moving heavy loads [4].

While between 1991 and 2005 workers' activities involved a steadily increasing amount of carrying or moving heavy loads, between 1995 and 2000 workers' exposure to repetitive hand and arm movements, and vibrations from hand tools, machinery, etc. decreased slightly (see also Figure 2) [2, 5, 15].

Figure 2: Percentages of workers who reported on different kinds of physical / ergonomic factors, EU-12 1991, EU-15 1995 and 2000, ACCs 2001



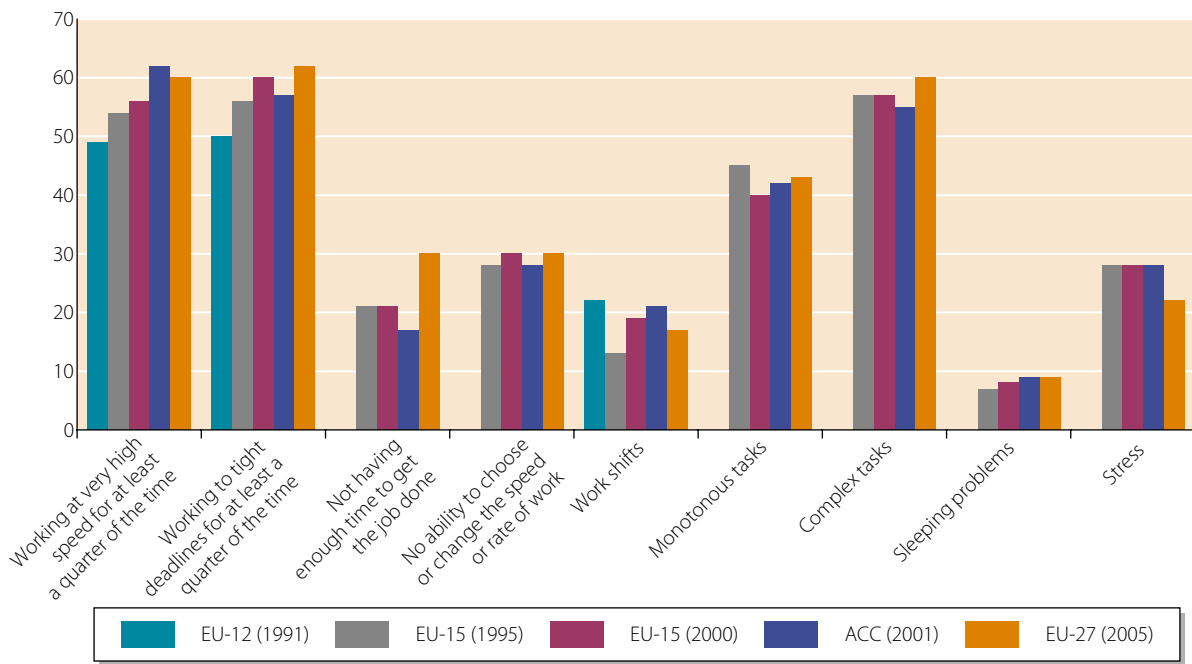
Source: European Foundation [2, 5, 15]

PSYCHOLOGICAL/ORGANISATIONAL FACTORS LEADING TO WMSDs

Several negative psychological/organisational factors cause stress. Stress often leads to the prolonged activation of small, low-threshold motor units in the shoulder and neck regions that often causes pain in these body regions [16].

Stress itself, like MSDs, is one of the most important work-related diseases in Europe. More than one worker in five (22.3%) in the EU-27 was of the opinion that work negatively affected his/her health by causing stress. More than half of the workers had to work to tight deadlines, on complex tasks and/or work at very high speed. Moreover, between 40% and 45% of workers suffered from monotonous tasks and/or about 30% were not able to change or choose the speed of their work. Approximately 20–30% of the workers did not have enough time to get their job done. 17% of employees work in shifts, and almost 10% of them reported having work-related sleeping problems. While most of these psychological/organisational factors did not differ significantly between the EU-15 and the ACCs, the workers in the ACCs had to work at very high speed more often than the workers in the EU-15. Nevertheless, the EU-15 workers had to work to tight deadlines and did not have enough time to get their jobs done more often than workers from the New Member States (NMSs) [2, 3, 4, 5, 15].

Figure 3: Percentages of workers who reported on different kinds of psychological/organisational factors EU-12 1991 (statistics only available for working at very high speed, working to tight deadlines and work shifts)



Source: European Foundation [2, 3, 4, 5, 15]

Regarding the psychological/organisational factors leading to MSDs, no general trend can be observed from the statistics.

It is interesting to note that while the proportion of workers not having enough time to get their job done has increased, the percentage of those reporting stress has decreased, even though more workers report also working on complex tasks and working to tight deadlines. While the proportion of shift workers has decreased, there has been no change in the rate of workers reporting sleeping problems.

The following psychological/organisational factors causing stress lead to MSDs:

High psychological job strain

High psychological job strain results from high job demands and a low job decision latitude [17]. The exposure to high job demands at work [18] such as high time pressure [19], high mental workload or the exposure to high assigned responsibility and concentration [20] is often associated with MSDs, in particular backaches [9] and low-back pain [21], as well as MSDs in neck and shoulders with possible pressure tenderness [22]. In addition, high job demands in combination with job insecurity can be seen as psychological/organisational factors leading to MSDs in shoulders [12]. Low decision latitude [23] or low job control [9] as well as lack of clarity regarding work tasks and quick change of work conditions [20] are associated with MSDs, such as backaches and neck and shoulder pain [9] as well as with MSD in upper limbs, in particular to hand-wrist afflictions [23].

Total commitment to the job

Total commitment to the job among employees can be seen as a risk factor contributing to the development of neck pain [18] and also, but less often, to shoulder pain [24].

Lack of gratification

The lack of financial and material gratification as well as the lack of acknowledgement of work are often associated with work-related backaches [24], neck pain and shoulder pain [18]. Low social status, little occupational prestige, few career opportunities as well as inadequate recompense, indicate the lack of gratification at work and lead to MSDs [20] and in particular to backaches [25].

Poor interpersonal relationships

Poor interpersonal relationships with colleagues and supervisors are often related to MSDs, in particular to low back pain [21]. In this context conflict, violence and harassment might also be contributing factors to MSDs [9]. In addition, poor social support from colleagues and supervisors is often associated with pains in neck and shoulders [9], upper limbs and in particular in hands and arms [26]. The lack of feedback from colleagues [20] and the lack of solidarity between different employees [19] also support the development of MSDs. Moreover, a company ignoring the demands of employees further contributes to the development of work-related backaches [8].

High competition

High competition among employees is often associated with work-related neck pain [12].

Monotonous work

Monotonous work is related to MSDs, in particular to back, neck and shoulder pain [9]. In combination with high job demands, time pressure, high diversity of work tasks, little self-determination, lack of clarity concerning the work tasks as well as low job security, monotonous work may also lead to MSDs in the neck region [27].

Low job security

Low job security is experienced in many workplaces. This is associated with MSDs, such as backaches [25] and MSDs in neck and shoulders [27, 28]. Fear of unemployment affects the health of highly educated employees more than less educated ones [29].

Low job satisfaction

Backache is often reported by employees with low job satisfaction [21]. For example, low satisfaction with the work hierarchy as well as with bureaucracy at work can be regarded as psychological/organisational risks contributing to the development of WMSDs [20].

WORKERS MOST AT RISK FOR WMSDs

The prevalence of MSDs is highest in sectors such as Health and social work, Construction, Transport and communications and Agriculture. Approximately every second worker in the Agriculture, forestry, hunting and fishing sector, as well as the Construction sector, considers that their health is negatively affected by backache. In addition, more than one-third of workers in sectors such as Health and social work, Transport and communications, Manufacturing and mining, Hotels and restaurants as well as in the Electricity, gas and water supply sector suffer from work-related backache. Muscular pain in shoulders and neck can be found in one-third of workers in the Construction industry, as well as in the Agriculture and fishing sector. Workers in these two sectors are also affected by muscular pains in upper and lower limbs, but to a comparatively lower degree [30].

Regarding work-related stress, about one-third of workers consider their health to be at risk of stress in sectors such as Health and social work, Education, Transport and communications as well as in sectors related to Real estate activities [30].

As many employees work in sectors such as manufacturing and mining (21%), Health and social work (10%), Construction (8%), Real estate activities (8%), Education (7%) as well as Agriculture and fishing (5%), a substantial part of the workforce has to suffer from negative health effects in these sectors. Moreover, while the sectoral distribution of the European workforce remained almost identical from 1995 to 2000, the data regarding the economic activity of the European workforce show an ongoing shift in employment from agriculture and industry to services from 1988 to 1997 [2]. This shift towards services may also result in more people being negatively affected by psychological factors at work.

CONCLUSIONS

Stress seems to be related to experience of musculoskeletal problems. Therefore, policy makers should take into account the importance of psychological as well as physical factors when addressing these problems. However, as many different physical/ergonomic and psychological/organisational factors are associated with work-related MSDs and the constructs often vary between different studies into the problem, it is difficult to reach final conclusions. Therefore, further research in particular meta-analyses as well as longitudinal studies should be carried out to investigate causal relations. Furthermore, an instrument that permits a combined analysis of psychological and physiological factors leading to MSD has not yet been developed.

In order to reduce negative work-related effects, the prevalence rates of MSDs could be decreased by developing and implementing preventive measures in relation to both physical/ergonomic and psychological/organisational working conditions in place [31]. Considering the crucial role that psychological/organisational factors play in the development of work-related MSDs [21], organisational psychology is seen as one of the emerging scientific disciplines that should be better utilised in the field of occupational health [32].

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WOMEN IN THE WORKFORCE

INTRODUCTION

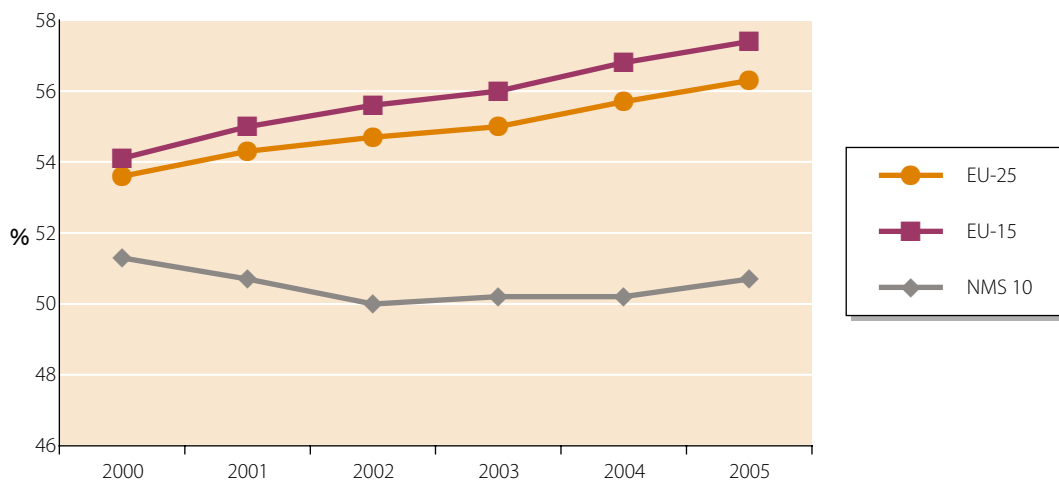
Currently, Europe has 463 million inhabitants (EU-25, 2006). By the year 2050, the population will decrease to an estimated 450 million people. In 2005, about 200 million people in the EU-25 held a job or conducted a business activity [1, 2].

According to Eurostat, in the EU-25 the average number of women per 100 men is 105.5. The proportion of women in the workforce is steadily increasing: today, women make up 44% of the EU workforce, with considerable differences between the Member States and between the north and the south. In southern Europe the employment rate of women is 38%, rising to 48% in the north of the continent [1, 2]. Nevertheless, the employment rate of women is still lower than for men (EU-25, 2005: women 56.3% vs. men 71.3%) [3]. The male and female employment rates are calculated by dividing the number of men/women aged 15 to 64 in employment by the total male/female population of the same age group.

On account of the different physiques of men and women, as well as traditional socio-cultural beliefs and attitudes, the working conditions of the genders tend to differ. Women and men perform different tasks and work at different workplaces in different sectors. Different jobs mean different exposure to hazards, which result in varying health outcomes – incidence of occupational accidents and diseases. Even when holding the same job and working within the same organisation, women and men carry out different tasks. Therefore, in terms of occupational safety and health, the gender aspect has to be taken into account. Besides, when talking about gender and OSH, it is important to consider also potential spill-over effects and the burden resulting from women’s combined work and family duties.

WOMEN AND EMPLOYMENT

Figure 1: Female employment rates 2000–2005, age 15-64



Source: Eurostat

Women’s activity and employment rates remain significantly below those of men (by 18 percentage points at EU level) [4]. In most Member States, the female unemployment rate is considerably higher than the male one [5]. In view of the changing demographic and employment situation, the European Council in 2000 in Lisbon set the

target of a 60% employment rate for women to be achieved within the next 10 years (70% overall). In 2005, the employment rate of women in the EU-25 reached 56.3%, almost meeting the interim target of 57% mentioned in the Lisbon Strategy [1]. Figure 1 shows this development: between 2000 and 2005, the female employment rate rose considerably – by three percentage points for the EU-25.

Figure 2: Female employment rates, age 15–64, EU-25, 2005 (%)



Source: Eurostat, structural indicators

It can be seen that the majority of countries are still below the Lisbon target (Figure 2). Some countries managed to achieve female employment rates above the target figure of 60% in 2005, among them several countries from the northern EU, with Denmark and Sweden having female employment rates above 70% [6]; a figure that has not changed much since 2000. On the other hand, some countries showed considerable progress with a rise of between five and 10 percentage points since 2000 (e.g. Spain, Italy and Ireland).

The New Member States face a similar situation and development. In Estonia, for example, the gender gap in terms of labour market participation is narrowing. However, this is occurring mainly due to the reduced employment of men – the participation rate changed from 73% for men and 58% for women in 1997 to 67% for men and 59% for women in 2005 [7].

Lack of, and cost of, good childcare can be a significant barrier preventing women from entering and remaining in the workforce. Many women find it difficult to reconcile work and family life, which can lead to stress and fatigue. Having identified the lack of childcare as a major reason for women to stay at home, the European Foundation recently launched a study which addresses the actual state of the European childcare systems. These systems differ significantly from country to country [8, 9].

About 85% of the European workforce are salaried workers, the rest being self-employed with or without employees of their own. Women tend to be represented more often among the first group: 89% of women are salaried workers, compared to 82% of men. Only 32% of self-employed people are women [2].

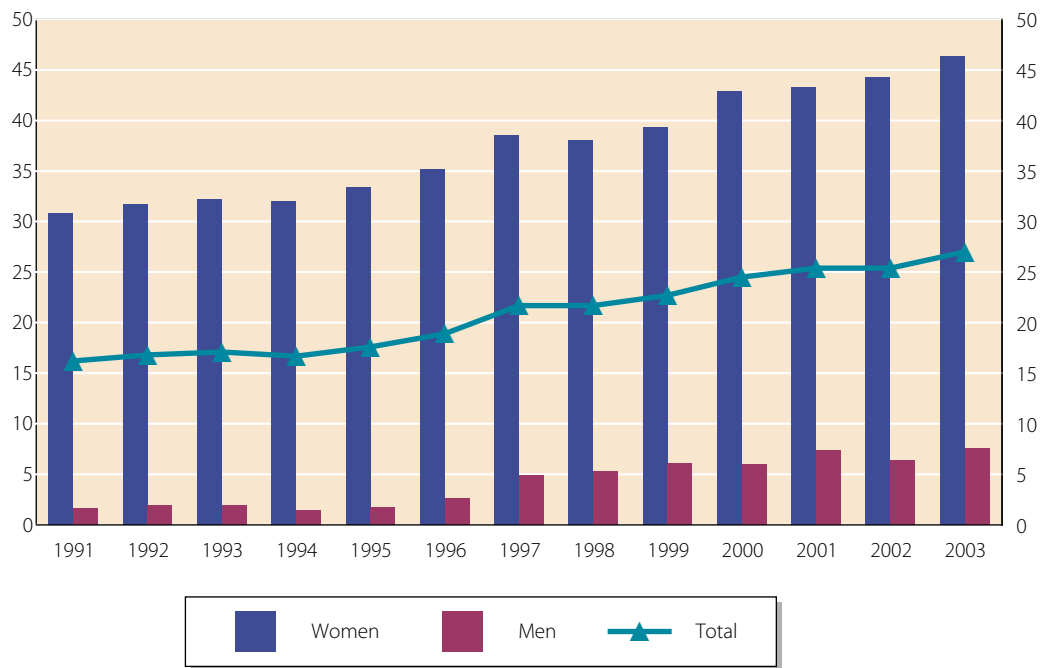
The average duration of employment of women in the same company is lower than for men (9 years vs. 11 years) [2], although the period differs significantly between sectors.

Working time

Employment statistics show a high prevalence of women in part-time work: 32% of women compared to 7% of men report working part-time (according to the ILO Part-Time Work Convention, 1994, a part-time worker is defined as an ‘employed person whose normal hours of work are less than those of comparable full-time workers’) [4]. These figures differ significantly among the EU Member States. Figure 3 shows the prevalence of part-time work in Germany, where women part-time workers are clearly over-represented compared to the European average. The number of women holding such a job has also risen significantly during the past few years, due to the labour market situation in Germany. Women’s occupational activity is increasing in the service sector in particular, with its high number of part-time jobs [10].

A strong reason for the higher prevalence of women in part-time jobs might be the role women play in caring for children and other family members: most women working part-time have children of school age or younger [9].

Figure 3: Part-time work (any type) in Germany between 1991 and 2003



Source: GSOEP, German Socio-Economic Panel - Scientific use file

Nevertheless, part-time jobs are likely to be lower paid or monotonous, with fewer opportunities for learning and training. Part-time workers are less exposed to physical and ergonomic hazards as well as to an intensive pace of work. They are more often involved in irregular work time schedules than full-time workers and have higher rates of evening, night and weekend work. Irregular working hours may cause various problems related to health and wellbeing, such as stress, fatigue, sleeping problems, anxiety and back pain. On the other hand, those in part-time

employment are more content with their work–life balance than those working full-time, and part-timers report slightly fewer health problems than full-timers [11].

In general, women work in their paid jobs fewer hours than men – 34.7 hours vs. 41.7 hours – even if the impact of part-time work is taken into account, and regardless of the occupational category or country. However, women spend, on average, over 20 hours per week doing unpaid work compared with less than 10 hours for men [12, 13].

The proportion of female and male employees working shifts is quite similar (17.2% men vs. 17.4% women, EU-27 in 2005), whereas the proportion of workers reporting working long hours differs significantly (22.4% men vs. 10% women) [2]. In sectors such as transport, hotels, restaurants, and health and social work, shift work and night work are more common than in other sectors [2]. Shift workers are more likely to suffer from sleeping problems than non shift workers (sleeping problems and shift work: men 17%, women 13%).

Short-term employment vs. permanent contracts

Women are more likely than men to work on the basis of short-term contracts (which are increasingly common in the EU). This is a consequence of women being over-represented in jobs where non-permanent employment is more likely, like healthcare professions, social work, and teaching [4]. Precariousness of employment is known to have health impacts, as employees have less job security and less job control. They suffer muscular pains, fatigue, and stress. They also face poorer ergonomic working conditions, which can partly be explained by the sectors where short-term contracts are more prevalent. Non-permanent workers also have less access to training, less skill development and poorer career prospects than permanent employees [4].

Women's occupations

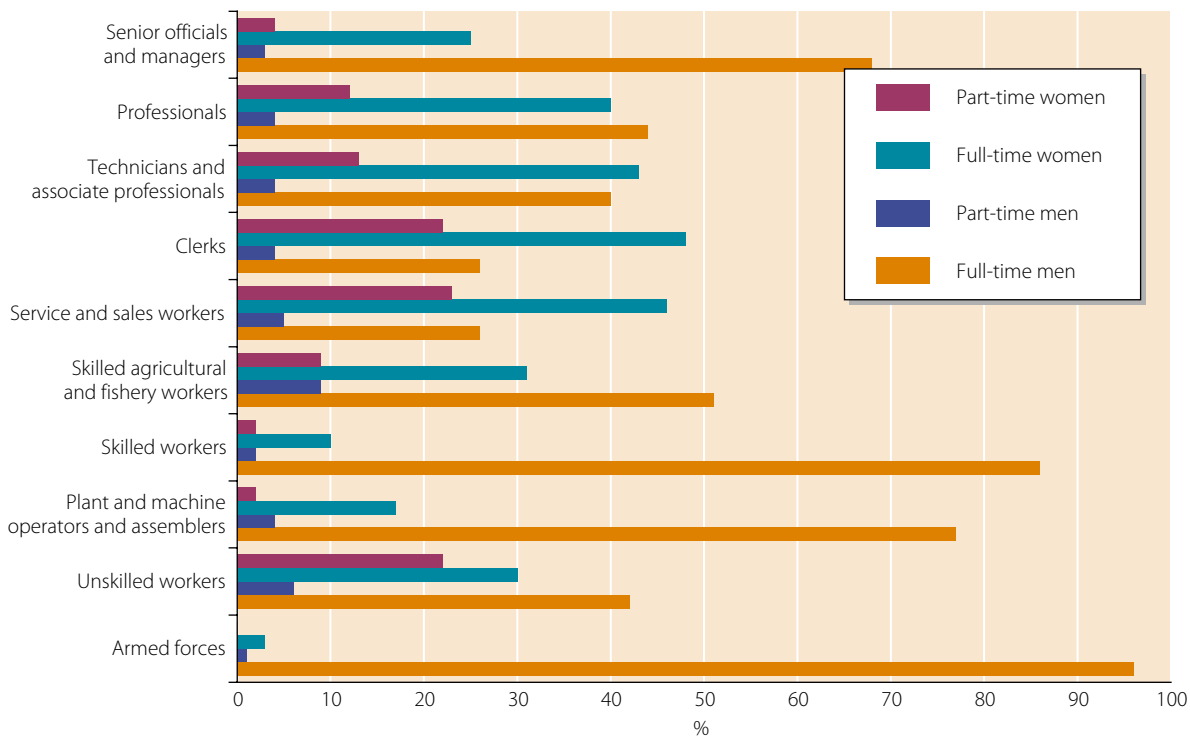
Women are primarily and increasingly employed in the service sector (e.g. in Germany, eight out of 10 women compared to 54% of men [10]). For example, they are twice as likely as men to work as clerks, secretaries or service workers. Women are also over-represented in the public sector and small, private sector firms, as well as in the education and the health sector. They are employed as nurses and care assistants, or they carry out social work or services in private households. Hairdressers, cleaners and shop assistants are also jobs commonly held by women.

In comparison to this, the workforce is predominantly male in all industrial job categories, such as the manufacturing sector, and in transport and agriculture. Men are much more often than women employed as senior officials and managers, or as construction workers, architects, engineers, etc. [4, 6]. Figure 4 shows the concentration of male and female workers in some occupational groups.

In terms of job positions, the number of women working in higher paid jobs with higher status is smaller than of men. They are under-represented in senior management positions as well as in higher graded jobs within a company. Working in lower positions is more likely to mean monotonous work or low control over work schedules, which is likely to cause the feeling of stress and its associated negative health outcomes. For example, whereas men predominate in managerial positions in the nursing sector, many female nurses have to face stress resulting from unpredictable scheduling, shift work and emotional stress [4].

In the New Member States only a minority of women assume management roles, while both sexes agree that women should take up 'typical' female occupations such as teacher, nurse, cleaner, etc. It seems that traditional role models are still quite common, as women still do most of the household duties and care for the children. In addition, the majority of women (53% compared to 37% of men) asked in an Estonian survey regarded family as the most important aspect of their lives, compared to 34% who said the same about work (vs. 46% of men) [7].

Figure 4: Percentage of jobs in each occupation filled by men and women in full-time and part-time jobs



Source: EWCS, European Foundation, 2005 [13]

Throughout the EU, most domestic work is done by women (cleaning, laundry, cooking, caring for children and the elderly, gardening, etc.). Women performing this work in their own homes are exposed to the same risks as paid domestic workers employed in private households, representing 2% of the employed women in the EU. They are exposed to toxic chemicals and repetitive movements, perform heavy lifting, work in awkward postures and while standing. These hazards compound their workplace exposures. Paid domestic workers additionally experience intimidation and harassment. Their activity implies poor access to health and safety advice, information and training, and isolation. The fact that the group of domestic and household workers is excluded from the scope of European occupational safety and health legislative framework contributes to this situation [4].

The gender pay gap

The gender pay gap is defined as the ratio of the average gross hourly earnings of female and male paid employees aged 15–64 who work at least 15 hours per week, covering all sectors and company sizes in the economy [5]

Women in the EU receive lower gross hourly payment than men: women’s average earnings in the EU are 16% below those of men, even for similar tasks. However, the reasons for this inequality are not easy defined, as several factors have to be taken into consideration, e.g. differences in male and female labour market and career structures.

Men are, for example, more likely to be employed in higher paid sectors and occupations or hold supervisory responsibilities. Women, on the other hand, represent a large proportion of workers employed in sectors such as healthcare, where they receive low remuneration and face difficult working conditions [14]. Traditionally, women also tend to invest less in their education than men, expecting to undertake responsibility for their family. This can lead to lower wages, as men assume the jobs where a higher education is required. A lower education status also has a negative impact on one’s professional career opportunities, the financial situation in the retirement, as well as on

other spheres of life such as participation in public life. There are, nevertheless, differences between the EU Member States: in some countries, more women than men are now starting higher education (e.g. Germany [10]).

The most important factors contributing to the gender pay gap in the EU are: earning differences between men and women with family responsibilities; gender segregation by sectors and occupations, with a higher concentration of women in part-time jobs, in low paying sectors and occupations; and, in particular, the relatively lower earnings of women in female-dominated sectors and occupations that cannot be explained by productivity differences between sectors and occupations [5].

However, several Member States have already taken steps to close the gender pay gap. France, for example, passed a law in February 2006 to achieve equal incomes of women and men.

OCCUPATIONAL SAFETY AND HEALTH EXPOSURES AND OUTCOMES

Women are more likely to report work-related ill-health problems than men, such as upper limb disorders and skin problems. A study in the UK revealed that stress tops the list, followed by musculoskeletal problems (see Table 1).

Table 1: Health and safety problems in %, cited by safety representatives

Stress	88%
Manual handling	63%
Repetitive strain injuries	53%
Violence	36%
Reproductive health (including pregnancy and breast feeding)	29%
Chemical or biological agents	25%
Menopause	22%

Source: TUC, 2002 [15]

Some of the most important exposures and outcomes are described below. This paper cannot be comprehensive and does not cover all risk factors, as women – like men – are exposed, in varying degrees, to a wide variety of risks during their working life.

Psychosocial hazards

Research findings suggest that stress affects both women and men. However, it seems that women face higher levels of stress due to numerous different, often cumulative, stressors. Several factors such as repetitive, monotonous work, less autonomy, lack of control and opportunities to make decisions, under-use of knowledge and skills, over-demanding jobs and greater total workload combined with lower pay, and lack of employer policies allowing for family responsibilities, seem to increase the level and impact of stress on women [4, 15]. Physical conditions such as noise can also add to stress at the workplace. Both sexes, but especially women, have to cope with an increasing intensity of work, which is measured by the perceived speed of work. The fact that women still do most of the domestic work and care for children and other family members finally contributes to the stress they are experiencing in their paid job [11].

Stress-related health outcomes seem to be increasing. Prolonged exposure to stressful working conditions may cause psychological and physical problems and diseases like sleep problems, fatigue, depression, coronary heart disease, changes in blood pressure, stomach pains and headaches or psychosomatic reactions like skin problems.

Women carrying out emotionally demanding work in education or health and social services (like teachers, nurses) very often experience a high level of stress [15]. Approximately 25% of nurses are affected by burnout, with a much higher ratio (up to 64%) in nurses with high affective strain, which they are particularly prone to if they deal with serious illness and death [16]. High stress levels are also experienced by all those who have to work at high speed, which is often the case for elementary occupations or those dealing with clients, such as sales and services.

- Compared to men, women are more likely to suffer discrimination, bullying and sexual harassment, especially if they enter a non-traditional occupation [18].
- It is estimated that 30 to 50% of women experience some form of sexual harassment or unwanted sexual behaviour in the workplace (compared to 10% of men). Young women with precarious jobs in hotels and restaurants and in the service industry are especially at risk of sexual harassment.
- According to surveys, women more often than men had to cope with harassment/mobbing – intimidating behaviour between colleagues – in the workplace during the previous 12 months [4, 13]. The reports of intimidation in the workplace are highest for women in white-collar jobs, with an increasing trend.
- Some sectors in which women are over-represented (health and social work, public administration, the education sector) are associated with a higher risk of physical violence at work from colleagues or other workers. In 2005, 16.4% of employees in the health care sector, 11.9% in education and 11.3% in public administration have reported threats of physical violence [2, 11, 13].

Musculoskeletal disorders (MSDs)

Musculoskeletal disorders are a growing problem in the EU, for both men and women. Between 2001 and 2003, the incidence rate of MSDs rose from 11 to 21 cases per 100,000 workers among women (compared to 14 to 26 among men) [3]. However, MSD of upper limbs and back pain are more frequent among women, upper limb disorders being one of the most common work-related diseases amongst women in industrialised countries. MSD can be a consequence of monotonous, repetitive tasks, heavy lifting, awkward postures and bad work organisation [4]. Many women, for example, carry out administrative tasks using a computer and complain about neck and back pain and disorders in hand or wrist. Working in the service sector, for example in sales, often means long periods of working in standing positions. The combination of physical factors with psycho-social risks (stress) increase the likeliness of absenteeism (see also Topic 'Psychological and organisational factors leading to work-related musculoskeletal disorders (WMSDs)).

Women also have to use tools and equipment designed for men, which, considering anthropometrical differences, can be more difficult for them.

Occupations where workers most often report musculoskeletal problems which were caused or worsened by work are: Health and social work, Construction and Transport and communication [1]. In the first-mentioned sector women are clearly over-represented, for example working as nurses [16]. On the other hand, women are less exposed to carrying and lifting heavy loads (27% of men compared to 17% of women) and to vibration (men 24%, women 7%) [2].

Skin diseases and respiratory diseases

Various substances that people have to work with can affect the skin and the respiratory system. Workers have to handle harmful substances which can affect the skin, or they are exposed to vapours, fumes, biological agents or dust which can have damaging effects on the respiratory tract and the skin. The exposure is twice as frequent among men than among women [2]. Nevertheless, women more often work in a damp environment or have to handle solvents and detergents, which increases the risk of skin problems like dermatitis. Occupations where women predominate and are at risk for skin problems include, for instance, hairdressing, beauty care, catering and

food processing, cleaning, healthcare, etc. Work-related asthma among women can be found in healthcare work, textile manufacturing, food production and hairdressing. Cases of sick-building syndrome (SBS) affecting the skin, mucous membranes and nervous system are more often reported by women than by men. This might be because women are more often employed in clerical or secretarial jobs, and they also seem to be more sensitive to the elements constituting the indoor environment. As the number of people working in offices is increasing, a higher awareness of SBS is important [4].

Occupational cancer

Occupational cancer seems to be less frequent in women than in men, which can be explained by different duration and types of exposure. Nevertheless, recent research on cancer among women has shown a link between cancer and employment in certain industries and occupations. The most common cancers in women are breast cancer, in situ cervical cancer and cancer of respiratory organs [17] (cancer of the lung, trachea and bronchi being the most common in both men and women). Some occupations typically carried out by women have a high exposure rate to UV radiation and therefore a higher skin cancer risk, for example in agriculture or education. It is also found that shift work is likely to increase the risk of breast cancer, although this could also be due to the increased stress that women experience when they do shift work (e.g. nurses, doctors, waitresses, kitchen staff, etc.) [4, 17].

In view of the hormonal, genetic, and other biological factors, there is a need for gender-specific occupational cancer research: gender differences in jobs and tasks within jobs have to be taken into account, as well as, e.g., the use and effectiveness of protective equipment of male and female workers, and risks that result from non-occupational factors (tobacco or alcohol consumption, stress from home responsibilities) [17].

Reproductive hazards

There are numerous factors that can affect female reproductive health, for example certain substances that can impair fertility (e.g. lead, solvents, some pesticides). Chemical substances can enter into a breastfeeding woman's milk. Poor working conditions can negatively affect the health of a pregnant woman as well as that of the foetus, for example insufficient breaks from work causing stress and tiredness or exposure to certain biological agents. Heavy lifting and long periods of standing can cause premature labour.

The EU Directive 92/85/EEC lists a number of hazards and issues that can affect women's occupational health, like mental and physical fatigue and working time; working at heights; occupational stress; standing and sitting activities; shocks, vibration or movement; ionising and non-ionising radiation; manual handling of loads, etc.

Reproductive disorders include birth defects, developmental disorders, spontaneous abortion, early foetal death, low birth weight, pre-term birth and congenital defects and illness in the offspring, but also reduced fertility, impotence, and menstrual disorders [4].

Women are at risk in all occupations where they are exposed to physical or biological agents or chemical substances; for example hairdressers and laboratory workers. The reproductive health of women is especially at risk in the healthcare sector, where women predominate. They are performing physically and emotionally demanding tasks, and are exposed to – among other things – manual tasks, biological agents, waste anaesthetic gases, disinfectants, or do shift and night work.

Biological agents which cause viral, fungal, bacterial and parasitic infections can present a significant hazard to the reproductive functions and to pregnant women in particular. They may be responsible for maternal morbidity or may cause miscarriage or birth defects. Diseases can be transmitted through needle stick injuries or contact with infectious materials, or with animals and their products.

'Female' occupations with a higher exposure to biological agents include healthcare, child care, teaching and social work, but also jobs with frequent contact with the public.

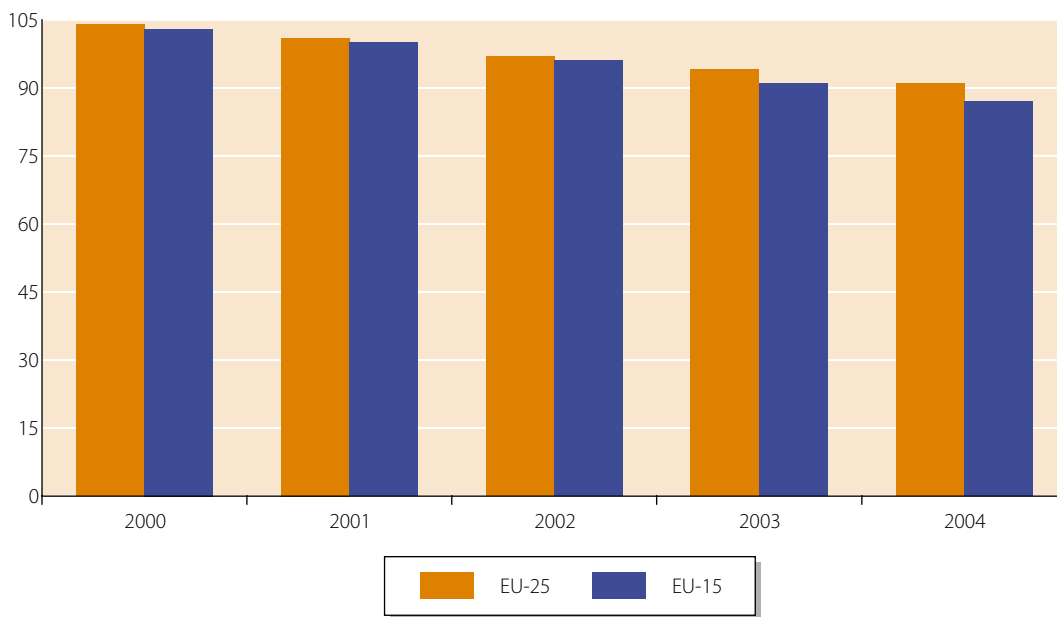
The European and international legislation takes into account the fact that pregnant and breast-feeding women are especially vulnerable and need special protection (e.g. Directive 92/85/EEC on the protection of pregnant workers and workers who have recently given birth or are breastfeeding, or the *ILO Maternity Protection Convention* published in 1952).

Accidents at work

Women are half as likely as men to suffer accidents at work, even if their shorter working hours are taken into account. This is a consequence of women being concentrated in workplaces and in jobs that are at lower risk than men: offices and shops, compared to the male-dominated sectors of construction and transport [4, 2].

The number of serious accidents suffered by women resulting in more than three days' absence is decreasing in all sectors. A similar trend is observed for fatal accidents [2].

Figure 5: Number of occupational accidents among women with more than 3 days' absence / number of employed persons in the population x 100,000



Source: Eurostat

Absenteeism

In general, absence due to illness is more common for female workers than for males: on average, women are absent due to an industrial injury for nine days a year compared to seven for men [2]. Absence from work due to accidents at work is 4% more common for male workers than for female workers.

Women tend to be absent more often than men for at least one day due to 'other health problems' (36% vs. 33% of men). For 'health problems caused by work', the figure is the same for men and women workers (10%). Part-timers report fewer health-related absenteeism than full-timers [11].

Women tend to have higher absence rates for mental disorders than men. This could be because women are more likely to ask for medical advice on mental problems than men. In addition, doctors are more likely to diagnose depression in women compared with men [19] and to issue a statement of incapacity for work.

In 2005, 24% of women reported being absent from work due to health problems, compared to 22% of men. They also required more time to recover – the average duration of time off was five days for women and 4.2 days for men [13].

CONCLUSIONS

Women are more likely to report work-related ill-health problems than men, even if, on the other hand, they perceive their health at work to be less at risk than men (22% vs. 33% of men). They are, however, slightly less often well informed about health and safety risks (82% vs. 84%) [13]. They are primarily reporting stress at work and musculoskeletal disorders, but also skin problems and disorders of the reproductive system.

It is, however, not correct to conclude that women are generally more vulnerable than men. It is a fact that the anatomy, physiology, psychology, and reproductive functions of women and men differ greatly. Men and women work in different occupations and are therefore exposed to different hazards. Many work-related health problems are therefore not related to gender aspects, but to the sector/occupation where women are working. In addition, women still have to shoulder the majority of family duties, which adds to the working time and to the hazards encountered.

An approach that takes these differences in exposures into account seems to be appropriate. In addition, women often have to work at workstations, using tools and equipment that was designed and built for men, which does not contribute positively to healthy working conditions for women.

In general, women's work-related injuries and diseases are less accurately reported, and their claims for compensation for some health problems are less often approved than men's [18]. In addition, women's issues tend to be absent from health and safety policies; the hazards involved are either unknown or underestimated. Women are also under-represented in decision making processes regarding occupational safety and health. Legislation is often made by men for men and makes no distinctions between male and female workers. Further research is necessary to take account of women's health issues in the workplace [20]. In view of the rising proportion of women in the workforce, many of whom are highly trained, it is crucial to include them in this field of research.

Policies taking gender issues into account do exist, but greater attention should be paid to them when focusing on the workforce. In general, Article 2 and 3 of the Amsterdam Treaty of 1 May 1999 state the obligation of the EU Member States to apply a gender-sensitive approach in all activities. In addition, the European Commission issued a communication (2000/0143 (CNS)) to establish a framework for action within which all Community activities can contribute to attaining the goal of eliminating inequalities and promoting equality between women and men, as set out in Article 3(2) of the Treaty.

To close the gender gaps in employment and social protection and to combat gender stereotypes, in March 2006 the European Council adopted the 'European pact for gender equality'. It could be a useful tool for achieving gender equality in accordance with the Lisbon Strategy [21].

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WORK-RELATED ACCIDENTS

Work-related accidents are the most visible consequence of the failures of occupational safety and health systems, and a significant burden on European society: in 2001 a European Union worker had an accident every five seconds and one worker died every two hours because of an accident at work [1].

This paper presents the trends and main characteristics of work-related accidents in the period 1998–2004.

WORK-RELATED ACCIDENTS IN EUROPE

The most useful source of information on the numbers and outcomes of accidents at work in Europe is Eurostat. Eurostat – for countries having a ‘universal’ social security system – obtains the information from national declarations of accidents at work to the public (Social Security), private insurance specific to accidents at work, or other relevant national authorities (Labour Inspectorates, etc.). Eurostat has harmonised the data on accidents at work since 1990 [2]. Detailed information about accidents at work is available [3, 4] for all old EU Member States (EU-15) and for Norway. In the New Member States and the candidate countries, the data have been collected in the same way since 2004. There is less detailed information available regarding the EU-25 starting from 1998.

The information is collected in relation to accidents at work resulting in more than three days’ absence from work (serious accidents) and fatal accidents. A fatal accident is defined as an accident that leads to the death of a victim within one year of the accident.

The incidence rate of fatal or serious accidents at work is the number of accidents at work – fatal or resulting in more than three days’ absence – per 100,000 persons in employment.

Thus, the incidence rate takes into account fluctuations in the number of accidents due to changes in the working population. (See also Topics ‘Labour market changes: The impact on occupational safety and health’, ‘Occupational structure’, ‘Employment structure by activity’ and ‘Young workers and accidents.’)

Changes in the incidence rate of serious and fatal accidents at work are shown in Table 1. These data exclude accidents on the way to or from work, occurrences having only a medical origin, and occupational diseases. The figure reveals that the rate of accidents in EU-15 corresponds almost exactly to EU-25. Both trends show significant reductions in the occurrence of accidents.

Table 1: Changes in the incidence rates of serious and fatal accidents at work in comparison to 1998 = 100. EU-15 and EU-25.

	Serious accidents						
	1998	1999	2000	2001	2002	2003	2004
EU (25 countries)	100	100	99	95	88	83	80 ^(p)
EU (15 countries)	100	100	98	94	86	81	79 ^(p)

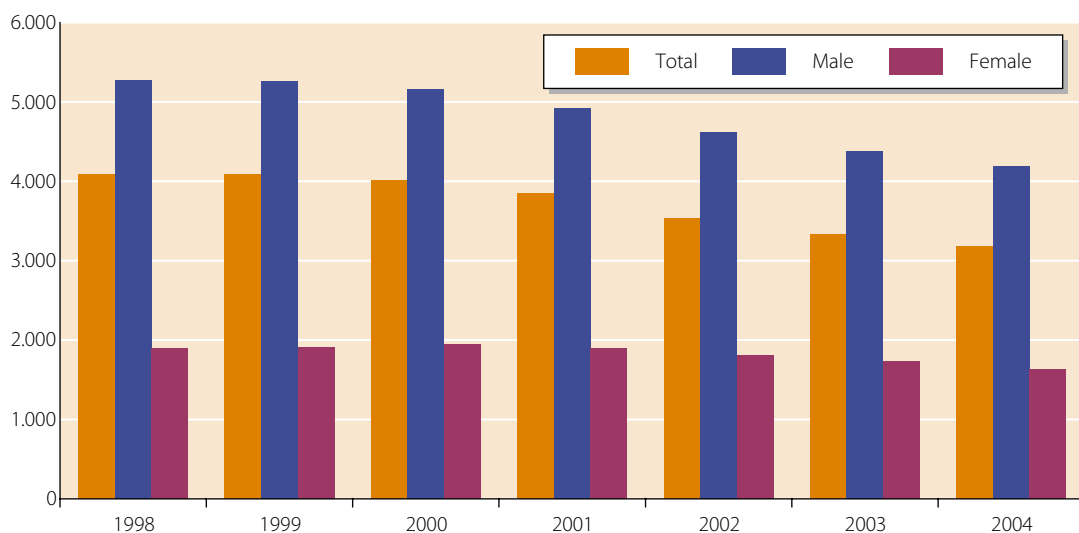
	Fatal accidents						
	1998	1999	2000	2001	2002	2003	2004
EU (25 countries)	100	88	87	85	81	80	78 ^(p)
EU (15 countries)	100	91	88	85	80	78	77 ^(p)

Source: Eurostat ^(p): provisional value

In 2004, for the nine main activity branches – Agriculture, hunting and forestry; Manufacturing; Electricity, gas and water supply; Construction; Wholesale and retail trade; Repair of motor vehicles, motorcycles and personal and household goods; Hotels and restaurants; Transport, storage and communication; Financial intermediation; real estate, renting and business activities – the incidence rate of serious and fatal accidents in the EU-15 was 3,176 (corresponding to almost 3.5 million accidents in the nine branches, or 4.2 million in all sectors). The rate of serious accidents – requiring more than 3 days off work – has been falling since 1998. A further reduction is expected in the 2005 figure.

77% of work accidents are sustained by male workers. However, since 1998 the incidence rate for males has dropped by almost 21%, while that for females has decreased by just 14%.

Figure 1: Evolution of the incidence rate of serious accidents at work EU-15, nine main branches by gender



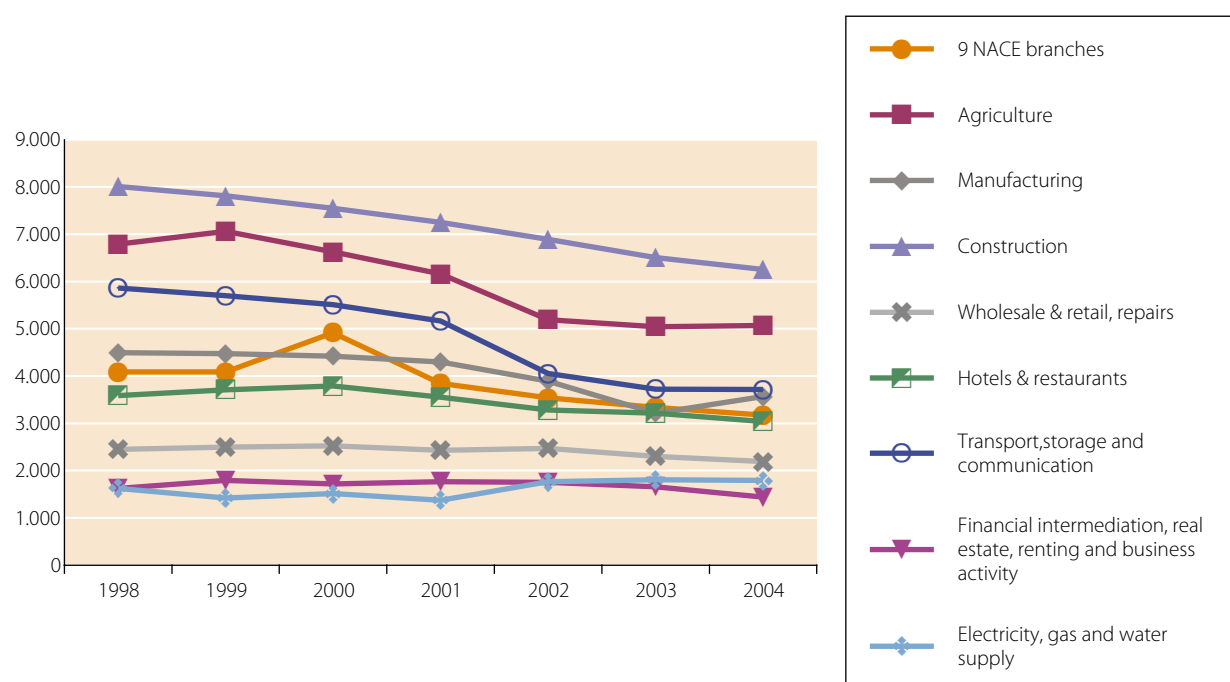
Source: Eurostat

Note: 9 NACE branches include: Agriculture, Manufacturing, Electricity, gas, water supply, Construction, Wholesale and retail repairs, Hotels and restaurants, Transport and communication, Financial intermediation, real estate and business activities

The accident rate is particularly high in the Construction sector, where the risk of an accident is almost twice as high as the average for the nine branches. Eight percent of the population is working in this growing sector. The rate for agriculture is 1.5 times higher than the average; however in this sector employment has a decreasing trend. Within the Manufacturing sector, workplaces manufacturing wood and wood products stand out for their high accident numbers – incidence rates exceed the average 2.3 times.

When it comes to a breakdown of accidents by age, workers between 18 and 24 have an incidence rate 1.4 times higher than the average. This rate has been decreasing steadily since 1998, but the decrease is the second lowest of all age groups. In 2004 this age group represented 10.6% of the European workforce. The age group 25–34 had an incidence rate slightly higher than the average during the whole period but it has also decreased more than the average. The age groups 35–44, 45–54 and 55–64 also have incidence rates that are below average. The last-named group comprises the oldest group of workers and the one with the greatest decrease in incidence of fatal accidents from 1998 to 2003. In 2004 this group represented 10.9% of the workforce; a percentage that is increasing.

Figure 2: Evolution of the incidence rate of serious accidents at work EU-15, nine main branches



Source: Eurostat

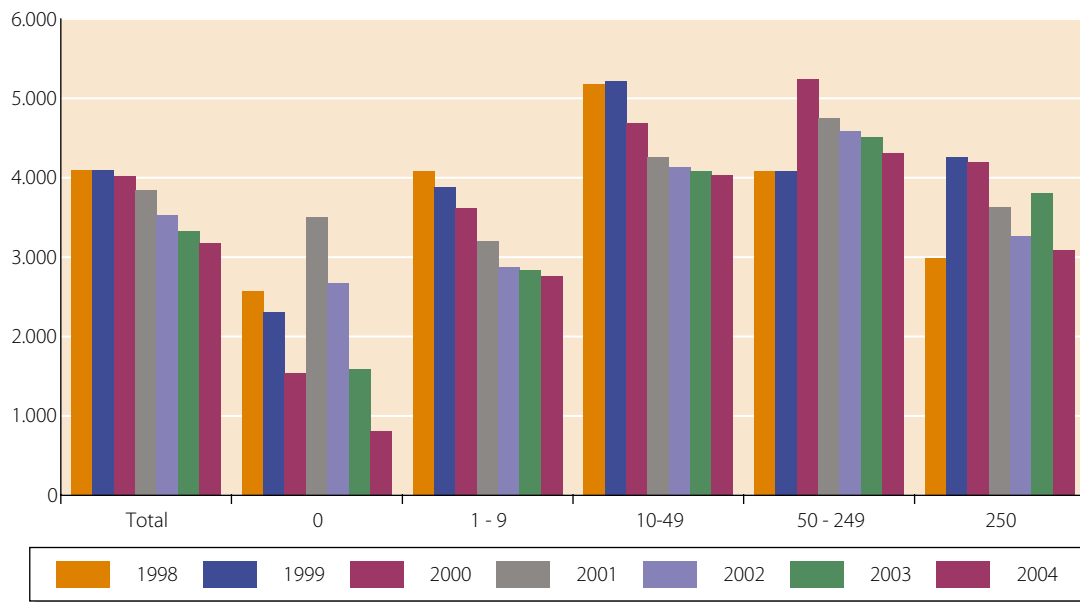
Table 2: Evolution of the incidence rate of serious accidents at work. Distribution by age

	1998	1999	2000	2001	2002	2003	% decrements 1998–2003
Total	4,089	4,088	4,016	3,841	3,529	3,334	-18.46
< 18	2,553	2,747	2,485	2,307	2,338	1,963	-23.11
18–24	5,725	5,804	5,856	5,529	5,077	4,711	-17.71
25–34	4,179	4,118	4,029	3,881	3,590	3,436	-17.78
35–44	3,678	3,703	3,692	3,530	3,254	3,097	-15.80
45–54	3,543	3,521	3,424	3,252	3,073	2,902	-18.09
55–64	3,602	3,577	3,475	3,325	2,953	2,787	-22.63
65 & >65	5,184	5,106	3,649	3,467	2,449	2,302	-55.59

Source: Eurostat

Information regarding incidence rates in the context of size of company is provided only for the EU-15 and Norway. Companies employing 10–49 workers and 50–250 workers have incidence rates over the average (1.3 and 1.4 times the average respectively) while self-employed without employees, companies employing between one and nine workers and those with more than 250 workers have incidence rates lower than the average. The incidence rate in the largest companies (more than 250 employees) has also increased slightly, although it is still below the average.

Figure 3: Evolution of the incidence rate of serious accidents at work EU-15 + Norway, nine main branches. Distribution by size of company (no. of employees).



Source: Eurostat

CONCLUSIONS

In 2004, there were almost 4.0 million serious accidents at work in the EU-15, which represents 3.176 accidents per 100,000 workers, or more than 3 % of the workforce. If these figures are extrapolated to the EU-25 more than six million workers are affected by accidents at work each year. If the EU-27 employment figures are used (218.5 million employed in July 2007), it means that some 7 million accidents occur annually in the present European Union.

On average each accident leads to a loss of 20 working days. The incidence rate has decreased by approximately 18% in the past five years. Although this development is promising, there are certain activities and groups that still have very high incidence rates, such as the Construction sector, 'young workers' (18–24) and medium-size companies. These categories require dedicated attention.

While 1.8% of accident victims have to reduce their working hours, 0.2% of them do not expect to return to work ever again. According to the 2002 Labour Force Survey ad hoc module, in 2002 about 0.9% of all 16–64-year-olds had a longstanding health problem or a disability resulting – in their judgement – from an accident at work. Extrapolating this figure to the EU-25 in 2004 means that 1.75 million workers had a persistent health problem due to a work accident. Reducing the number of accidents (and work-related diseases) is particularly important if we consider the future of the European Community. The ageing of the population requires not only increased levels of participation of the active population in the workforce (for example, by increased employment of women); it also demands an increase in the duration of working life. The retirement age is rising, and early retirement is being discouraged.

Economic and social considerations also have to be taken into account. It is very difficult to estimate the cost of accidents due to differences in the costs of labour, national insurance, healthcare and social security schemes. Physical damage, lost production, legal liability, cost of retraining (about 5% of accident victims cannot return to

their previous work) and recruitment also have to be considered. In recent times, public image has gained an economic dimension as well, so negative publicity is also likely to affect the economic performance of any company.

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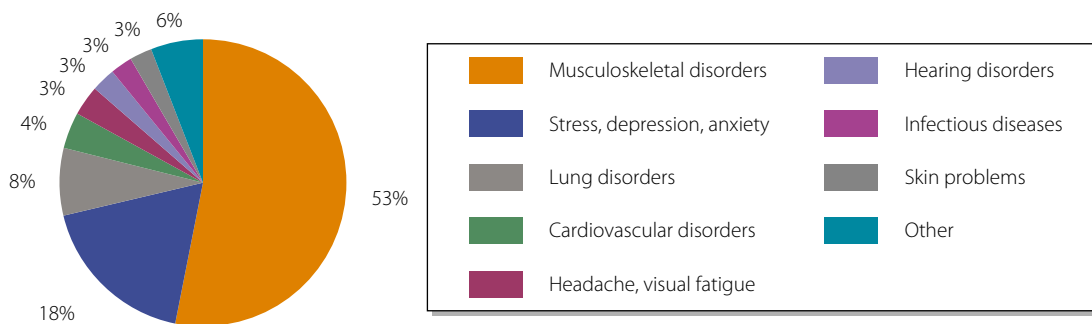
WORK-RELATED MUSCULOSKELETAL DISORDERS (WMSDs)

Work-related musculoskeletal disorders (WMSDs) are a group of painful disorders of muscles, tendons, joints and nerves. All parts of the body can be affected, although upper limb and back are the most common areas. WMSDs arise from movements such as bending, straightening, gripping, holding, twisting, clenching and reaching. These common movements are not particularly harmful in the ordinary activities of daily life. What makes them hazardous in work situations is the frequency of repetition, often in a forceful manner, and most of all, the speed of the movements and the lack of time for recovery between them. Heat, cold and vibration also contribute to the development of WMSDs [1].

SELF-REPORTED WMSDs

Work is known to be one of the most important determinants of people’s health status [2]. According to the Labour Force Survey (LFS) 1999 ad hoc module, about 7.7 million workers in the EU-15 suffer from illness, disability or other physical or psychological health problem(s), which according to their own judgement was caused or made worse by their current or past employment (this figure does not include accidental injuries). WMSDs, as the most serious health problem, affect more than half of the complainants, about 4.1 million workers. This means that about 2.6% of all EU-15 workers have such complaints (Figure 1) [3, 4].

Figure 1: Work-related health problems, EU-15



Source: LFS 1999 ad hoc module, Eurostat

According to the European Working Conditions Survey (EWCS) 2005, 25% of European workers complained of backache, and 22.8% reported muscular pains. In 2000, a quarter (about 23%) of workers were affected by neck and shoulder pains. About 12% of workers believed that their muscular pain in the upper limbs and/or lower limbs was work-related [5].

RECOGNISED CASES OF WMSDs

In most cases of WMSDs it is difficult to point out the exact cause. Therefore WMSDs are not very commonly accepted in national compensation or reporting systems. As a result, the number of recognised cases of occupational disease is orders of magnitude smaller than the number of self-assessed work-related cases.

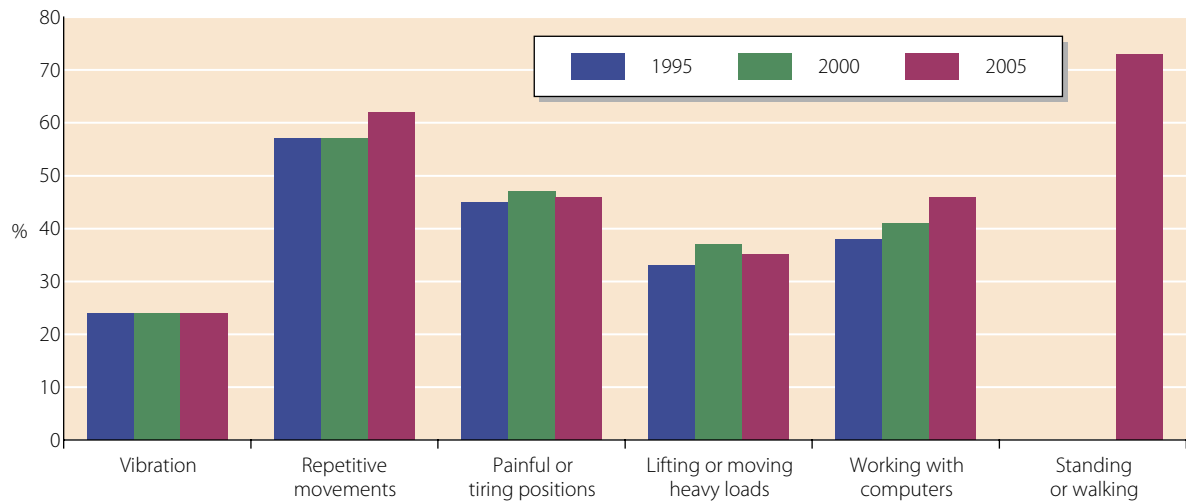
According to the European Occupational Diseases Statistics (EODS) data collection, the most common musculoskeletal occupational diseases are tenosynovitis of the hand or wrist, epicondylitis of the elbow and carpal tunnel syndrome – a neurological disease of the wrist. The incidence rate for musculoskeletal disorders was 28.5 per

100,000 persons in employment during 2005 and 15.7 for carpal tunnel syndrome. Both rates have increased significantly since 2001 (respectively 15.2 and 8.4) [6, 7].

Risk factors

There are numerous established work-related risk factors for the various types of musculoskeletal disorders. Unfortunately there are only limited Europe-wide data on their occurrence and distribution in the population [8].

Figure 2: Exposure to WMSDs – risk factors



Source: EWCS 1995, 2000, 2005 (some data not available for 1995 and 2000)

Repetitive work correlates closely with WMSDs [5, 9].

Table 1: Health problems related to making repetitive hand/arm movements, %

	Backache	Musc. pain neck / shoulders	Musc. pain upper limbs	Musc. pain lower limbs
Repetitive movements	48	37	24	21
No repetitive movements	19	11	4	5
Average	33	23	13	11

Source: EWCS 2000

WMSDs AND GENDER

Overall, male workers are more likely to be affected by WMSDs than females.

Self-reported WMSDs

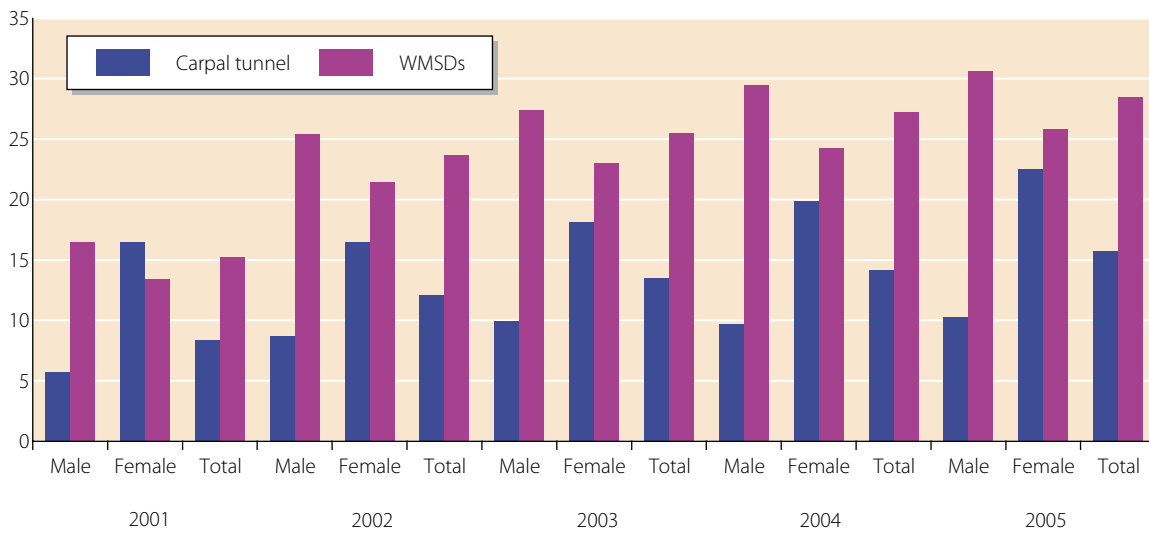
According to the LFS 1999, male workers suffer more from WMSDs (1,279,302 cases among male workers compared with 1,196,027 among female workers) [3]. The EWCS 2005 indicates that male workers more often report back pain (26.6%) and muscular pain (24.3%) than female workers – 22.3% and 20.8% respectively [5, 10]. The predominantly male occupational group Skilled agricultural and fishery workers reported by far the highest

occurrence of both complaints. However, employment in the occupational group Technicians and associate professionals, experiencing a high increase in self-reported WMSDs, is growing faster among women. This may affect the current gender differences in reported WMSDs.

Recognised cases of WMSDs

Based on the EODS data, the incidence rate for musculoskeletal disorders is higher among men than women (30.6 per 100,000 persons for men and 25.8 per 100,000 for women in 2005). For both men and women, the incidence rate has been increasing since 2001 (from 16.5 and 13.4 respectively). Carpal tunnel syndrome seems to affect women twice as much as men (22.5 and 10.3 respectively), and has also been on the increase since 2001 (when the incidence rates for women and men were respectively 12 and 5.7) (Figure 3) [6].

Figure 3: Incidence rate (per 100,000 workers), non-fatal, EODS obligatory list



Source: EODS

According to the EWCS, unlike in previous surveys, in 2005 female workers did not report more continuously *repetitive movements* than men [5, 10]. Typical risk activities include assembly of electronic equipment, cashiers in supermarkets, textile and sewing workers and typists and computer operators [11]. These activities are more commonly carried out by female employees than by males. Workers in the agriculture and construction sectors were more commonly required to handle heavy objects at work. These activities are more frequently conducted by male employees than by female employees [10].

WMSDs AND AGE

Being at risk of WMSDs seems to increase with age.

Self-reported WMSDs

According to the LFS 1999 ad hoc module, the prevalence rate for WMSDs is the highest for workers between 45 and 64: 3,399 for workers in the age category 45–54 and 3,555 for workers in the age category 55–64, compared to an average of 2,645 per 100,000 workers [3]. The EWCS 2000 indicates that workers between 40 and 54 are reporting being affected by backache (35.6%) and muscular pain in neck, shoulders (26%) and upper limbs (15.3%) more often

than workers of the other age categories (average respectively 33.2%, 22.8%, 12.9%). In 2005, the same age group reported more back pain (27.3%) and muscular pain (25.4%) than other age groups [5, 10].

However, it would be incorrect to conclude that WMSDs are a health problem only for older workers, since they are also prevalent in younger age groups – for 25 to 39-year-olds the rate is only 3% lower than for the older group, and almost identical to those over 55. Age, years of employment and training issues are often strongly correlated, which makes it difficult to disentangle their effects on the occurrence of WMSDs. They all can compound one another's effect. A person of 30, for instance, may experience low back pain but may already have been performing lifting tasks for 10 years. In addition, young people with little experience often report low back pain due to unadjusted postures, a lack of training or because they are placed in jobs that require more manual material handling because of their lack of seniority [8].

It is important, however, to note the growing employment rate of older workers caused by general demographic trends, and the extension of the working life caused by rises in the retirement age (see also Topic 'Age').

WMSDs AND ECONOMIC SECTOR

Agriculture, Construction, Transport, Manufacturing and Health and social work are the most exposed sectors.

Self-reported WMSDs

Based on the LFS 1999 ad hoc module, WMSDs are more frequent in the Construction, Transport and Health and social work sectors. The prevalence in these sectors is 1.2 to 1.6 times higher than average [3] (Figure 4). In EWCS 2005, backache was reported most often in Agriculture – 50.5%, followed by Construction with 36.5%, and Transport, Manufacturing and Health and social work with 28%, 27% and 26% respectively. The proportion is at least 20% in all sectors. The situation is quite similar for muscular pains [5, 10].

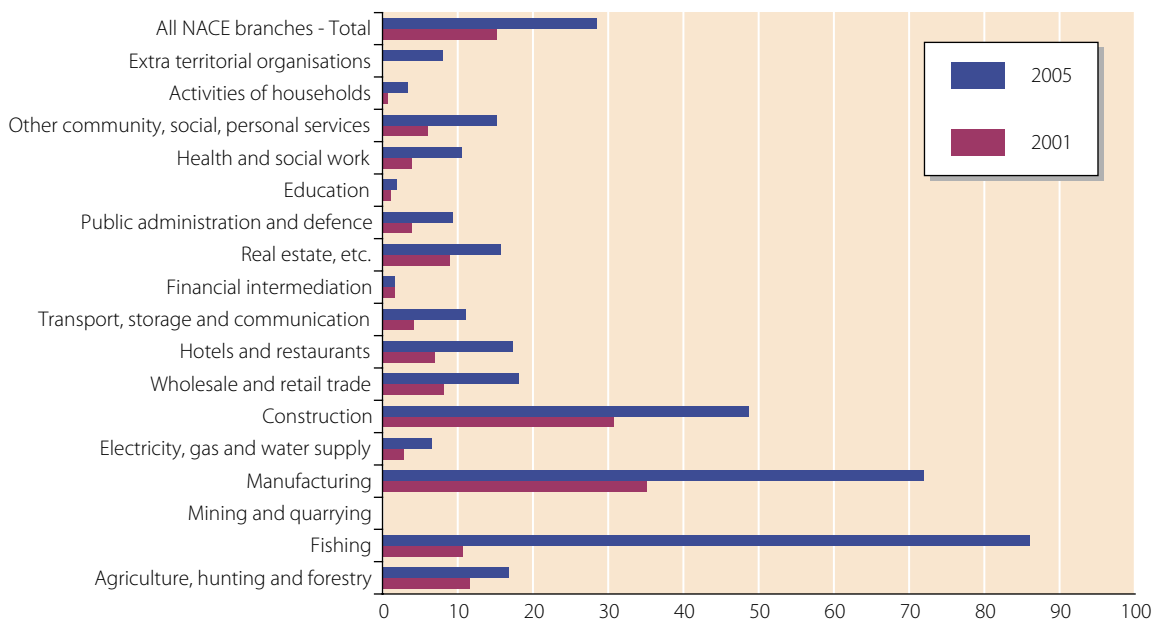
Again, there is reasonably good evidence for a causal relationship between WMSDs and workplace biomechanical exposures. According to the EWCS 2005 workers in the Agriculture and Construction sectors were more required to "handle heavy loads" at work, and most often were standing or walking. "Repetitive movements" are carried out in many sectors such as Agriculture (milking, gardening), in industry using equipment (nail-guns, pneumatic hand tools, other machinery), service sector (such as making beds), telephone service centres, banking and insurance [11].

Recognised cases of WMSDs

According to the EODS, the incidence rate of WMSDs and carpal tunnel syndrome varies greatly between the sectors. It is by far the highest in Mining and quarrying, but Manufacturing, Construction and Agriculture also have an incidence rate clearly higher than the sectors mostly associated with office-type work. Nevertheless, it must be underlined that this is partly due to the fact that the national recognition practices are better established for recognition of such diseases occurring under non-office type working conditions [6, 7].

It should be mentioned that the number of employees in the sectors most at risk, Construction and Health and social work, has increased over the last 10 years. Within Agriculture a slight decrease can be observed (see Topic 'Labour market changes: their impact on occupational safety and health').

Figure 4: Incidence rate of musculoskeletal diseases, per 100,000 workers



Source: EODS [6]

Please note that for practical reasons the incidence rates for Mining and quarrying are not included in the graph. For 2001 the incidence rate of WMSDs for this sector was 271.4, and in 2005 – 606.8.

WMSDs BY OCCUPATION

Manual workers both skilled and unskilled are most at risk of WMSDs.

Self-reported WMSDs

According to the LFS 1999 ad hoc module, Service workers and shop and market sales workers, Elementary occupations, Plant and machine operators and assemblers and Skilled agricultural and fishery workers are reporting being most affected to WMSDs [3]. The EWCS 2000 concludes that the breakdown by occupation for 2000 shows a very high level (60%) of reported backache among Agricultural workers. The highest increases in self-reported backache were for Professionals (from 18% in 1995 to 24% in 2000) and Technicians (from 23% in 1995 to 31% in 2000). In 2005, however, the figure for both of these occupational groups was approximately 17%. 'Blue-collar' and 'agricultural workers' are most susceptible to muscular pains [5, 10].

While in the 2000 EWCS data the occupation Plant and machine operators and assemblers was highlighted as the highest risk group for *repetitive movements* (77%), followed by Craft and related trade workers (74%), Elementary occupations (71%) and Skilled agricultural and fishery workers (70%), significant increases were observed in 2005 for Skilled agricultural and fishery workers (to 83%), and Craft and related trade workers (to 81%) [5, 10].

Recognised cases of WMSDs

According to the EODS, in 2005 Craft and related trade workers, Elementary occupations and Plant and machine operators and assemblers are the most likely to suffer from WMSDs (respective incidence rates of 111, 72.4 and 68

cases per 100,000 workers). Carpal tunnel syndrome also seems to be the most prevalent within these occupations (respectively 44.2, 45.2 and 43.4 cases per 100,000 workers) [6].

The number of employees in the occupations most at risk, Service workers and Elementary occupations, has increased over the past 10 years. Similarly, an increase can be observed in the occupations that significantly increased self-reporting – Professionals and Technicians. Within the categories Skilled agricultural and fishery workers and Plant and machine operators and assemblers, a slight decrease can be observed.

WMSDs BY EMPLOYMENT STATUS

Employees on fixed-term contracts have the highest reported rates of WMSDs.

Self-reported WMSDs

Based on the results of the LFS 1999, employees who have a permanent job are more likely to report WMSDs than those with a temporary job and those undergoing training or serving a probationary period (respective relative incidence rate of 105, 89 and 20) [3]. According to the EWCS 2000 and 2005, self-employed workers report more backache and muscular pain than employed workers. Both groups are increasingly reporting the problem since 1995. Among employees, those on fixed-term contracts reported a higher incidence of backache and muscular pain [5, 10].

Statistical data show that temporary workers are more susceptible to physical hazards and a higher level of work intensity and pace than permanent workers. According to the EWCS, temporary workers remain significantly more exposed to repetitive movements. Non-permanent employees are also more exposed to influences such as heavy loads and painful positions than employees on indefinite contracts [12]. In addition, non-permanent workers often have little experience and little on-the-job training.

Recent statistics show an increase in the share of temporary employment contracts in the European workforce.

CONCLUSIONS

Research at European level indicates that WMSDs are a significant and increasing health problem. These disorders are a major cause of concern not only because of the health effects on individual workers, but also because of the economic impact on businesses and the social costs to European countries. The costs to European businesses include: lost production; staff sickness, compensation and insurance costs; losing experienced staff and the cost of recruiting and training new staff; and the effect of discomfort or ill health on the quality of work [13]. Earlier retirement and disability also have to be considered, especially in the context of the demographic changes occurring in Europe and the targets set up in the Lisbon Strategy.

Prevention must aim at eliminating the repetitiveness of the work, reducing the applied force, eliminating fixed body positions, decreasing the pace of work requiring excessive repetition of the same movements, and reducing the lifting of heavy objects by proper job design. Preventive strategies such as good workplace layout, tool and equipment design, and proper work practices should be considered. Prevention is especially important considering changes in the demographics of the European workforce (ageing of the population resulting in a necessary increase in employment rate of older workers, but also their share of the workforce, and a higher retirement age), and changes observed within industry structure: growing employment within sectors and occupations at risk.

Early recognition of these musculoskeletal disorders is very important because medical treatments are unlikely to be effective once these injuries become longstanding. For the incidence of WMSDs to fall, it is essential to protect young workers by providing a safe working environment and information and training.

Preventive and control measures, in order to be truly effective, require significant involvement on the part of the workers, their representatives, and management to improve occupational health and safety [11].

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WORK-RELATED STRESS

The European Agency for Safety and Health at Work offers the following definition for work-related stress (WRS): ‘WRS is experienced when the demands of the work environment exceed the employee’s ability to cope with (or control) them’ [1].

WRS is not considered a disease in itself, but if it is intense and is experienced for some time, it can lead to mental and physical ill health. WRS can be caused by psychosocial hazards such as work design, organisation and management; high job demands and low job control, and issues such as harassment and violence at work. Physical hazards, such as noise and temperature, can also cause WRS [2, 3].

Self-reported WRS

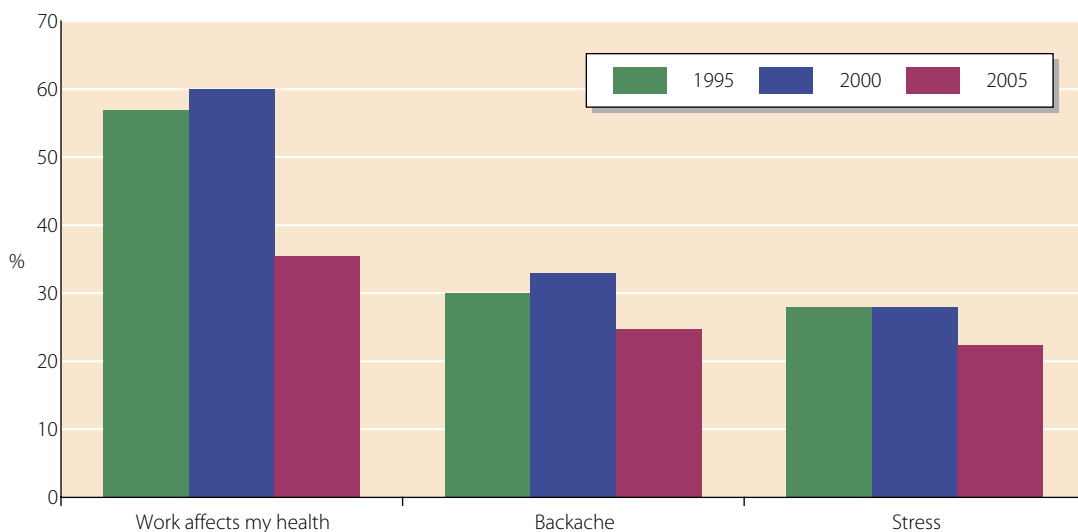
Work is known to be one of the most important determinants of people’s health status [4].

According to the Labour Force Survey (LFS) 1999 ad hoc module, about 7.7 million workers in the EU-15 suffer from health problem(s) (apart from accidental injuries), which according to their own judgement were caused or made worse by their current or past employment. The prevalence rate for employees is 5,372 cases per 100,000 persons per year, linked to their current employment.

Psychosocial health problems are reported by about 20% of those affected – about 1.4 million workers. This means that around 1.2% of European workers have complaints in terms of stress, depression and anxiety. Such problems are the second most important type of work-related health problems after musculoskeletal problems (backache) [5, 6].

Based on the results of the European Working Conditions Survey (EWCS), the problem is even more widespread. Moreover, the available data do not indicate a trend towards improvement. As in 1995, in 2000 WRS affected nearly one in four EU workers (28%) – 41 million workers. Again it is, after back pain, the second most common work-related health problem. There was a significant improvement noted in 2005 in 27 Member States; however the reduction in reporting of exposure to stress occurred mainly in the EU-15 countries (20.2%), while New Member States (NMS) still reported high levels of exposure – more than 30% [7, 8] (Figure 1).

Figure 1: Reported health problems



Source: EWCS 1995–2005

The European Schedule of Occupational Diseases does not include any disorders of a psychosocial nature, but urges the Member States to enhance studies exploring their occupational origin [6, 9].

WRS is a major cause of concern not only because of the health effects on individual workers, but also because of the economic impact on businesses and the social costs to European countries.

Research suggests that between 50% and 60% of all lost working days are related to stress. In the 15 Member States of the pre-2004 EU, the cost of stress at work and the related mental health problems is estimated to have been on average between 3% and 4% of gross national product, amounting to EUR265 billion annually. Studies estimate that work-related stress alone costs the businesses and governments of those countries about EUR20,000 million in absenteeism and related health costs, in addition to the toll in terms of lower productivity, higher staff turnover and reduced ability to innovate; not to mention the effects it has on the personal lives of the affected workers [2, 10, 11, 12].

RISK FACTORS FOR WRS

Stress-related hazards can be found in the job content, workload and pace of work, the organisation of working time, the level of participation and control in decision-making. Most of the causes of stress are related to the way work is designed and the way in which organisations are managed. Other sources of stress can be career development, status and pay, the role of the individual in the organisation, interpersonal relationships, the organisational culture and the home/work interface [2].

Based on the information available from the EWCS, some key factors for several indicators are described:

Work with a very high speed and to tight deadlines

High-speed work can lead to stress-related illnesses and ultimately burnout of the individual. It can also increase the potential for human error, leading to workplace accidents. 56% of all workers interviewed for EWCS 2000 reported exposure to high-speed work at least a quarter of the time. Within the past 10 years, the surveys note an increased frequency (47% in 1990, 54% in 1995) of reporting of high-speed work. Almost two in three workers (60%) had to cope with tight deadlines for at least one-quarter of the time in 2000, up 3% from 1995 [7, 13, 14, 15] (Figure 2).

Work pace dictated by external demand or machine-dictated work pace

The nature of work is changing: it is less dependent on machinery speed and production targets and increasingly driven by customer demand.

The frequency of reporting of pace of work induced by external demand increased between 1995 and 2005 from 67% (EU-15) to 68% in EU-27 countries, but it is as high as 71% in EU-15. The proportion of workers whose pace is induced by the speed of machines or by the production cycle has declined from 22% to 18.8% [7, 13, 14, 16] (Figure 2).

Unforeseen interruptions at work

In 2005, almost one-third (32.7%) of workers reported several interruptions every day to perform unplanned tasks. For a high proportion of workers such interruptions were disruptive [7, 13] (Figure 2).

Control over work methods, order of tasks and work rhythm

While between 1990 and 1995 there was a significant increase in the proportion of workers exercising autonomy over their work, between 2000 and 2005, this figure stabilised.

In 2005 36% of all workers interviewed reported that they had no ability to choose or change the order of their tasks. 33% of them had no control over methods of work and more than one-fourth could not influence their work rhythm [7, 13] (Figure 2).

Match between skills and work demands

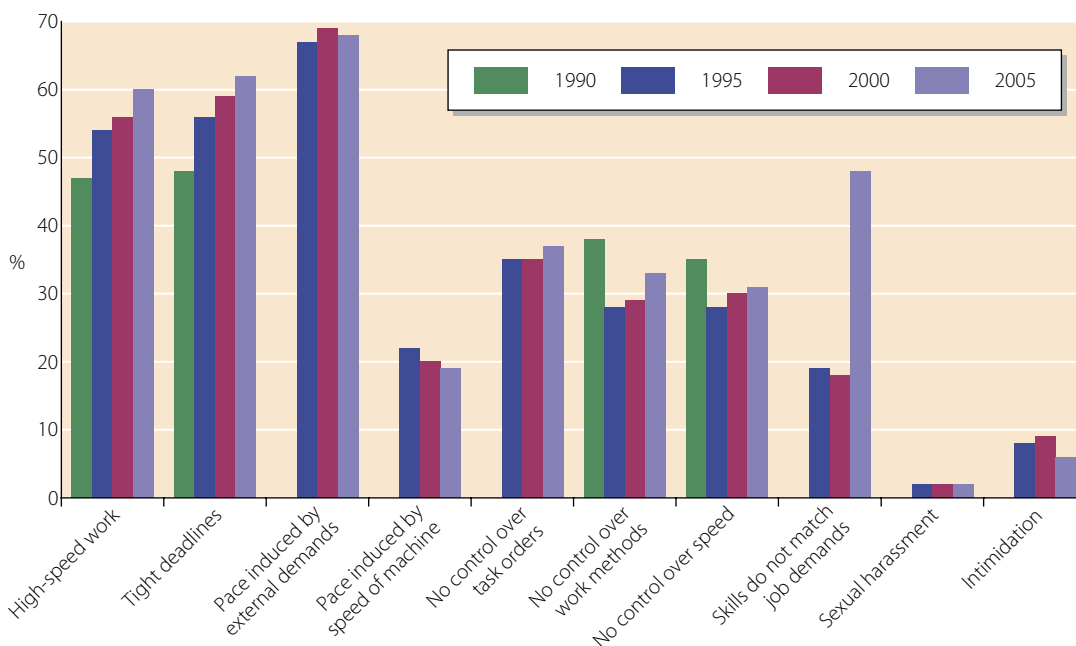
The proportion of those who think that their skills do not match the demands of their job decreased slightly between 1995 (18%) and 2000 (17%). In 2005, however, only 52.3% of workers considered that their skills corresponded well to the demands of their job [7] (Figure 2).

Intimidation and sexual harassment

Harassment can be another factor leading to stress-related illnesses. Sexual harassment was reported by 2% of respondents. Harassment and victimisation often lead to stress-related illnesses. Almost one in 10 workers (9%) reported being subject to intimidation in the workplace in 2000, a slight increase since 1995 (+1%). However, a significant improvement was noted in 2005 – only 6% of workers were subjected to threats of physical violence, but 1.8% still reported physical violence from colleagues and 4.3% violence from other people.

Physical violence can lead to a wide range of physical and psychological injuries. Anxiety resulting from a threat of violence, witnessing or being subjected to violence can cause stress-related illnesses [7, 13] (Figure 2).

Figure 2: Distribution of some risk factors



Source: EWCS 1990/1995/2000/2005

STRESS AND GENDER

There are no significant differences in the prevalence of psychosocial health risks between men and women.

According to the LFS 1999 ad hoc module, female workers suffer a little more than men from psychosocial health problems that, according to their own judgement, were caused or made worse by their current or past employment [5, 17].

The EWCS 2000 indicates that since 1995 exposure to stress among female workers increased (from 27% to 29%), while it remained stable for male workers at 28%, but in 2005 both genders reported exposure to stress less often – (men 23.3%; women 21%) [7, 13]. This change is significant considering the gradual increase in the numbers of women in employment.

STRESS AND AGE

Young workers seem to report less WRS than workers in older age categories.

According to the LFS 1999 ad hoc module, the prevalence rate for psychosocial health problems is the highest for workers between 45 and 54: 1,532 per 100,000 workers, compared to an average of 1,181 per 100,000 workers. Workers between 35 and 44, and workers between 55 and 64 closely follow this age group (respectively 1,365 and 1,339 per 100,000 workers). Young workers are reporting less WRS: 542 per 100,000 workers between 15 and 24 years [5, 17].

This is confirmed by the EWCS in 2000 and 2005: workers aged between 40 and 54 reported being affected by WRS more often, closely followed by the age category 25–39 years. Workers under 25 and over 55 not only report stress less often, but their exposure has been declining consistently since 1995. The trend for workers over 55 years is very significant as their employment rate and statutory retirement age are increasing [7, 13] (see Topic 'Age').

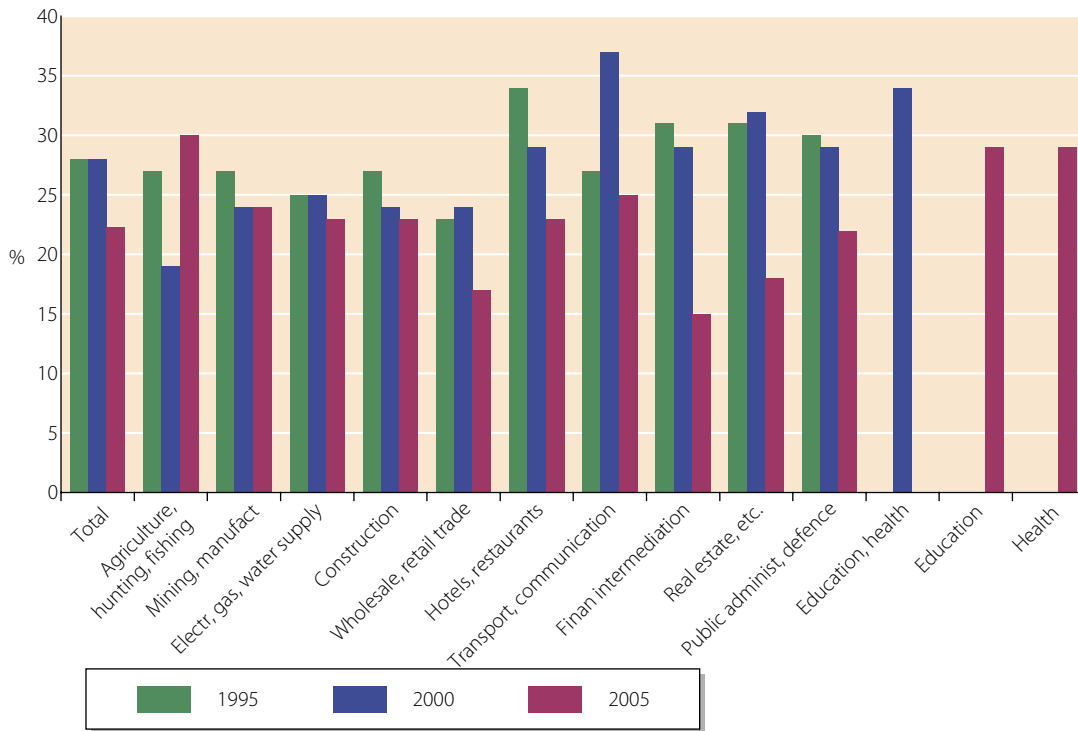
STRESS AND ECONOMIC SECTOR

The prevalence of psychosocial health problems is the highest in Education, Health and social work and Transport and communication.

There are significant differences in the levels of stress experienced in various sectors. Studies conducted in 1999 and 2000 identified that workers in the sectors of Transport and communication, Education and Health and social work experience stress significantly more often than those employed elsewhere. Agriculture, hunting, forestry and fishing and Construction had the lowest incidence rate of stress, although one must bear in mind that in Agriculture and Construction other health problems, more common and severe, may have influenced the reporting of psychosocial problems. However, in 2005, workers in Agriculture, hunting, forestry and fishing were reporting stress most often, followed by Health and Education, while those employed in Finance, Retail and Real estate reported the lowest levels of exposure [5, 7, 17] (Figure 3).

It should be noted that the number of employees in the sectors reporting increased risk – Health and social work and Real estate, renting and business activities, has increased significantly over the past 10 years (by 18% and 47% respectively). (See also Topic 'Labour Market changes: Their impact on occupational safety and health').

Figure 3: Reported WRS by sector



Source: EWCS 1995, 2000, 2005

Note: no data available for sector Education and health in 1995. A different sectoral breakdown was used in 2000 and 2005.

STRESS AND OCCUPATION

WRS is reported most by higher qualified workers.

According to the LFS 1999 ad hoc module, Legislators, senior officials and managers and Professionals are the groups most affected by psychosocial risks [5, 17].

The EWCS, using a different classification of professions, showed in 2005 the highest stress levels among higher qualified blue-collar workers, such as skilled agricultural workers (confirming high exposure for the sector), plant and machine operators. Since 1995 decreased occurrence of stress has been observed among managers (from 37% down to 22%). After increases in exposure of technicians (from 29% 1995 up to 35% in 2000) and clerks (from 22% in 1995 up to 25% in 2000), in 2005 their exposure dropped to 19% and 17% respectively [6, 9, 7, 13].

It should be noted that employment in the Technicians and associate professionals group is growing, therefore the reduction in exposure in this group is very significant. On the other hand, between 2000 and 2004, employment in the Clerks group decreased.

STRESS AND EMPLOYMENT STATUS

Employees with a fixed-term or permanent contract have the highest reported rates of WRS.

Based on the results of the LFS 1999 ad hoc module, employees who have a permanent job are more likely to report psychosocial health problems than those with a temporary job [5, 17].

The EWCS 2000 data indicate that while there are no important differences in the prevalence of psychosocial health risks between self-employed and employed workers (respectively 27.4% and 28.2%), marked differences appear within the group of employed workers. Workers employed on a permanent basis report the highest incidence of WRS (29.5%) followed by employees on a fixed-term contract (25.7%), confirming the findings of LFS 1999. Apprentices and trainees, and those on a temporary employment agency contract, are reporting less WRS (respectively 18.6% and 14.1%). In 2005, the self-employed group reported higher exposure to stress – 25.6%, compared with 21.8% of the group of employed workers [7, 13, 18]. The gradually increasing share of alternative job arrangements, including temporary employment, and the reducing proportion of permanent employees may have an effect on the future experience of stress in the working population (for more information, see Topic ‘Labour market changes: Their impact on occupational safety and health’).

CONCLUSIONS

Research at European level indicates that work-related stress and psychosocial hazards in general are a significant health problem. These hazards are a major cause of concern not only because of the health effects on individual workers, but also because of the economic impact on businesses and the social costs to European countries [10].

Stress-inducing hazards can be found in many aspects of the work: job content, workload and pace of work, the organisation of working time, the level of participation and control in decision-making, job insecurity, the introduction of new technologies and workplace culture (bullying, harassment) [2].

According to the World Health Organisation (WHO), levels of depression and stress are predicted to rise dramatically as new technologies grow and globalisation accelerates [19].

The WHO predicts that the ageing of the population, as observed in the European Community countries, by changing the proportions between working and retired populations, will not only increase the average age of the working population but will also increase the workload of the gradually decreasing number of workers, thus contributing to development of stress [8].

Work-related stress may be prevented or counteracted by job redesign (e.g. by empowering employees, and avoiding both over- and under-load), improving work organisation (fewer interruptions), by improving social support, and by promoting reasonable rewards for the effort invested. And, of course, by adjusting occupational physical settings to the workers’ abilities, needs and reasonable expectations [8, 16].

Both the WHO and the ILO point out that it is in the interests of both employees and employers to change trends in occupational health and that this can only be done if ‘the quest for higher productivity and cost effectiveness go hand in hand with considerations of health and safety at work’ [19].

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YOUNG WORKERS

INTRODUCTION

Due to falling birth and mortality rates, over the coming decades Europe’s economically active population will see an increase in the proportion of workers aged 50 and above, with a corresponding reduction in the proportion of younger people [1].

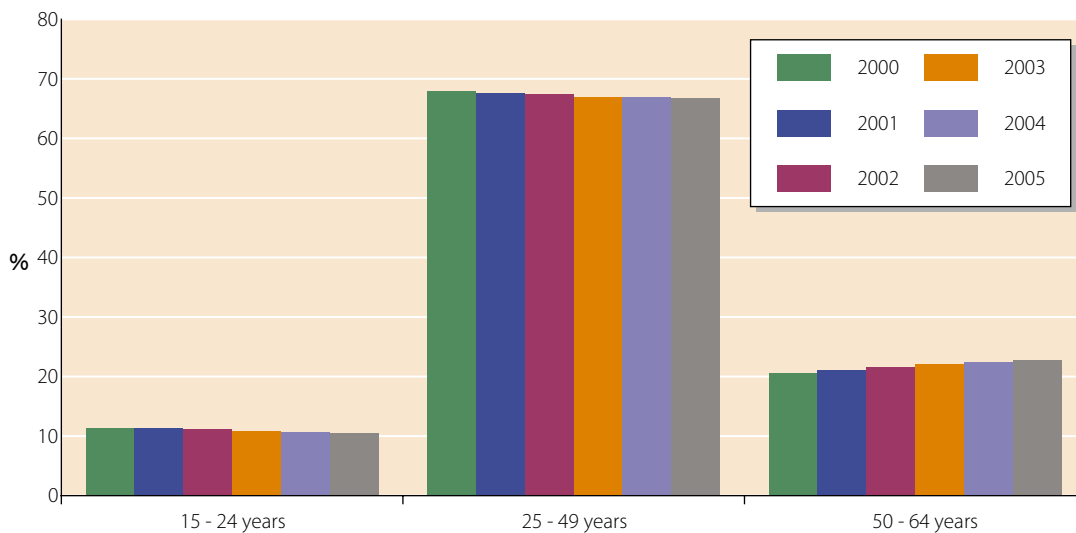
The successful integration of young people into work life is therefore vital for society and for business, not to mention of great importance for young people themselves [2]. One of the aspects of the successful entry of young people into working life is their health and safety at work.

This paper gives a brief picture of the employment of young workers in Europe and their exposure to risks at the workplace. (See also Topics ‘Young workers and accidents’ and ‘Age’.)

YOUNG PEOPLE IN THE WORKFORCE [3]

In 2005, about 193.8 million people were employed in the EU-25, including 20.4 million workers between 15 and 24. Young workers therefore accounted for 10.5% of the workforce. The proportion of young workers has decreased by 0.9% since 2000, when they represented 11.4% of the workforce, while the proportion of workers in the age category 50–64 years has increased by 2.1%. In 2005 the employment rate of young workers reached 36.3%, compared to 63.6% for the population aged 15–64. Since 2000, the employment rate for young workers has fallen by 1.2% (from 37.5%) (Figure 1). (The employment rate represents the total number of persons in employment as a percentage of the population of that age group.)

Figure 1: Employment rate of various age groups EU-25



Source: LFS, Eurostat, 2000-2005

This general decrease in workforce participation within the youngest age category is a reflection of the falling proportion of young people in the general population, but may also indicate that educational activities are becoming more common and are taking longer. In addition, young workers are more vulnerable to economic recession – employers react to economic recession by cutting back on hiring new young workers [4].

However, unemployment figures indicate yet another trend: in many EU Member States unemployment rates of young workers have also increased over recent years, although there are fewer young people in an overall ageing population. In the EU-25, unemployment rates of young workers are on average twice as high as overall unemployment rates. There are also substantial differences across regions: in two-thirds of EU-25 regions the unemployment rate for young people was at least twice that for overall unemployment. Regional unemployment rates for young people varied from 6.2% to 59.1%.

In this context it is important to note that according to the EWCS (European Working Conditions Survey) 2005, 2.6% of women and 2.5% of men reported that they had been subject to age discrimination over the previous 12 months. The rate is so low that it is difficult to assess exactly the differences between groups. There seem to be no important differences by sector or by size of the company, while obvious differences exist between different age categories. The occurrence is the highest in the youngest, followed by the oldest, age categories.

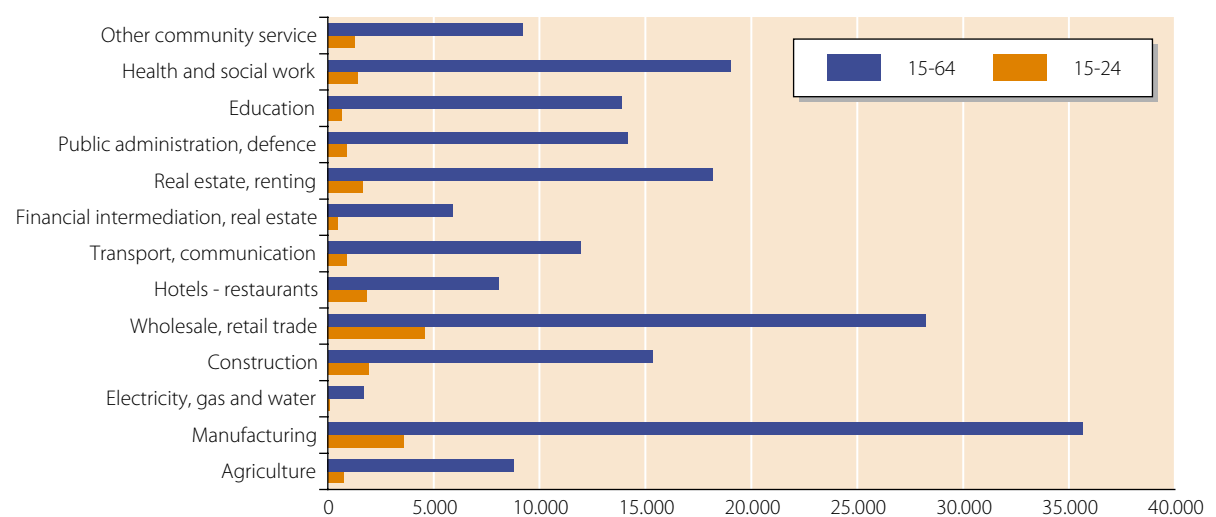
According to national figures, in some Member States young women are considerably more affected by unemployment than young men. This might increase their readiness to accept precarious working conditions and at least partly explain why they work in lower hierarchy levels and more unskilled, low-paid jobs.

National figures also indicate that young people are typically low-wage earners and that they have less access to social benefits.

As within the working population as a whole, more young males than young females are at work (11.1 million males against 9.3 million females).

A comparison of employment in the various EU-25 economic sectors in 2005 shows that young workers were most numerous in Trade (4.6 million) followed by Manufacturing (3.6 million). Construction (1.9 million) and Hotels and restaurants (1.8 million) were in third and fourth place (Figure 2).

Figure 2: Employment by age groups and economic activity (1,000)

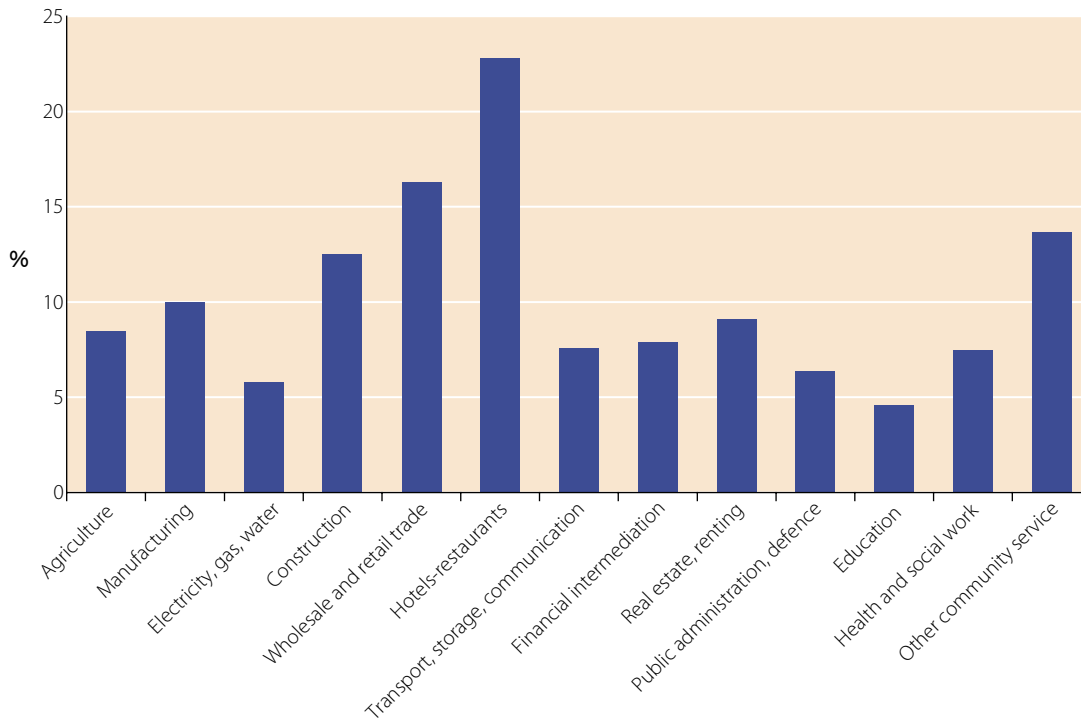


Source: LFS, Eurostat, 2000-2005

The sector with the highest proportion of young workers (number young workers/ working population 15–64 years in the sector x 100) is Hotels and restaurants (22.7%), followed by Trade (16.3%) (Figure 3). These sectors respectively employ 1.8 million and 4.6 million young workers. Typical 'young' occupations are Service workers, shop and market sales workers, Armed forces and Elementary occupations (respective proportion young workers 20%,

18.1%, 13.4%). These figures have important implications for occupational safety and health among young workers because of the specific set of harmful conditions that characterise these jobs: temporary seasonal work, poor employment conditions and physically demanding jobs [5].

Figure 3: Proportion of young workers per sector in %, EU-25



Source: LFS, Eurostat, 2005

Contractual relationships and working time distributions reflect yet another factor contributing to the workplace situation of young people – which is marked by high accident rates and higher exposure to some workplace risks – as well as contributing to their lack of training and experience. In 2005, about 37.5% of young workers were in fixed-term jobs, compared to about 12% of the overall working population (15–64 years). Since 2000 the proportion of young workers who work on a temporary basis has increased by 4.3% (from 33.2%) in comparison to an increase of 1.5% within the total working population (from 10.5%). Studies reveal that people employed on temporary contracts have less access to training and to participation in long-term competence development than workers with permanent contracts. Temporary workers also have less job control in terms of the order of tasks, pace of work and work methods, lower job demands, and are less informed about risks at work [6].

The highest proportion of part-time work can be found at the beginning and at the end of people’s working lives: 25.7% of young workers and 20% of workers aged 50–64 years worked part-time in 2005, whereas full-time employment is concentrated in the middle years (16% part-time workers within the age group 25–49 years in 2005). Within the group of young workers, the proportion of part-time employment shows an increase of 4.7% (from 21% in 2000 to 25.7% in 2005). These results suggest that part-time work may facilitate, at least in a number of countries, the gradual entry of young persons into the labour market (combination school/work) as well as the gradual withdrawal from wage employment of older workers.

Employees with part-time contracts have the following characteristics: working in more favourable ambient conditions, working less at non-standard hours (evening work, night work and weekend work), less control over working time, less skilful work, less training, working in the social sector and hotel/ restaurant sector, and not in construction, working in service/ sales occupations and not as managers [7, 8].

EXPOSURE TO RISKS [3–8]

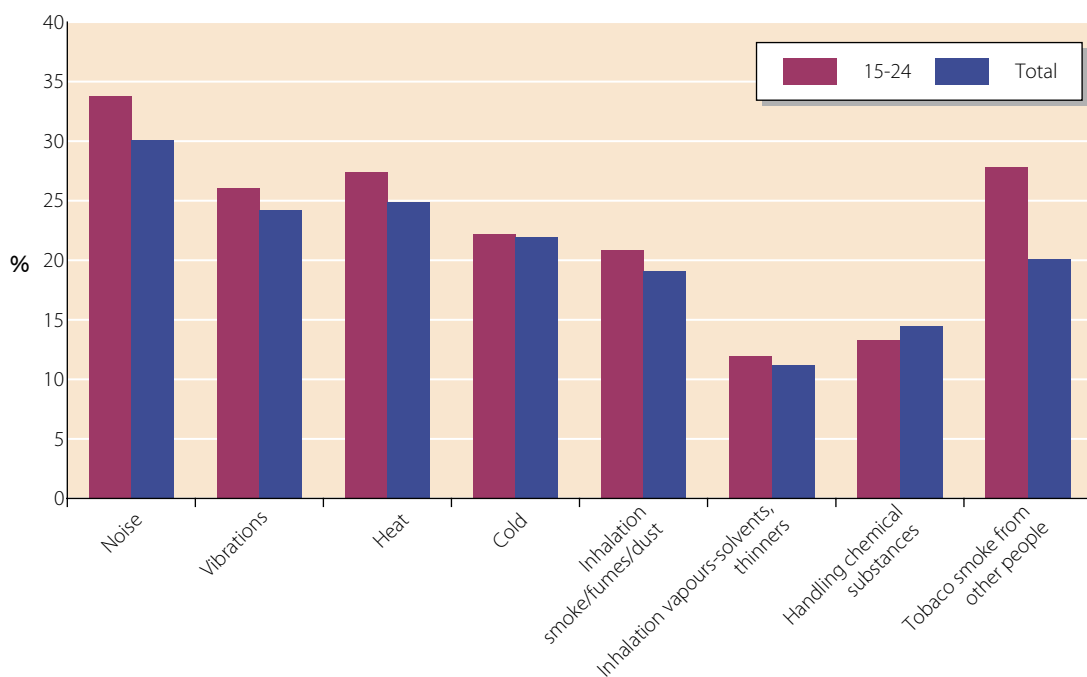
According to the European Working Conditions Survey 2000, young workers are more exposed to the following physical work factors: noise, vibrations, heat/ cold and handling dangerous substances (Figure 4) [8]. National studies and the consecutive survey (2005) confirm these findings [3].

Young people working in Hotels and restaurants and Construction are especially at risk of exposure to loud noise. As call/ contact centre telephone operators, they are thought to be the group of workers most at risk of acoustic shock injuries [9, 10]. In addition to these work-related noise exposures, young people are extensively exposed to loud noise in their leisure time, which increases the risk of hearing damage.

Low frequency whole-body vibration, caused for example by driving or riding in off-road vehicles on uneven surfaces, may be associated with back pain, and other spinal disorders. Young workers may be at greater risk of damage to the spine as the strength of the muscles is still developing and bones do not fully mature until around the age of 25 [11].

Exposure to heat is common among outdoor operations (Agriculture, Construction) as well as in Industry and Hotels and restaurants. The frequency of accidents appears to be higher in hot environments than in more moderate environmental conditions. Dangerous substances appear in various occupational settings where young workers are employed.

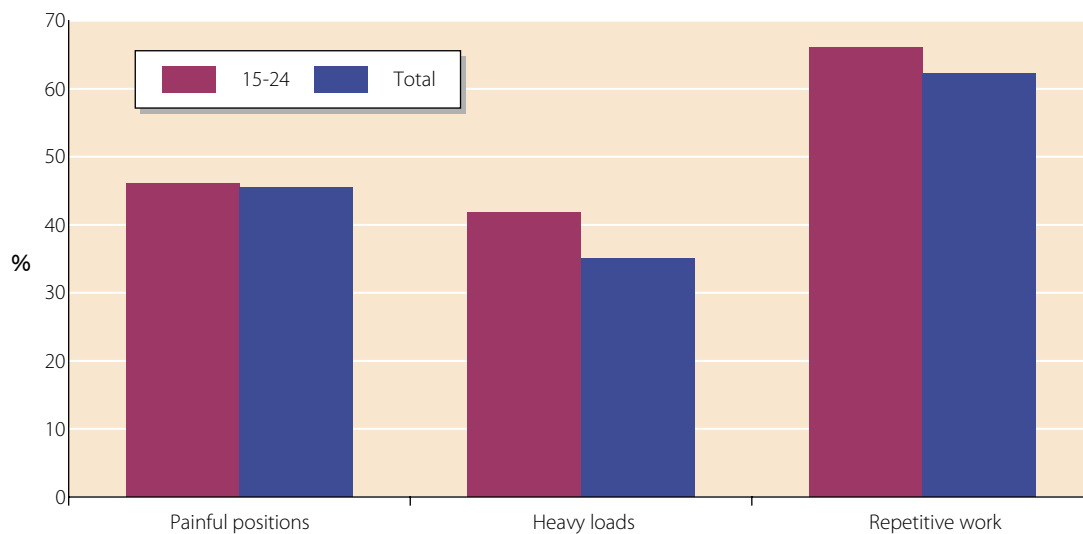
Figure 4: Overview: Exposure to physical work factors: % workers exposed, EU-27



Source: EWCS, 2005

According to survey results, physically demanding work factors (such as painful positions, handling of heavy loads and repetitive work) seem to be more common among young workers than in the average workforce (Figure 5). As a result, young workers are at considerable risk for the development of musculoskeletal disorders (including lower back pain).

Figure 5: Overview: Exposure to MSD-related physical work factors, % of workers exposed, EU-27



Source: EWCS, 2005

Young workers appear to wear more protective equipment than the average working population, but seem to be less informed about occupational risks. In 2005, about 37.8% of the young workers in the EU-27 were wearing personal protective equipment, compared to 34.0% within the total working population. About 19.9% of the young workers were badly or very badly informed about workplace hazards, compared to 16.9% of the total workers. There is evidence that wearing protective equipment and being informed about the occupational risks are very important factors in order to reduce occupational accidents and diseases rates among young workers.

As the pace of life and work continues to accelerate, young people – like all workers – are increasingly confronted with the necessity of working to tight deadlines and at very high speed. And even though surveys suggest that they work fewer hours than the average working population, young people do more shift work and have more irregular working hours.

With respect to psychosocial work factors, young workers report being the subject of unwanted sexual attention more often than the average worker. Young women with precarious jobs in the hotel and service industry are likely to be many times more exposed to the risk of sexual harassment.

HEALTH OUTCOMES

According to the European Statistics on Accidents at Work (ESAW) young workers seem to have a higher accident rate, but fewer fatal accidents than older workers. Young men appear to be particularly at risk (see also Topic 'Young workers and accidents') [12].

According to the European Occupational Diseases Statistics (EODS), around 5% of all occupational diseases in Europe in 2005 are suffered by young workers. The proportion of occupational diseases among young workers has decreased slightly since 2001. The top five occupational diseases within workers aged 15–35 years (no breakdown is available for young workers) are: allergic effects, irritant effects of the skin, pulmonary disorders, infectious diseases and musculoskeletal disorders. Although these results do not show the precise figures for young workers, they can be used as an indication [13]. Young workers have a lower average risk of occupational diseases than older workers. This can be explained by the fact that occupational diseases often need a cumulative exposure and/ or have a

latency period to develop and may not always be recognised due to short-term work contracts. In comparison to chronic occupational diseases, the prevalence of acute diseases such as allergic and toxic outcomes may be higher among young workers. This is because typical selection and ‘the healthy worker effect’ do not have enough time to make an effect [4].

CONCLUSIONS

Europe’s economically active population is getting older. It is expected that people will remain occupationally active for much longer than at present – the retirement age is being moved progressively further into the sixties. Against this ‘grey’ background, young workers are important players. Nevertheless, this group is getting smaller every year. As worldwide research results point out that young workers are a very vulnerable group when it comes to OSH, more attention needs to be paid to improving their occupational safety and health.

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YOUNG WORKERS AND ACCIDENTS

INTRODUCTION

Europe's working population is ageing [1]. In 2005, about 193.8 million people were employed in the EU-25, including 20.4 million workers between 15 and 24 years old. Young workers (15–24 years old) accounted for 10.5% of the workforce. The proportion of young workers had decreased by 0.9% since 2000 while the proportion of workers in the age category 50–64 years increased by 2.1% [2]. The successful integration of young people into work life is therefore vital not only for the young people themselves, but for society and the economy as a whole [3]. One of the ways of ensuring a successful entry by young persons into work life is by paying attention to their health and safety at work. This document presents a picture of occupational accidents among young workers in Europe (see also Topic 'Young workers').

NON-FATAL OCCUPATIONAL ACCIDENTS [4]

According to the European Statistics on Accidents at Work (ESAW), in the EU-15 in 2004 there were about 3.3 million accidents at work resulting in more than three days of sick leave. About 566,430 of these accidents happened to workers aged 24 and below. This group of young workers therefore suffered 17% of all occupational accidents in the EU-15. This proportion has been decreasing slightly since 1995 (Table 1).

Table 1: Occupational accidents with more than three days lost, NACE A-D to K, 1995–2004 (EU-15)

EU-15	Number of occupational accidents			Standardised incidence rate per 100,000 workers		
	< 25	All ages	Proportion – in % – of accidents involving workers aged 15–24 years	<18	18–24	Total
1995	895,578	4,010,491	22.33	3,117	7,308	4,266
1996	708,973	3,963,702	17.89	2,728	5,751	4,229
1997	689,509	3,894,210	17.71	2,398	5,613	4,106
1998	713,844	3,947,552	18.08	2,553	5,725	4,089
1999	750,146	4,058,272	18.48	2,747	5,804	4,088
2000	766,151	4,078,455	18.79	2,485	5,856	4,016
2001	731,213	3,976,954	18.39	2,307	5,529	3,841
2002	662,987	3,688,403	17.97	2,338	5,077	3,529
2003	598,385	3,485,050	17.17	1,963	4,684	3,329
2004	566,43	3,337,906	16.97	1,899	4,481	3,221

The ESAW indicates that workers aged 18–24 years have higher non-fatal accident rates than the other age groups. In 2004, 4.5% of this age group had an occupational accident with more than three days lost, compared to 3.2% for workers as a whole. The lowest rate of non-fatal accidents is among workers under 18 years (1.9%). Within the total EU-15 working population, the rate of accidents resulting in more than three days of absence has been decreasing since 1995 within all age groups (figures 1, 2 and 3). (ESAW data split the young workers into two groups: under 18, and 18–24.)

Figure 1: Standardised incidence rate of accidents at work with more than three days lost and age (rate per 100,000 workers), ESAW

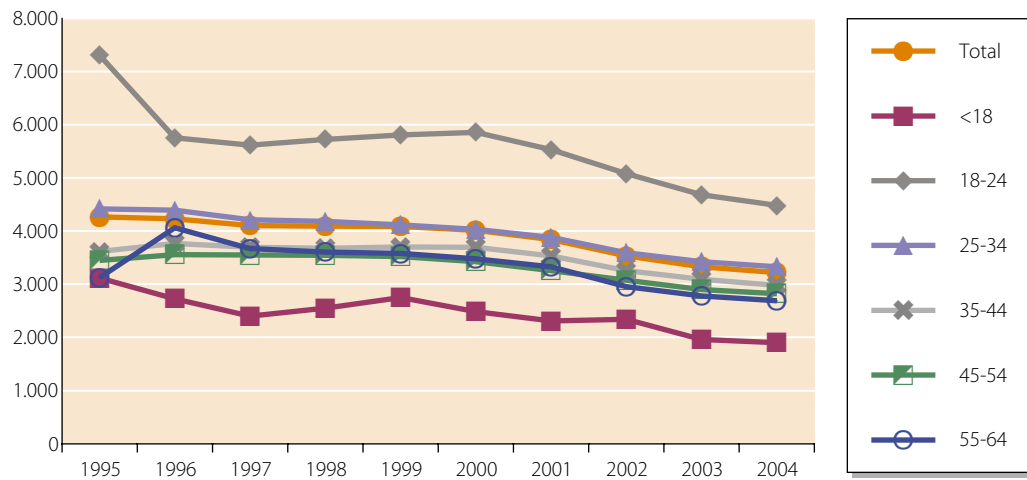


Table 2: Standardised incidence rate of accidents at work with more than three days lost, 2004, ESAW

Age group	Incidence rate per 100,000 workers
Young workers 18–24 years	4.481
Workers 25–34 years	3.326
Workers 35–44 years	2.980
Workers 45–54 years	2.820
Workers 55–64 years	2.686
Young workers less than 18 years	1.899

Even though non-fatal accident rates are higher among young workers, under-reporting of work injuries is one issue that may be particularly relevant to this group [5]. The incidence may be biased due to inadequate data on the nature, amount and seasonal variability of work done by adolescent workers [6]. Under-reporting may also occur due to young workers' lack of knowledge about the reporting process and hesitation to report an injury for fear of losing their jobs [5], as many of them are working on temporary contracts.

FATAL OCCUPATIONAL ACCIDENTS [4]

In 2004, about 3,959 fatal accidents occurred in the EU-15. About 324 of these accidents happened to workers aged 24 and younger. The group therefore represents 8.2% of all fatal occupational accidents within the EU-15. The proportion has been decreasing slightly since 1995 (Table 3).

Table 3: Fatal accidents, NACE A-D to K, 1995–2004 (EU-15), ESAW

	Number of fatal occupational accidents			Standardised incidence rate per 100,000 workers		
	< 25	All ages	Proportion within workers aged 15–24 years as % of total accidents	< 25	All ages	Proportion within workers aged 15–24 years as % of total accidents
1995	575	5,421	10.61	2.4	3.7	5.9
1996	468	4,858	9.63	1.3	3.8	5.3
1997	465	4,949	9.40	2.2	3.7	5.2
1998	453	4,854	9.33	1.9	3.6	5.0
1999	441	4,736	9.31	1.5	3.4	4.8
2000	433	4,638	9.34	1.3	3.3	4.6
2001	348	4,388	7.93	1.1	2.6	4.2
2002	392	4,286	9.50	1.2	3.0	4.1
2003	329	4,112	8.00	1.3	2.5	3.9
2004	324	3,959	8.18	1.0	2.6	3.8

Figure 2: Standardised incidence rate of fatal accidents at work (rate per 100,000 workers), ESAW

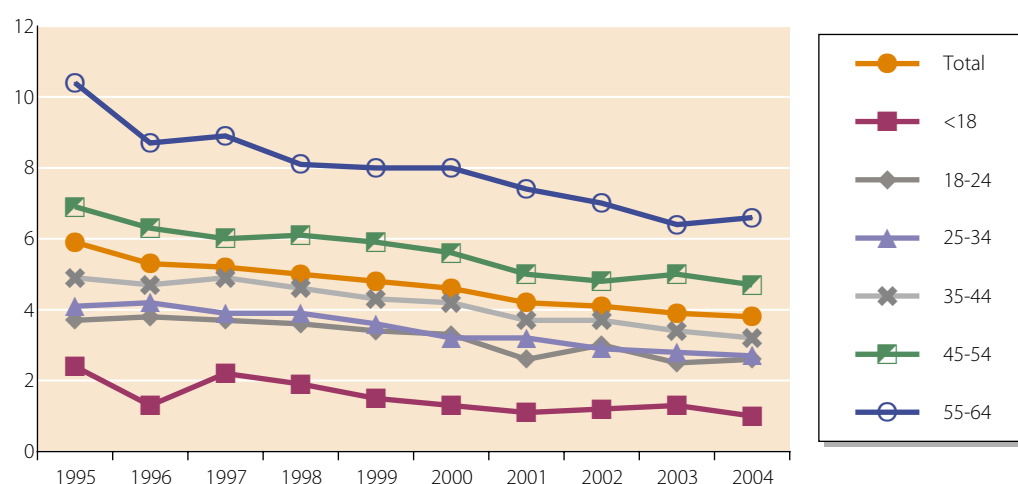


Table 4: Standardised incidence rate of fatal accidents at work (rate per 100,000 workers), 2004, ESAW

Age group	Incidence rate per 100,000 workers
Workers 55–64 years	6.6
Workers 45–54 years	4.7
Workers 35–44 years	3.2
Workers 25–34 years	2.7
Young workers 18–24 years	2.6
Young workers less than 18 years	1.0

SEVERITY OF INJURY

Research concludes that compensated work injuries among young people are not as serious as injuries sustained by adult workers, and rates of permanent impairment indicate that the severity of injury increases with age. This could be explained by the fact that young people have a better impact resistance and recover better from trauma than older workers. In addition, the degree and type of work hazard exposure can differ across age groups. Young workers are concentrated in the retail trade and service sector, resulting in many acute injuries such as cuts, burns and falls [5]. Nevertheless, there are indications that some young workers sustain injuries that have long-term consequences. Permanent impairment among adolescents and young adults, though less frequent than for older adults, is of concern because these long-term health consequences may result in increased need for healthcare services into adulthood. People with permanent disabilities also have reduced earning capacity and increased risk of poverty [6].

Overall, EU figures indicate that accident risks to young workers are decreasing more slowly than for other age groups. Accident prevention measures in this category do not seem to have been as effective as for other workers. This is especially true for accidents in certain sectors, such as fatalities in construction or agriculture. It is a worrying fact that fatal accidents affecting women in retail are due to a high extent to violence.

Some research indicates that young workers might be less targeted by rehabilitation measures, and lower recuperation times of young workers might also indicate a lack of awareness about the risks they are exposed to, and their consequences. Therefore, rehabilitation, back-to-work policies and guidance for how to keep injured workers at work also needs to be refocused to include young workers, especially when they have suffered an injury that leads to a permanent impairment, irrespective of the origin of the injury, and whether it is due to psychosocial or physical risks.

SECTORAL BREAKDOWN OF NON-FATAL AND FATAL OCCUPATIONAL ACCIDENTS [4]

A sectoral breakdown of the incidence rate of occupational accidents resulting in more than three days lost shows a higher incidence rate for young workers between 18 and 24 years within all sectors, compared with the average working population. Young workers between 18 and 24 working in construction, agriculture and manufacturing in particular are at a great risk compared to the average worker (Figure 3). The incidence rate of occupational accidents with more than three days lost among workers under 18 is lower than average within all sectors.

A sectoral breakdown of the incidence rate of fatal occupational accidents shows that young workers (under 18 and 18–24) are less affected within all sectors, compared with the total working population. Agriculture has the highest incidence rate of fatal accidents among young workers, followed by construction and transport and communication (Figure 4).

Figure 3: Standardised incidence rate of accidents with more than three days lost at work by economic activity, severity (rate per 100,000 workers), ESAW, 2004

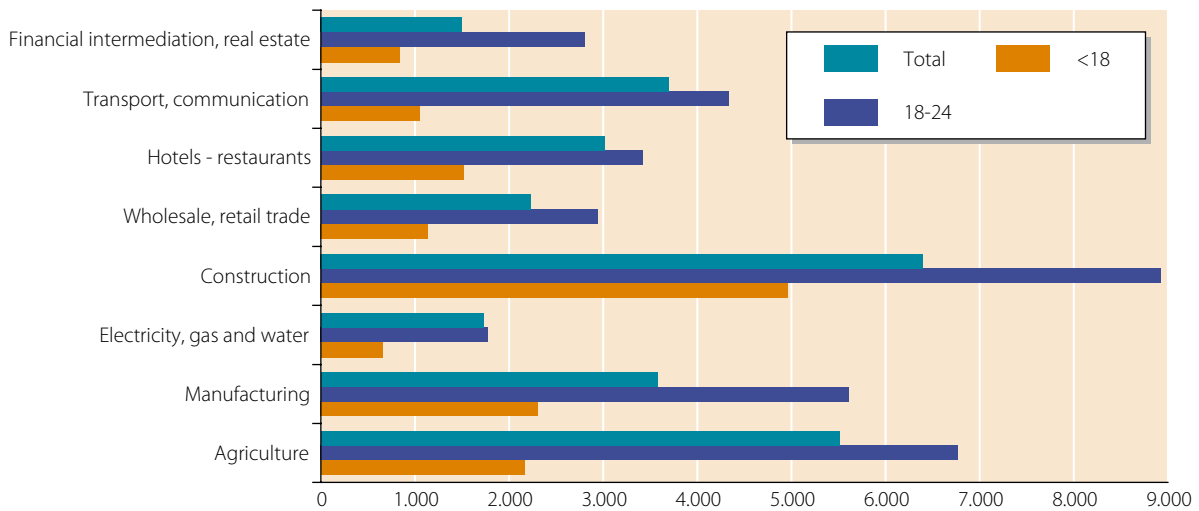
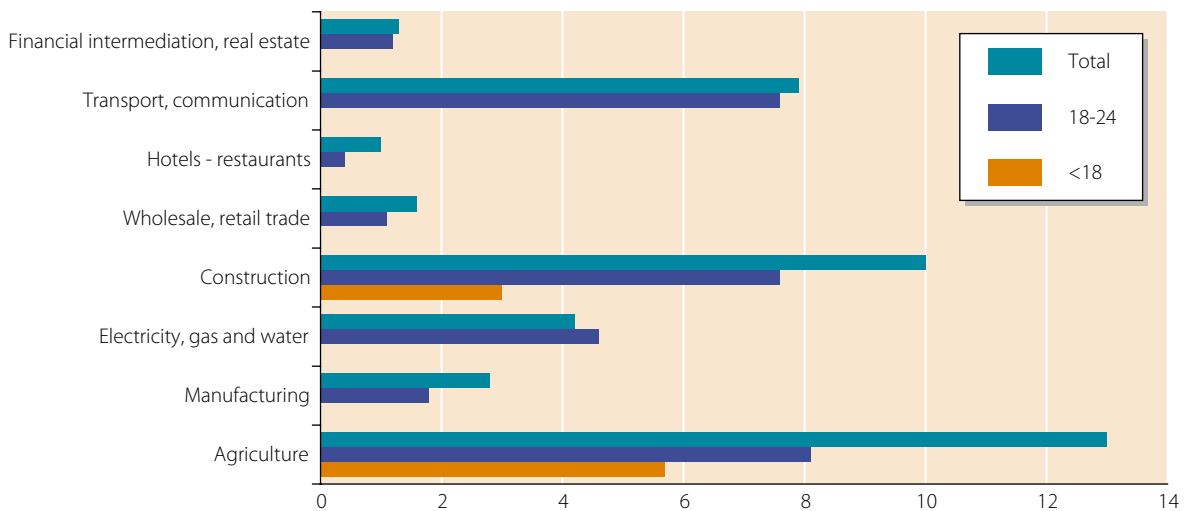


Figure 4: Standardised incidence rate of fatal accidents at work by economic activity, severity and age (rate per 100,000 workers), ESAW, 2004



CONCLUSIONS

Europe’s economically active population is getting older. Against this ‘grey’ background, young workers are becoming increasingly important. Research indicates that young workers are a very vulnerable group when it comes to OSH. In 2004, about 566,430 accidents or 17% of all accidents at work resulting in more than three days of sick leave involved workers aged 24 or under. The incidence rate of non-fatal accidents at work per 100,000 workers is more than 40% higher for 18- to 24-year-olds than for the workforce as a whole. This phenomenon is observed across all sectors of economic activity. In 2004, 324 young workers aged 24 or under died as a result of an accident at work (8.2% of all occupational fatal accidents).

Many of the risk factors for younger workers are seen as inherent to their risk-taking behaviour or the temporary nature of their involvement in work. If they are not in work on a permanent basis, young workers might receive less attention, and less training and guidance will be given to them. Investment in their capabilities tends to be low. This is illustrated by surveys which indicate that young workers receive less training and information on workplace risks. But accident rates and figures on the health impact of accidents show us that young workers are at high risk.

In order to make sure that young workers are protected from negative health outcomes, a two-way approach is recommended. On the one hand the 'mainstreaming' of OSH into education has to be promoted. By making aspects of OSH part of the school curriculum, a culture of risk prevention can be taught to young people [7].

In addition, employers have to establish OSH policies and programmes in order to protect their workers – including the young ones – from harm. Prevention measures need to be targeted at young workers, at their trainers and employers. A sectoral approach could be beneficial in that respect. Occupational risks should be controlled, workloads reduced and training, information and supervision provided. A framework for these OSH policies and programmes can be found in the EU regulations, grounded on two directives: Directive 89/391/EEC of 12 June 1989, on the introduction of measures to encourage improvements in the safety and health of workers at work [8] and the Directive 94/33/EC of 22 June 1994 on the protection of young people at under the age of 18 [9]. Both Directives have been transposed into national legislation of the European Member States. Many Member States have underlined that the Directives and the transpositions have increased awareness of the need to protect young people at work.

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