

The occupational safety and health of cleaning workers



THE OCCUPATIONAL SAFETY AND HEALTH OF CLEANING WORKERS

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Executive summary

The purpose of this report was to provide an overview of the most important issues related to occupational safety and health for cleaning workers, to highlight the main trends and issues regarding the working conditions, hazard exposure and health outcomes, to identify gaps in knowledge and information available, and to formulate recommendations for future studies.

Context

Cleaning is a generic job carried out in all sectors and workplaces, outdoors and indoors, in private companies as well as in public areas. It encompasses a wide variety of tasks. Cleaning services is one of the most dynamic areas of corporate services in Europe and continues to grow, especially in the newer EU Member States. The sector is mainly composed of small and very small companies. Most of the cleaning work is performed as contract cleaning where the cleaners are employed by a cleaning company but work within the premises of one or more “host companies”. The sector also has a large proportion of (sometimes undeclared) self-employed workers, who are mostly found in domestic cleaning. The workforce is predominantly female (77%) and most of the workers are working part-time (70%). In Europe, it is estimated that about 30% of cleaning workers are migrant workers, although this is probably underestimated. [1] [2] [3]

In order to understand the working conditions of the sector and the situation at stake with regard to occupational safety and health, it is important to take into account the specific socio-economic context in which the sector operates. The cleaning sector is under constant competitive pressure. In some cases where the cleaning work is sub-contracted, cleaning companies have to carry the burden of the cost-cutting efforts of their customers who give them very strong constraints regarding high work quality for reduced working hours and price. Health and safety matters are not always included in the customer’s procurement and, instead of being an integral part of the negotiations beforehand, are discussed after the contract is signed. This leaves very little room for the cleaning company to be able to negotiate safe and healthy working conditions for its cleaning workers within the host company. Therefore, the employers, i.e. the cleaning companies, have difficulties in controlling the environment in which the cleaners work although they are responsible for their health and safety. This leads to some situations where the cleaners work in the premises of the customer where they generally have very little power to influence the working conditions and environment, and they often lack the knowledge about their rights. Moreover, cleaning worker often lack training, tools and information in order to perform their work in the best healthy and safe manner. However, the EU social partners European Federation of Cleaning Industries (EFCI)¹ and UNI-Europa² are involved in the sectoral social dialogue for cleaners and develop information material and practical guides for cleaning workers.

Working conditions

Cleaning services include a broad range of activities and are performed in different work environments, such as homes, offices, industries, schools, shops, aircrafts and hospitals. The risks that cleaners may be exposed to therefore depend on the tasks they perform but also on the premises they work in.

Chemical hazards

Cleaners’ exposure to chemicals depends on the type of products used as well as on the characteristics of the working environment in which they are used (for example the efficiency of ventilation during and after cleaning) and the conditions of use (such as frequency, quantity, application mode and cleaner’s breathing rate). Cleaning workers may be exposed to a broad range of different chemicals:

not only contained in the cleaning products that they use, for dust and dirt removal, disinfection, surface maintenance, etc., such as volatile organic compounds (VOCs) (e.g. acetone, formaldehyde, halogenated alkanes), surfactants, film formers (such as wax), complexing agents (e.g. EDTA), acids

¹ <http://www.feni.be>

² <http://www.uni-europa.org/>

(e.g. hydrochloric acid) and bases (e.g. potassium hydroxide), biocides, additives such as colour pigments and fragrances;

but also from the substances contained in dust, dirt, soot which can be for example aerosolized and inhaled when being cleaned, such as VOCs, surfactants, quartz, minerals and other inorganic substances (for example, trace metals).

In addition, over-dosage, mixing different products or the incorrect use of some cleaning products may create unexpected chemical reactions and release dangerous substances. For example, some chemicals may have irritant properties at low concentrations and be corrosive at high concentrations, e.g. acids or bases. Some chemicals may for instance cause breathing problems if over sprayed, used without adequate ventilation or sprayed onto hot surfaces for example. Therefore, when assessing the chemical risks that cleaning workers may be exposed to, **the chemical substances present in dirt, dust, soot particles, etc. being cleaned, as well as the characteristics of the environment and the work process have to be taken in account in addition to the chemical components of the cleaning products used.** Depending on the chemical substances involved, different types of health outcomes may be caused such **irritation of the eyes and mucous membranes, skin dermatitis, respiratory disorders, including asthma, and cancers.** The chemicals contained in some cleaning agents may also be **flammable or explosive.**

Biological hazards

In addition to chemical hazards, cleaning staff can be also exposed to different types of biological agents such as micro-organisms (bacteria, viruses and moulds) and their products, such as fungal secretions and bacterial endotoxins present in dust as well as in aerosols created during the cleaning process, including when vacuuming. The main exposure routes are the same as for chemical hazards, meaning mainly inhalation and dermal uptake, and incidentally ingestion. Cleaning workers may also be exposed to blood-borne pathogens - in particular in the healthcare sectors and in public places where they may come in contact with contaminated needles and sharps encountered at their workplace - as well as to pathogens contained in body fluids. Possible contact with animals (e.g. pets, rodents and birds) and their secretion and droppings, as well as with insects (e.g. mosquitoes) may also put cleaners at risk. Infection with the Human Immunodeficiency Virus (HIV) and hepatitis B (HBV) or C (HCV) viruses are the most common risks. HIV causes AIDS and the hepatitis viruses cause inflammations of the liver. Indications of associations between cleaning activities and infection with Hepatitis A virus and Noroviruses were also found.

Physical hazards

Physical hazards encountered in cleaning work encompass among others **falls from ladders, elevated platforms and wet or slippery floors, falling objects, sharp objects, moving or rotating machinery parts**, no only from the work equipment used but also from the environment where the cleaning work is performed.

Cleaning work is rather **physically demanding and strenuous for the musculoskeletal and cardio-respiratory systems.** Cleaners often work in awkward postures, bent forward and with twisted backs, because of the poor ergonomic characteristics of the cleaning equipment or of the work environment (e.g. confined places). At the same time, they sometimes have to lift heavy pieces of furniture or work equipment. They daily perform a high number of repetitive movements which sometimes require the application of high forces, for example when scrubbing. The hazards linked to the poor ergonomics of work equipment, such as buffers, mops or vacuums, are strongly related to the particular tool used and also to whether it is adapted to the characteristics and specific needs of the worker taking into account their anthropometry, physical strength, etc.. This combination of factors, to which they are in many cases, puts them at **high risk of developing musculoskeletal disorders (MSDs).** Adequate work equipment and training on how to use it correctly are crucial. Cleaning companies and host companies should consult the cleaning workers in order to buy equipment adapted to their needs, and to design and equip premises to be cleaned, for example hotel rooms, with ergonomic furniture (e.g. beds and furniture easy to lift).

The use of **vibrating equipment** can reinforce negative effects of physical strain such as awkward postures, handling heavy loads, etc., and lead to MSDs, numbness in the limbs and neurological disorders in the hand-arm system (carpal tunnel syndrome, white finger syndrome).

Noise to which cleaners are exposed tend to be overlooked and considered as “only” a comfort issue as they are generally below the action limit value of 85 dB(A) set in Directive 2003/10/EC³. However, some cleaning machines produce noise levels that contribute to generating stress in cleaners, especially when several cleaning machines are used simultaneously, and may even lead to collisions and accidents when they cover the sound of other people or vehicles approaching.

Defective electrical tools and equipment, appliances, wiring, switch panels and electrical outlets or transformers are a source of **electrical hazards**. Once the right equipment has been selected to minimise risk, employers have to maintain it according to the equipment Directive in order to ensure that hazards do not develop, such as electrical hazards from worn cables. For high risk equipment such as rotary disc machines where damage to cables is common, cleaners should visually inspect the electrical cables before each use.

Heat stress can occur in hot environments, which is mostly the case for cleaning tasks in restaurant kitchens, washing rooms, etc. Working in hot and humid atmospheres can result in heat rash, intertrigo (chafing), skin maceration and supervening bacterial or fungal infection, especially in overweight and diabetic individuals. Direct contact of the skin with external heat sources such as **hot objects or surfaces** might result in occupational thermal injuries such as contact burns and heat urticaria.

In the healthcare sector, not only medical staff but also cleaning and maintenance staff can be exposed to high levels of **static magnetic fields inside Magnetic Resonance Imaging (MRI) rooms** or inside the bore of the magnet. The static field of sometimes very high intensity is permanently present, even when the MRI is not in use. Besides, cleaners can be exposed to static magnetic fields of Nuclear **Magnetic Resonance spectroscopy (NMR-spectroscopy)**, of which the magnet capacity is generally higher than in the MRI scans. There are some indications that the exposure levels measured represent a risk for wearers of metallic implant such as pacemakers.

Work organisation and psychosocial factors

Cleaning enterprises are under increasing pressure to deliver more flexible and cheaper services. As a consequence they often opt for a work organisation that reflects these **increased demands for flexibility**, sometimes at the detriment of the cleaners' health and well-being: flexibility in the employment schemes of staff (fixed-term contracts, agency temporary employment, etc.) in order to respond quickly and accurately to the demands from the customer; flexibility in terms of working times (part-time work, change of work shift at short notice, etc.); and flexibility in the tasks to carry out in order to accommodate the clients' needs.

In terms of **working hours**, cleaning is mostly performed outside the usual daily working times, generally in the morning (from 6am to 9am), evening (from 6pm to 9pm) or at night so that it does not interfere with the daytime “core” activities of the host company. However, this may lead to adverse effects for cleaning workers, such as working at unsociable hours, social isolation, disruption of work-life balance, fatigue, higher risk of being victim of violence, or higher exposure to dangerous substances because of ventilation/air-conditioning systems being turned off. Although social partners have been striving to promote daytime cleaning, highlighting the advantages both for the workers and customer (e.g. increased workers' satisfaction and hence efficiency; reduced energy bills), not all EU countries have yet implemented it.

The fact that cleaning workers are often in a **precarious employment situation** also contributes to work-life conflicts. In addition, cleaning workers who want to attain the equivalent of full-time employment often have to combine different kinds of interrupted rosters, which does not improve their work-life balance. The **fear of job loss** linked to precarious employment contracts and to the instability of the labour market adds a burden on the cleaning workers' well-being and mental health.

³ Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC). OJ L 42, 15.2.2003, p. 38–44.

The workload of cleaning workers is generally high mostly because of **work intensification** and **high pace of work** - which are among the main stressors to cleaners - deriving from the demands for an increasing flexibility and productivity from employers and customers. Job contents are sometimes **repetitive, monotonous and strenuous** and cleaners have in general **little control over the work organisation and their job**. In addition, they sometimes have to adapt rapidly to unplanned situations for example in order to meet ad-hoc, additional demands from the customer.

Reducing the workload and enriching the job content, developing more team-based jobs and combi-jobs (i.e. jobs that combine cleaning with other tasks such care-taking) could be introduced to improve the negative organisational and psychosocial aspects of cleaning work.

The social partners, and in particular EFCI and UNI-Europa at European level, have developed good information material and practical tools to tackle some of the above mentioned risks for cleaning workers.

Occupational accidents and diseases

Quantitative data on occupational accidents and diseases in cleaners are not always available. One reason is the fact that, although the cleaning industry is defined in the NACE code, cleaning jobs are in practice spread over different sectors and it is therefore difficult to put monitoring systems in place. In addition, a significant part of the cleaning workforce, especially in private households, is undeclared and not included in any health surveillance and OSH monitoring systems, which also complicates the issue of data collection. Therefore, it was not possible to carry out an exhaustive data collection on health outcomes in cleaners in all Member States in the scope of this report. However, some data could be found:

- on occupational accidents from Belgium, Germany, Portugal and the UK; and
- on occupational diseases from Belgium.

Regarding **occupational accidents**, although the data found cannot be extrapolated to a European level, they still provide an indication of the main trends and causes of accidents in the sector. **Most injured body parts are hands and fingers, feet and ankle, upper limbs and back**. The most important causes of accidents are “**slips and falls**”, “**manual handling**” of loads (lifting, carrying) and “**moving objects**”. The most frequent consequences are **contusions, sprains and fractures**. Although women represent the largest part of employees in the cleaning sector, the figures indicate that more men suffer an occupational accident than women. This may be explained by the gender distribution of the work where men are employed more often in higher-risk cleaning activities such as industrial cleaning, refuse cleaning and window cleaning.

The official data on recognised **occupational diseases** for the cleaning sector collected from Belgium do not show any real trend in the disease figures between 2001 and 2006. Contrary to the accident figures, **about 90% of the victims are women and 47% are 45 years or older**. The most common official occupational diseases in the sector in Belgium are **skin diseases and tuberculosis**.

Some research studies on **work-related diseases** in cleaners found from Belgium, Denmark, Finland, Germany, Norway, Portugal, Spain, Sweden, and the UK complement these data and indicate that **MSDs, respiratory diseases and skin diseases** are the most common negative work-related health outcomes found in cleaners. In addition, it seems that the **incidence rate of disability is higher** amongst cleaners than in other workers' groups, and that **long-term diseases are more common** in the cleaning sector. Also, **cleaners go more often on early retirement** due to work incapacity than the general workforce. Skin diseases, such as dermatitis and (contact) eczema, are one of the most frequent work-related diseases in cleaners due for example to dermal exposure to chemicals and biological agents, frequent wet work, and mechanical abrasion of the skin due to the work. An **elevated risk for asthma** in cleaning workers was also found. Indications of associations between cleaning activities and **cancers** (cancer of the pancreas, liver, bladder, lungs, cervix, brain glioma, esophageal squamous cell carcinoma, gastric cancer, leukaemia and non-Hodgkin's lymphoma) **as well as reproductive health disorders** were also found. Last but not least, the prevalence of **mental ill health** due to poor organisational conditions tends to be significant in the sector.

Challenges and need for further research and actions

A number of challenges for the sector remain. The data and research available clearly suggest that the prevalence of health problems in the cleaning workforce is high. However, most studies give only a fragmented view of the cleaning occupation, the focus of most of the studies in cleaning being indeed on specific elements of the cleaning work or health outcomes, rather than on the cleaning occupation as a whole. There is therefore a need for scientific studies adopting a global approach of the risks and issues for the sector, taking in account combined exposure to several risk factors. Efforts should be made to develop monitoring systems and health surveillance in cleaners, down to the level of the different types of cleaning jobs, in order to be able to better identify the risks, the groups at risks, the health problems and the needs for prevention.

Last but not least, although social partners increasingly collaborate at the European level and strive to produce and disseminate health and safety information for the sector, there is still a need to improve the situations in terms of workers' access to training and the awareness for OSH down to employers, "host companies", cleaners themselves, and even to further actors whose work highly impact on the OSH situation of cleaning workers such as architects or designers and manufacturers of hotel room furniture or cleaning equipment.

1. Introduction

Professional cleaning is a basic service occupation that is an integral part of different industrial sectors and workplaces, outdoors and indoors, including public areas, and comprises a wide variety of tasks.

The cleaning services represent one of the most dynamic areas of corporate services world-wide, including in the EU Member States. The cleaning “sector” generated a turnover of over 54 billion Euros in 2006 in the 20 European countries⁴ covered by the survey of the European Federation of Cleaning Industries (EFCI) [3]. The number of companies in this sector has grown continuously since 1989 (31,809 contractors in 1989; 47,439 in 1996) up to **129,000 cleaning contractors** in 2006 that employed about **3.6 million workers**. However, the real figures are **considered to be higher** due to the high number of unregistered workers in the profession. This growth is particularly important in the newer Member States. The cleaning sector is, in terms of company dimensions, mainly composed of **small and very small companies**. There are also many self-employed cleaners. In 2006, **about 89% of the cleaning companies had less than 50 employees** and only 11% had more than 50 employees. On average at EU level, **about 70% of the employees in the sector work on a part-time basis**. The other characteristic of the cleaning sector in terms of employment is the high proportion of women in the cleaning workforce: **77% cleaning workers were women** in 2003.

Industrial cleaning work is generally performed as **contract cleaning**, where the cleaners are sub-contracted, i.e. are employed by a cleaning company, but work within the premises of one or more “host companies”. Their employer, i.e. the cleaning company, is responsible for their health and safety, but is not in control of the environment in which they work. The services offered by such cleaning companies are most often designed for enterprises and organisations and are only occasionally found in private households. [2]

Another type of cleaning workers is those directly employed by the organisation where the cleaning work is performed. They are hired on a freelance basis or are part of the staff of the company. This is mostly the case in hotels and catering services or schools. **These employees are not included in the employment and accident and disease figures of industrial cleaning, but are included in the figures related to these specific sectors.**

In private households, cleaners are generally self-employed. However, these activities are often **“undeclared”**, meaning that they are not known to the authorities. Many “illegally” employed workers, who do not comply with the requirements of the national laws, are found in cleaning jobs. This is for instance the case of immigrant workers, staying in the country on an illegal basis, or not having the right to work in the country. **This hinders the real estimation of the number of individuals operating in the cleaning activities.** [4]

The purpose of this report is to provide an overview of the most important issues related to occupational safety and health for the cleaning workers; to present some quantitative data available at European level as well as at national level from some EU Member States in order to highlight the main trends and issues regarding the working conditions, exposures and health outcomes; to identify gaps in knowledge and information available; and to formulate recommendations for future studies.

Since the cleaning sector covers very disparate activities, the scope of this report was limited to cleaning jobs in workplaces where similar cleaning techniques are required, such as:

- office cleaning;
- cleaning in the education sector;
- cleaning in catering, hotels and restaurants;
- cleaning in health care and hospitals;
- domestic cleaning (cleaning in private households); and
- industrial cleaning.

This means that the report, for the most part, excludes cleaning jobs characterised by very specific techniques and risks such as: façade and window cleaning, street cleaning, industrial maintenance

⁴ Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom

cleaning and parts cleaning (machinery and equipment), disinfection of workplaces and buildings, maintenance of areas around buildings, chimney sweeping, waste collection services, etc.

It should be noted that in the revision 2 of the NACE code entered into force on 1 January 2008, cleaning is defined as a sub-sector on its own in section N “Administrative and support service activities”, class 81.2 “Cleaning activities” which includes:

- 81.21 “General cleaning of buildings”
- 81.22 “Other building and industrial cleaning activities”
- 81.29 “Other cleaning activities”.

However, until January 2008 and in many studies referred to in this report – such as the survey from the European Federation of Cleaning Industries (EFCI) [1] - “cleaning industry” was understood in reference to the NACE classification revision 1, section K, division 74, group 74.7: “industrial cleaning”.

2. The European cleaning industry in figures

The findings below are mainly based on a sector report commissioned by the European social partners UNI-Europa (workers' group) and the European Federation of Cleaning Industries - EFCI (employers' group) as well as on the results of the EFCI's survey on the cleaning industry in Europe conducted in 2003 in 18 European countries⁵ [1]. It should be noted that, in the EFCI's survey [1], "cleaning industry" has to be understood in reference to the NACE classification – REV. 1, section K, division 74, group 74.7: "industrial cleaning" (before the second revision of the NACE code in use since January 2008). A more recent survey carried out in 2006 covered 20 countries (18 Member States, Norway and Switzerland⁶) [3].

Although this report does not intend to give an exhaustive picture of the sector's situation in Europe, it presents a number of key issues which explain the contextual factors that directly or indirectly affect the cleaning sector.

2.1. Number of cleaning companies

Since 1989, the number of companies in this sector has grown continuously and has almost tripled in the last 10 years (31,809 contractors in 1989; 47,439 in 1996; and 129,000 in 2006) [1] [3]. In The Netherlands, for example, the number of cleaning companies grew from 5,000 in 2003 [1] to 8,000 in 2008⁷. This growth is particularly important in the newer Member States. In 2006, the about 129,000 cleaning contractors employed about 3.6 million employees in the 20 countries covered by the EFCI survey [3].

Table 1: Number of companies and employees in 2003 in the 18 European countries included in the EFCI survey [1]

Country	Number of companies	Number of employees	Mean number of employees by companies
Austria	2,800	48,000	17
Belgium	1,613	53,544	33
Czech Republic	2,837	26,000	9
Denmark	5,000	60,000	12
Finland	3,099	36,000	12
France	13,882	375,000	27
Germany	6,874	840,867	122
Hungary	5,000	71,000	14
Italy	16,000	292,000	18
Luxembourg	63	4,235	67
Netherlands	5,000	200,000	40
Norway	2,213	22,791	10
Poland	5,600	270,000	48
Portugal	1,500	45,000	30
Slovakia	350	40,000	114
Spain	9,074	254,000	28
Sweden	5,045	36,800	7
United Kingdom	8,200	390,000	48

⁵ Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom

⁶ Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom

⁷ Data from the employers' organisation in The Netherlands provided by EU-OSHA's Focal Point

2.2. Turnover

The turn-over generated in 2006 amounted to over 54 billion Euros [3], compared to 44.5 billion in 2003 [1]. The 2006 figure shows an increase of 8.18% compared to 2005, while the Gross Domestic Product (GDP) growth in Europe over the same period was limited to an average of 3%. The sector has recorded an almost continuous growth since 1989. The sector's steady and sustainable growth can be explained mainly by the evolution of the market penetration of cleaning companies due to the continuous outsourcing of services. The estimates show that, on average in all European countries, the market penetration (i.e. the share of the global cleaning services contracted out to specialised cleaning companies, the difference being performed in-house) increased from 43% in 1989 to 62% in 2006.

The analysis of turnover by country in 2003 shows that Germany, France, Italy and the United Kingdom, were the four largest national markets (Table 2).

Table 2: Turnover by country in 2003 [1]

Country	Turnover	
	in million €	in %
Austria	340	0.76%
Belgium	1,062	2.00%
Czech Republic	460	1.00%
Denmark	1,550	3.00%
Finland	940	2.00%
France	7,605	17.00%
Germany	10,114	23.00%
Hungary	520	1.00%
Italy	6,220	14.00%
Luxembourg	70	0.16%
Netherlands	2,286	5.00%
Poland	950	2.00%
Portugal	350	0.79%
Slovakia	6.6	0.01%
Spain	3,948	9.00%
Sweden	2,044	5.00%
United Kingdom	5,162	12.00%

2.3. Market segment

The breakdown of turnover by market segment shows the development of the sector in terms of activity.

Over the last decade, the share of office cleaning has shown a trend slightly downwards as a result of the diversification of activities towards integrated services and facility management such as industrial cleaning (including the hygiene of food chains), specialised cleaning services (hospital cleaning, etc.), façades and window-cleaning, cleaning of public transport, cleaning of schools, etc.. These services represented almost half the sector's turnover (47%) in 2006 [3]. They all involve the use of sophisticated equipment as well as specific training for employees. However, office cleaning was the core activity of the cleaning companies in 2003, representing 55%⁸ of the total turnover (Table 3), and still represents the main activity of the cleaning market in Europe in 2006 [3].

⁸ The EFCI recommends taking these figures as estimations because the gathering of information is done using different sources and breakdowns, or in some cases there exists no systematic national data collection.

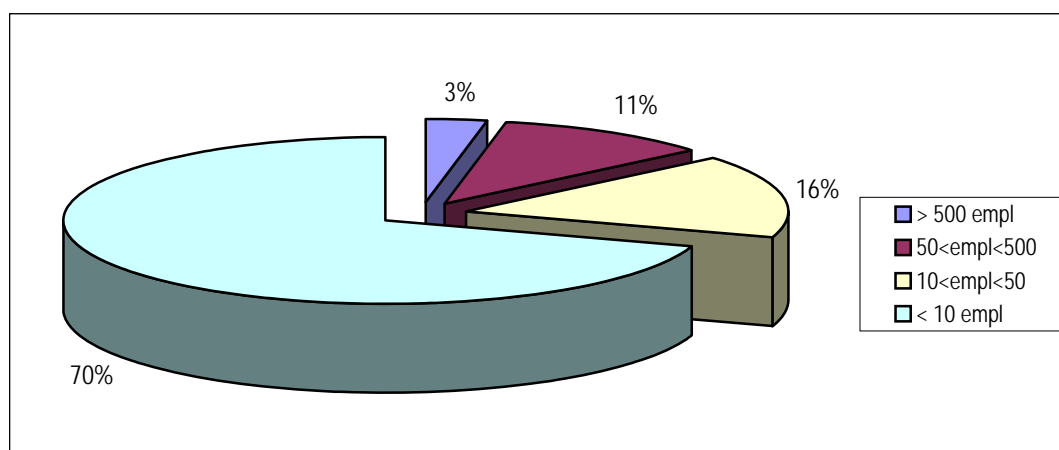
Table 3: Breakdown of the turnover by market segment in 2003 [1]

Market segment	Turnover
Offices	55.4%
Industrial (e.g. food, high-tech)	11.7%
Specialized cleaning (e.g. hospitals)	7.0%
Others (e.g. facade cleaning)	6.1%
Associated services (e.g. catering)	4.8%
Windows	4.5%
Public transports	4.0%
Schools	3.4%
Retail	2.0%
Services for individuals	1.1%

2.4. Companies' size

The cleaning sector is, in terms of quantity, mainly composed of small and very small companies. In 2006, 89% of the cleaning companies had less than 50 employees and only 11% more than 50 employees [3].

A more detailed analysis of the company size in 2003 [1] shows that **very small companies with less than 10 persons largely dominate the cleaning industry** (Figure 1). However, companies employing more than 500 persons (3% of the companies) generated almost half of the total turnover in the industry.

Figure 1: Breakdown by company size in 2003 [1]

2.5. Employment in the sector

In 2006, the cleaning industry employed about 3.6 million people in the 20 countries covered by the EFCI survey [3]. This represents an increase of employment by approximately +3.5% compared with 2005. Over the last ten years, the number of employees in the sector has grown constantly. On average over that period, employment grew by almost 5.5% annually. However, the real figures are considered to be higher due to the high number of unregistered workers in the profession.

More detailed data from 2003 [1] show that Germany remains the biggest employer (27% of the workforce). In 2003, four European countries employed 70% of the total workforce (France, Germany, Italy and the UK) (Table 1).

The sector is commonly characterised by a significant staff turnover as a consequence of the precarious employment conditions (temporary and short-fixed term contract) but also due to the importance of undeclared or partially declared work [2] [5] [6] [7]. However, no figures were found on the turnover in the sector [8].

2.6. Characteristics of the workforce

2.6.1. Status

Operational cleaning staff or blue-collar workers represent the biggest part of the workforce (around 86.2% in 2002). Managers, executives and technical and administrative staff are only a small part of the workforce. The workforce in the traditional cleaning activities is mainly unskilled or low-skilled. The sector is not very selective in terms of education and experience. It means that the cleaning sector may offer employment opportunities to people who have difficulties in finding employment in other sectors more demanding in terms of skills. However, this might progressively change in the years to come due to a growing professionalism, diversification and specialisation of the cleaning activities. [9]

2.6.2. Gender

Women are the majority of the workforce in the sector. They represented **about 77% of the total workforce in the cleaning industry** in 2006 [3]. Reasons can be sought in the nature of the activities – society has traditionally considered cleaning activities as being a women’s job - but also in the fact that the availability of part-time positions in the cleaning sector predominantly attracts women. **Less than one fourth (24%) of managers in the cleaning industry are women.** [1]

2.6.3. Age of the workforce

As it is the case in all business segments, the share of older persons in the cleaning sector will significantly rise from 2010 due to the ageing of the population in general. Little data on the age of the workforce has been found. According to a Finnish article on the cleaning sector, 50% of the cleaners were over 45 years old in Europe in 1999 [10]. In Belgium, about 27% of cleaners were older workers in 2005. The number of older workers increased on average by 1.3% per year from 2003 to 2005 [11].

2.6.4. Migrant workers

A large proportion of workers in the cleaning industry are migrant workers. In the European Union, the estimation of their proportion in the workforce is around 30%. According to the EFCI survey, the proportion of migrant workers is particularly high in Austria (70%) and Sweden (53%). [1]

Again, these numbers need to be treated with caution, as it is not clear from the EFCI survey whether all EU countries (EU-15) were included in the statistics. Some of the candidate countries were included in the figures. Further issues are not either entirely clear, for example whether second and third generations are also included in the percentage of “immigrant employees” in the EFCI survey. This means that it is impossible to understand the full complexity of the issue and to compare these national data.

3. Contextual framework

Several aspects that are part of a larger socio-economic context have an impact on the working conditions in the sector and the safety, health and wellbeing of the workforce.

3.1. *Competition and subcontracting*

3.1.1. Competition

The cleaning sector has undergone constant rationalisation from the 1980s onwards aiming at improving the productivity and cutting costs [2]. A large number of companies, many of them being small and medium size enterprises are under constant competitive pressure.

According to a joint study developed by the Free University of Brussels with a field study in three European countries (Belgium, Spain, UK), unfair competition is an important factor shaping the sector.

Other factors that have an important effect and are causing a strong competition include:

- Undeclared or illegal employment,
- Low or no skill requirements to get a job in the profession
- Customers asking for the cheapest solution and contracting the service company that can provide the best price. [12]

Since approximately 80% of the costs billed to the customers are labour costs, cost-cutting often means reducing the number of staff, increasing work intensity, deteriorating the standards of the health and safety conditions, etc. Some companies do not respect labour laws and drive down prices. Cleaning services are sometimes offered at prices that are below the national minimum wage or the collectively agreed minimum. The pressure on the enterprises also has a negative effect on the quality of the services, which in the long run can jeopardise the revenue of the sector. [12]

All these factors leave very little room for a long-term vision and investments and have a clear negative effect on the working conditions and the training possibilities of the workers.

In addition, this situation hinders the establishment of a good policy for retaining workers in work. The sector is not always perceived very positively, companies face difficulties in retaining and recruiting qualified people. Jobs in the cleaning industry have traditionally suffered from low status and a lack of training and career opportunities. [2] [12]

3.1.2. Subcontracting

The factor of competition is closely linked to subcontracting. Companies have progressively outsourced their cleaning activities in order to reduce costs. Since the financial aspect is important, the pressure of cutting costs is shifted towards the cleaning companies that are, however, confronted with very strong constraints from the customer regarding work quality, working hours and price. Customers very often seem to base their business decisions on the financial issues alone and pay less attention to the health and safety of workers.

▪ *Impact of subcontracting on the workforce*

The reality of subcontracting leads to very specific occupational situations for cleaners.

They work on the premises of the customer, and are thus directly affected by the working conditions of the customer but are not in the position to negotiate improvements in these working conditions. In addition, if a new or next contract is negotiated with another customer, their work situation and conditions can change from one day to another but they have no possibility to have a say on this. Cleaners are caught in between being under pressure from the customer as well as from their own employer. [2]

3.2. Undeclared work

The fact that the sector faces fierce competition and struggles with high staff turnover increases the opportunities for illegal work. Although different sources acknowledge the existence of illegal labour, no concrete figures are available. [2] [5]

A Polish study [13] on employment of foreigners in Polish households in 2001-2002 showed that the majority of foreigners employed in households are illegal workers, originating mainly from Ukraine, Belarus and Russia. The number of undeclared migrant workers is estimated to be several times greater than the one of workers in possession of individual work permits in Poland and its neighbouring countries. Undeclared workers are mainly found in jobs that do not require high qualifications, including household duties and cleaning – as well as construction work, farm work, care of elderly and children. They are often found in the lowest market segments that are regarded as unattractive by native workers, and have few rights, if any [14].

A Norwegian survey on wage disparities between Norwegian and Polish workers in Norway found for instance that illegal work is most common among self-employed individuals. In the cleaning services sector, which has the largest proportion of self-employed individuals, 84% of workers operate illegally or in a grey area. [15]

In order to create new employment opportunities for the sector, and to open the cleaning sector towards private individuals, different countries have introduced service cheques or vouchers for instance in Belgium, France or Germany. This is supposed to create job opportunities for unemployed people with a low level of education and to achieve a shift from unregistered labour towards registered labour in the sector [16].

The cheques enable users to buy household services and include health and accident insurance contributions. The cheque seeks to facilitate and promote legal 'quasi-employment' in the area of household-related services. By paying with the cheque, the (quasi-)employer fulfills all social insurance obligations on behalf of the worker who - for his or her part - has to declare all the cheques received for the work. In Belgium the vouchers can for instance be used for the following private services to individuals: cleaning, gardening, ironing, preparation of meals, doing groceries. More than 90% of the vouchers are used for cleaning activities. Although the cheques are intended to create sustainable jobs, in practice, the cheques have sometimes the opposite effect by creating more precarious short term contracts. [12] [16] [17]

3.3. Cleaning companies and health and safety

3.3.1. Procurement

In order to be chosen by the customer, cleaning companies have sometimes to respond to very competitive calls for tender. In some cases it is difficult for the cleaning company to influence on the customer so that a safe working environment is provided to cleaning workers. Instead, cleaning companies sometimes have to accept a contract knowing that the health and safety requirements will not be met for their cleaning workers, or they lose the contract. This means that to a large extent the customer decides on the cleaners' working conditions.[2]

Often, health and safety matters are not included in the customer's procurement and are first discussed ad-hoc after the contract is signed instead of being an integral part of the negotiations beforehand.

According to the sectoral study from UNI-Europa and EFCI, customers are not always ready to make necessary changes and fail to resolve dangerous situations even if this is brought to their attention. The level of occupational health and safety for the cleaners is very dependent on the customer's attitude towards this issue. This means that cleaners from the same cleaning company may work in very different conditions depending on the customer they work for. [2]

Key issues that can lead to problems for the cleaners are:

- lack of coordination between the cleaning company and the customer;
- the customer requires the cleaners to do additional work not mentioned in the contract and for which they are not prepared or do not have the necessary tools. [2]

3.3.2. Workers' participation

Another aspect mentioned in the sectoral study by UNI-Europa and EFCI [2] was the fact that even when there is a prevention culture in the host companies, the cleaners are often left outside of OSH measures and policies and lack the necessary tools and information to adopt a safe and healthy working attitude. Efforts in this respect seem to be more directed at workers' representatives (delegates) and technicians. [2]

3.3.3. European OSH directives and their application in the sector

At European level, the Framework Directive 89/391/EEC "on the introduction of measures to encourage improvements in the safety and health of workers at work" (OJ, n° L 183, 29.06.1989) and its "daughter" Directives apply to all sectors and therefore also the cleaning sector⁹. The provisions of these directives are enacted through national law in each Member State. The Framework Directive obliges the employers to take the necessary measures to ensure the safety and health of workers in every aspect of their work. The individual directives which are relevant for cleaning workers cover different topics such as minimum safety and health requirements for workplaces (89/654/EEC), the use of work equipment (89/655/EEC) and personal protective equipment (89/656/EEC), manual handling of loads (90/269/EEC), carcinogens (2004/37/EEC) and chemical agents (2000/39/EEC and 98/24/EEC), biological agents (2000/54/EEC), physical agents such as vibrations (2002/44/EEC) and noise (2003/10/EEC), working time (93/104/EEC), pregnant workers (92/85/EEC), temporary workers (91/383/EEC), and young people at work (94/33/EEC). [18]

The Directives regulating the procurement of services are also applicable to the cleaning sector.

In March 2004, the European Parliament and Council adopted a revision of the EU procurement legislation [18]:

- Directive 2004/17/EC (the "Utilities Directive")¹⁰ regulates contracting of works, supplies and services by entities operating in the water, energy, transport and postal services sectors.
- Directive 2004/18/EC (the "Classical Directive")¹¹ regulates contracting of works, supplies and services by all other public authorities.

They do not provide extensive guidance on social considerations. These new directives had to be transposed into national law by January 2006. [18]

The sectoral study from UNI-Europa and EFCI mentions that the application of health and safety regulation is in general inadequate in the host companies. In general, the larger the company, the better they comply with the regulations, partly because they can often rely on better skilled staff and a better organisation of the workers participation and consultation. According to the same sectoral study, the sometimes poor implementation of the legislation cannot be followed-up thoroughly by the inspectorates due to lack of institutional resources. [2]

3.3.4. Social representation and social dialogue

The European social dialogue committee for the industrial cleaning sector was set up at the beginning of the 1990s. The partners participating in this dialogue nowadays are the European Federation of Cleaning Industries (EFCI) from the employers part and UNI-Europa (Union Network International) from the workers side.

The main issues for the cleaning industry targeted by the European social partners are: the improvement of the sector's image, the professionalisation of the industry, the creation of career perspectives for employees in the sector, the development of an "employee loyalty" (*fidélisation*) with the transition from part-time work to full-time work and the transition towards day-cleaning, the fight

⁹ The different council directives can be found under <http://osha.europa.eu/data/legislation>

¹⁰ Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0017:EN:HTML>

¹¹ Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0018:EN:HTML>

against unfair competition and for better health and safety at work [19]. They are also focusing on the development of the social dialogue in the newer member states.

At the **national level**, the main issues covered by the social partners are:

- Improving the attractiveness of the sector with salary increases, bonuses, holiday benefits, etc.;
- Improving working time patterns (shift from evening work and night work to daytime work);
- Fighting the precariousness of employment, e.g. fixed-term contracts, temporary agency work;
- Payment of overtime and of Sunday work;
- The transfer of undertakings and the protection against dismissals;
- Combating unfair competition (illegal work, exploitation of workers, cascade of subcontracting, etc.);
- Access to vocational training for employees; and
- Health and safety.

Other issues are also under discussion, such as time-credit schemes, pension schemes, job classifications, transport costs, leaves of absence, contracts, sick pay schemes, maternity leave, etc. [19]

3.3.5. Access to information, training and OSH services

Lack of training or poor training at the workplace is mentioned several times in the research [9] [20]. However, general health and safety training as well as training on the use of equipment and on suitable work postures is essential to improve cleaners' health and safety. In particular, it is important to make sure that cleaning workers who work outside the regular working hours have access to health and safety information and trainings provided to other workers during regular working times, such as emergency and fire simulations¹².

There is also a lack of easy-to-access information on the specific risks of the cleaning sector and prevention measures for employers and safety officers. Analysis of available information from literature, brochures, guides or web pages in most of the EU countries suggests serious gaps in an access to simple tools for hazards identification and risk assessment specific to cleaners' working environment. The social partners of the cleaning sector have developed a manual for employees on health and safety in the office cleaning sector. [19]

¹² Feedback from a National Labour Inspectorate via the Agency's network of Focal Points.

4. Working conditions and exposure to risks

A broad range of cleaning activities, from sweeping and vacuuming to disposing of waste or cleaning toilets is performed in different work environments such as homes, offices, industries, schools, shops, but also aircrafts or hospitals. The types of risks to which cleaning workers are exposed are hence not only specific to the type of cleaning tasks they perform, but also specific to the sector and premises they work in [21].

4.1. Chemical hazards in cleaning

Cleaning workers use many different cleaning agents to facilitate dust and dirt removal, for disinfection and surface maintenance, which are a source of chemical hazards. The exposure depends on the type of products used and the conditions under which they are used such as frequency, amount, and manner of application, cleaner's breathing rate and efficiency of ventilation during and after cleaning or use of protective measures to limit exposure and intake [22] [23]. For example, some chemicals may have irritant properties at low concentrations and be corrosive at high concentrations, e.g. acids or bases. Some chemicals may for example cause breathing problems if over sprayed, used without adequate ventilation or sprayed onto hot surfaces for instance [24]. The chemicals contained in some cleaning agents may be flammable or explosive. The incorrect use of certain products (e.g. over-dosage, unsafe mixing of different products, inappropriate cleaning methods) can increase the risks for cleaners [25]. Furthermore, when cleaning workers work outside the regular working times, i.e. before or after the opening hours, the ventilation, air exhaust or air conditioning system may be turned off and the air not renewed in the work areas, which may increase the exposure to chemical substances [9].

In addition to the cleaning products used, the dirt itself which the worker aims at removing may be a source of chemical – as well as biological - hazard. According to P. Wolkoff [26], the process of cleaning can be considered as a chemical reaction causing, depending on the substances (whether dust, fat, etc.) being cleaned, either the dissolution of deposits of minerals or inorganic salts i.e. equivalent to acid-base reactions; or complex formation of soluble 'reaction products' with water; or the formation of micelles of dust or fat to which cleaning workers are exposed when removing these. Therefore, when looking at the chemical risks that cleaning workers may be exposed to, the exposure to the **chemical substances present in dirt, dust, soot particles, etc.** being removed from surfaces to be cleaned such as floors, furniture etc. has to be taken in account in addition to the **chemical ingredients of cleaning products** that the workers use in order to clean this dirt, dust, grease, etc.. Identifying the different types of chemical hazards involved in the cleaning process is hence of great importance.

4.1.1. Exposure to chemicals generated by the cleaning process itself

Cleaning stirs up dust, mixing it with the breathing air, sometimes at considerable levels that are liable to cause health problems for cleaners and the building's users [10]. Investigations of Jerrim et al [27] showed that dry dusting disperses particles into the air immediately, and that the use of spray-polish, for example, diminishes this dispersion phenomenon.

The very physical characteristics of dust of course play an important role in the toxicology of dust, but not only. The toxicological properties of dust particles are also influenced by the hundreds of chemically or biologically active components that the dust particles may contain. These active components can enter the human body via several exposure routes, such as skin contact after re-suspension of dust and deposition onto the skin; absorption through mucosal membranes of the eyes; or inhalation followed by phagocytosis in the deep lungs and deposition into the lymph system, or followed by swallowing and digestion. Each of the chemical or biological components of the dust may represent a different health risk which may differ from one exposure route to another. In an experimental study by Molhave et al. [28], about 11 kg of dust from vacuum cleaner bags from seven Danish office buildings with about 1047 occupants (12 751 m²) was analysed. In addition to micro-organisms (see 4.2.), desorbable VOCs were detected at the level of 176-319 µg/g with a majority of aldehydes, in addition to plastic softeners (dibutyl phthalate (DBP) and di-(2-ethylhexyl)-phthalate (DEHP)). The dust was then re-suspended to simulate and analyse the exposures that can result from the re-suspension of sedimented dirt and dust from surfaces being cleaned. The dust content was similar to results reported in the literature and

showed a relatively low toxic potency. However, the authors indicated a need for more investigations as even inert dust may put cleaners' health at risk.

Dust can contain different types of particulate matters such as human debris, paper and other particulate organic matter and fibers; micro-organisms (bacteria, viruses, mould); volatile organic compounds (VOCs) and semi-VOCs; as well as non volatile compounds such as surfactants¹³ (neutral), quartz, minerals and other inorganic substances such as trace metals [26]. Some studies indicate the presence of nearly 200 VOCs, including formaldehyde and even pesticides, in particles and dirt found in homes and offices.

The amount of dust, and hence the level of risk, depend on the type of cleaning workplace (e.g. in an office or a private household). Very high levels of dust exposures are found in some industrial premises or where construction or renovation work is done. In the latest case, cleaners may be exposed to concrete dust containing quartz. In the study of Riala [29], the dust concentrations to which women cleaners were exposed while doing various types of cleaning work were investigated. Levels of airborne dust when cleaning on renovation or construction sites were twice as high as in new buildings. As for the influence of the type of cleaning task the highest dust concentrations were measured when dry sweeping.

4.1.2. Exposure to chemical constituents from cleaning products

Beside the hygienic and aesthetic (clean aspect) benefits, using cleaning agents may also generate risks such as the risk of inhalation of dangerous substances contained in the detergent. Cleaning products used for common cleaning tasks are usually mixtures of different chemicals, including dermal and respiratory irritants and sensitizers [23]. Cleaning agents typically are composed of one or several **active components**, depending on the technical function of the cleaning agent, as well as of additives and usually water.

Surfactants are considered as the main active components of most cleaning agents and also as responsible for a range of skin problems reported by cleaners and attributed to cleaning work [26]. One of such skin diseases is hand dermatitis which can be caused by skin contact with detergents – as well as repeated prolonged contact with water, prolonged wet work or work while wearing occlusive gloves [30]. Considering the increased number of occupational dermatoses [31] in cleaning professions, as well as in other professions such as health care workers and kitchen workers, measures of prevention and skin protection are highly needed. The authors stressed in particular that there is a high need for promoting a better skin care culture through awareness-raising measures and educational programmes, advisory services, diagnostics and additional therapies in occupational dermatology.

Other active substances may be also **acids or bases, disinfectants, solvents or some complexing agents** (substances capable of forming a complex compound with another material in solution) [26]. Products with acid substances such as hydrochloric acid included for example in acid toilet-bowl cleaning products pose the highest risk and are corrosive to the eyes and skin. Industrial cleaning agents for tableware, ovens and grills contain strong bases and are thus corrosive.

Formaldehyde is used in some cleaning products as disinfectant or preserving agent. According to a study by the French Agency for Environmental and Occupational Health Safety, Afsset [32], in 2005, 54.4% of preparations for domestic use in France contained formaldehyde for its preservative properties. The concentration in formaldehyde in these products was inferior to 1% (generally between 0.2 and 0.3%). In domestic cleaning products such as toilet bowl and bathrooms cleaners where formaldehyde is used as disinfectant, the concentrations were very variable (between 0.1 and 40%). In newer products, a trend toward lower concentrations in formaldehyde was noted, and even toward substitution of formaldehyde by other substances. However, these substituting substances were found to form formaldehyde as a by-product when the detergent is used and can therefore not be considered as a substitution alternative for formaldehyde. In the scope of the study by Afsset, 28 measurements of airborne formaldehyde were performed in cleaning workplaces in public places, households, etc. The average concentration measured was 1.65mg/m³, which shows a **very important average exposure of cleaning workers to formaldehyde**. Afsset and the Scientific Committee on Occupational Exposure Limits (SCOEL) recommend a short-term occupational exposure limit value (OEL) of 0.5mg/m³ – which

¹³ Taken from Encyclopaedia Britannica Online: "surface-active-agent, also called surfactant: substance such as a detergent that, when added to a liquid, reduces its surface tension, thereby increasing its spreading and wetting properties."

is intended to protect workers against irritant effects (eye irritation) from acute exposure by inhalation - and a time-weighted average 8-hour exposure limit of $0.25\text{mg}/\text{m}^3$ – in order protect workers against carcinogenic effects of formaldehyde (pharyngonasal cancer) and prevent from irritant effects.

Complexing agents (substances capable of forming a complex compound with another material in solution) such as EDTA (Ethylene Diamine Tetra Acetic Acid) can cause eye or skin irritation.

Cleaners may also be exposed to **volatile organic compounds (VOCs)** emanating from cleaning products [33]. Laboratory studies testing cleaning agents in a climate chamber under controlled conditions identified about 100 different VOCs in the chamber air. The VOCs concentration measured were in orders below the OELs of the substances for which OELs are available. The study concluded that the use of cleaning agents would result in a temporal increase of the overall level of VOCs in the indoor environment. The variety and duration of the emissions depend among others on the use of fragrances and high-boiling-point VOCs. The increase in VOCs level may occur during the cleaning process and thus it can enhance the probability of increased short-term exposure of the cleaners. However, few field studies have been carried out to measure cleaners' exposure. Some building materials release more VOCs through wet cleaning and thus may also affect the indoor air quality (IAQ) [26].

In addition, the **propellants in aerosol cans** are often highly combustible and pose a significant risk¹⁴.

The **most common additives in the cleaning agents are fragrances and perfumes** added to give a pleasant odour or mask an unpleasant smell. However, some are reported allergens [26]. Also, some fragrances may react with other air contaminants and form secondary products. For example, terpenes (hydrocarbons produced by plants, in particular conifers) contained in some fragrances can react rapidly with components in indoor air such as ozone, a pollutant which is transported from the outdoor environment into the indoor environment by building ventilation, generating many secondary pollutants such as formaldehyde [26] [32] or hydroxyl radicals [26], which are very reactive with organic chemicals and lead to the formation of other chemicals. In fact, the recent emphasis on "natural" or "green" cleaning products has led to an increase in the use of terpenes, such as alpha-pinene, limonene and delta-carene, in cleaners and air fresheners [34]. The research by the US National Institute for Occupational Safety and Health (NIOSH) showed that, when combined with ozone, alpha-terpineol, which is one of the common components of pine oil cleaners, transforms into many oxygenated organic compounds in both the gas-phase and on surface reactions creating new products potentially harmful to those exposed, such as sensitisers or irritants that might be responsible for the observed increases in work-related asthma. Similar reactions were observed with many of the terpenes investigated. More generally, unsaturated organic compounds from cleaning products have the potential to react with oxidants, such as hypochlorite, ozone and nitrogen oxides, and produce secondary pollutants. Many of these oxidation products are not captured by conventional sampling methods, new techniques are needed to assess worker exposure and the potential health risk. The challenge is also to identify fragrances for cleaning products less likely to produce hazardous secondary products [22] [33].

Non-volatile constituents of cleaning products can also be inhaled, either because the cleaning process itself releases liquid or solid particulate matter into the air and forms aerosols, or because residual cleaning materials are later suspended, for example, through abrasion and wear.

Last but not least, the product usage pattern must be also taken into account, including the quantity of used product and the frequency of its application [22] [23]. Some chemicals are irritants at low concentration and corrosive at high concentration, e.g. acids or bases. It should be noted that chemicals can also cause fires, explosions and environmental pollution.

4.1.3. Exposure routes

Chemical substances may enter the human body in different ways, depending on their properties (e.g. liquid, gas, etc.) and the way they are used. They may penetrate into the body through the respiratory system when inhaled, direct contact with eyes or skin, or by accidental ingestion.

¹⁴ Feedback from a National Labour Inspectorate via the Agency's network of Focal Points.

Dermal exposure:

Hands are the major body part where skin contact with cleaning agents can occur. In addition of possible irritant or toxic properties, cleaning agents contain substances that can degrease and break down the natural barriers of the skin. Also, frequent exposure to water (wet work) alters the defense mechanisms of the skin barrier with the consequence that the skin becomes more “permeable” and more sensitive to other chemical substances. A damaged natural defense of the skin can lead to the development of (irritant) contact dermatitis. The systemic intake of substances may also increase where the skin is damaged. Although gloves protect the skin from wet work and contact with chemical agents, they may paradoxically lead to skin problems if they do not permit the skin to “breathe”. The use of disposable natural rubber latex gloves can be a risk factor for latex allergy of the skin [21]. In addition, in practice, inappropriate gloves are sometimes used, or correct gloves are used but over too long a period of time without taking in account how long the glove actually offers protection, which becomes a risk in itself¹⁵. According to Directive 89/656/EEC¹⁶, protective gloves – as well as any personal protective equipment (PPE) – should be assessed before its selection and use. Appropriate barrier creams, together with regular training and awareness rising of workers at risk, have been positively evaluated as protection measure against dermal risk. Last but not least, proper skin care programmes, which includes skin protection, skin cleaning and skin care, are also important [35].

Office cleaning

According to a study of wet work in the cleaning industry [30], office cleaning was classified as wet work. The major cleaning activities performed in office premises are cleaning of floors, restrooms, furniture and dustbin and over 50 % of the whole cleaning process is wet work with hands exposed to water and other skin irritants (e.g. acids, alkaline agents, solvents) for most of the cleaning time. Products containing irritant or allergenic substances are used on a daily basis and skin contact occurs often.

Inhalation:

As previously mentioned, cleaning workers are exposed to the inhalation risk of dust and other particulate matters re-suspended into the air because of the cleaning process, of cleaning agents' constituents and of secondary products from reactions between substances from the cleaning agents and substances present in the working environment [22].

In some cases, cleaning workers mix different types of cleaning products together in order to obtain the final cleaning agent desired. A common example is mixing bleach together with ammonia or acids in order to obtain a cleaning agent for floor mopping, which may create hazardous fumes of chlorine or chloramines and as a consequence lead to severe acute respiratory effects in cleaners, severe enough to have to seek immediate medical attention. In addition, according mainly to American literature, the mixture is mostly prepared without following any instructions neither on the appropriate proportions of bleach and ammonia or acid, nor on the safe way to do so [22] [36].

Medina-Ramón et al. [37] have linked symptoms of obstructive lung disease in domestic cleaners to the use of diluted bleach and other irritant cleaning products such as degreasing sprays/atomisers and air fresheners. They concluded that exposure to certain irritant cleaning products aggravates lower respiratory tract symptoms in female domestic cleaners with asthma or chronic bronchitis.

In 2004, Nazaroff and Weschler [22] published a table of 13 documented asthma and allergy associations related to the use of cleaning products. Among the main causing agents identified, carpet shampoo or floor-cleaning detergents with ethanalamine as active substance are the main cause of respiratory diseases among cleaners. By the same authors, some recent studies in Spain, Finland, Brazil, and several states in the US indicate an increased prevalence of occupational or work-related asthma among cleaning workers [22]. As it shown in a study by Zock J.P. et al. [38], the frequent use of common household cleaning sprays may be an important risk factor for adult asthma. According to the

¹⁵ Feedback from a National Labour Inspectorate via the Agency's network of Focal Points.

¹⁶ Council Directive 89/656/EEC of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC), OJ L 393, 30.12.1989, p. 18–28.

assessment of risks linked to non-professional home-cleaning, the highest risks were found for sprays used for glass-cleaning, furniture, and air-refreshing, while **cleaning products not applied in spray form were not associated with asthma**.

Further work on work-related asthma topic investigating the frequency of adverse respiratory effects among cleaning workers is still needed [39].

Hospital cleaning

Hospital cleaning is characterized by the **wide range of products used, including disinfectants**, which are an important group of chemicals in cleaning products in general, and the **high cleaning frequency** in order to comply with the regulations in force aimed at ensuring hygienic conditions and avoiding the presence of infectious microorganisms putting at risk patients' and worker's health [23]. The use of disinfectants, aimed at destroying microorganisms, is associated with several health effects related to the presence of active compounds such as formaldehyde, sodium hypochlorite or benzalkonium chloride. These substances are either corrosive, harmful in contact with skin or may cause chronic health effects [40].

In the study by Bello et al. [23], the inhalation exposure potential of a number of common cleaning tasks were qualitatively assessed and categorized as "low", "medium" or "high" exposures.

Floor cleaning tasks were in the "low" inhalation exposure category, although they are carried out during a longer amount of time than other cleaning tasks, mainly because floor cleaning results in low concentrations of VOC in the air as a consequence of the high dilution rate of floor cleaning products; quaternary ammonium compounds, which are common chemicals of concerns in floor detergents, are not volatile; and the floor cleaning products are not sprayed.

Window and mirror, sink and counter, and toilet bowl cleaning were classified as medium inhalation exposure because of the higher concentrations of volatile ingredients in the diluted products and as spraying increases the risk of exposure to aerosols and other non-volatile compounds such as quaternary ammonium compounds. The worse exposure scenarios can happen when several cleaning tasks are performed in small and poorly ventilated spaces such as bathrooms.

Floor finishing tasks such as **stripping, waxing and buffing were characterized as high inhalation exposure** tasks mainly because of the high concentrations of VOCs in the products and of the use of buffing and waxing machineries that facilitate dust and particles re-suspension in the air that may be inhaled. Although less frequent, these tasks may lead to acute, high exposure levels that can be related to irritation mechanisms of asthma and other respiratory symptoms in cleaning workers.

With regards to **dermal exposure** [23], although hands were found to often be in contact with the mop handle contaminated with cleaning solution during floor cleaning tasks, overall floor cleaning was associated with the lowest exposure potential while **mirror/window, sink and toilet bowl cleaning were identified as tasks with high potential for dermal exposure** due to fact that the spraying of products generated liquid particles that may reach the skin, including of the head and upper body parts in particular for mirror/window and toilet bowl cleaning.

Information on the occurrence of cleaning-related health-effects such as asthma, respiratory disorders, allergies and hand dermatitis are presented more in detail in part 5 of this report. In most cases, these effects are associated with the use of several types of cleaning products which are available in a broad range on the market nowadays. An overview of chemical hazards in cleaners' workplace is presented in Table 4.

Table 4: Chemical hazards in cleaning workplaces

Examples of chemical substances present in cleaning products	Products that may contain these substances	Possible health effects to human	Source of information (reference)
Acids (such as sulphuric, acetic, citric, hydrochloric or phosphoric acid)	Chemical cleaning products, mainly toilet cleaning products	Corrosive action;	[21] [23]
		burns on skin; dermatitis; in case of eye-contact: reduced vision or blindness (e.g. due to hydrochlorid acid)	
		Skin, eye and mucous membrane irritation; respiratory problems; possible asthma	
Alkaline agents (e.g. ammonium hydroxide, sodium hydroxide, silicates, carbonates)	Substances present in degreasing cleaning products	Skin, eye and mucous membrane irritation; intoxication	[21] [40] [23]
Hypochlorite, aldehydes, quaternary ammonium compounds	Disinfectant	Sensitisation, mucous membrane irritation	[21] [23]
Solvents (e.g. toluene, alcohols, glycol ethers such as 2-butoxyethanol)	Substances present in floor cleaners, degreasing cleaning products, disinfectants, detergents, waxes	Irritative to skin, respiratory system; Neurotoxic or reproductive toxic agents	[21] [22] [23] [41]
Fatty acid salts, organic sulphonates	Detergents; Soap	Skin, eye and mucous membrane irritation	[21] [22]
Formaldehyde	Used as preserving agent or disinfectant in floor cleaners, waxes, detergents, etc.	Mainly allergic action, sensitization	[21] [41] [32]
Complexing agents, e.g. EDTA, Nitrilotriacetic acid (NTA)	Dissolving cleaners	Skin, eye and mucous membrane irritation	[21]
Film formers, polishes (wax, acryl polymers, polyethylene)	Surface care products	Sensitizing action	[21]
Ethanolamine	Anti-corrosion; Surfactant used in floor care products, general purpose, glass and bathroom cleaners	Skin sensitization; Irritation of respiratory ways and lung; link to occupational asthma	[23]

All cleaning workers are potentially exposed to chemical hazards. An aggravating factor is that they usually lack the basic OSH knowledge in relation to the cleaning products that they use to perform their work, as well as the knowledge on how to use, store and mix them safely, and to substitute dangerous chemicals with less hazardous ones. Labels and Material Safety Data Sheets (MSDS) are generally not read although they contain crucial information on the composition, concentration and hazardous effects of the cleaning agent and its constituents, as well as on its safe handling [26]. However, many ingredients that are found in ready-to-use solutions prepared by mixing and diluting concentrated products are not listed in the MSDS of these concentrated products as **MSDS are required to list only the ingredients in concentrations above 1%. It is therefore important to consider the composition of the ready-to-use solutions in the workplace risk assessment**, in particular with regards to sensitizers as sensitization may occur even at trace concentrations [23]. Last but not least, **because the risks to cleaners' health from cleaning products is a function of the product formulations and the working procedures, it is important to take both aspects in account when assessing the exposure and the risks and in order to develop appropriate prevention measures.**

4.2. *Biological hazards in cleaning work*

In addition to chemical hazards, cleaning staff can be also exposed to different types of biological agents such as micro-organisms - bacteria, viruses and moulds – and their products such as fungal secretion products and bacterial endotoxins, present more particularly in dust and aerosols released during the cleaning process or vacuuming [21]. The exposure routes to biological agents are the same as for chemical hazards, meaning mainly inhalation, dermal uptake and incidentally ingestion.

Exposure to mould takes place particularly when emptying dust collectors, filters etc. [42]. Exposure to moulds or mould spores potentially leads to adverse health effects in workers. The most common disorders are allergic diseases, asthma and other respiratory diseases, nose, eye and throat irritations, fungal infections and sick building syndrome. [43]

Exposure to viruses (e.g. Hepatitis A) and bacteria (e.g. E.Coli) may occur via faecal-oral transmission when contaminated, unwashed hands, or contaminated hands with gloves touch the mouth. The review by Krüger and al. [9] found 2 articles published in 1993 that concluded on a high prevalence of Hepatitis A in cleaners, one in hospitals and the other one in kindergartens. A study of a gastroenteritis outbreak in a nursing home showed an increased risk of Norovirus infection in the staff performing the cleaning work (RR=2.8) similar to the ones of health care workers health worker with high level of contact with residents (RR = 2.8; 95% CI, 1.1-7.3) [44]. Infections with Salmonella and Campylobacter, for example, may also occur through direct contact to infected animals or their excretions, mainly during cleaning of animal holding areas [45]. For example, cleaning places were workers may come in contact with pigeons' feathers and droppings may put them at risk of contamination with bacteria which could lead to various diseases (e.g. psittacosis, tuberculosis, salmonella) ¹⁷. Regular and effective hand-washing has been shown to reduce the spread of micro-organisms and the risk of contamination, including the common cold virus and various form of influenza [43] [45].

Inhalation is also a possible exposure route to viruses and bacteria when cleaning, for example when bioaerosols are formed. For example Legionella, a bacteria present in low concentration in soil and water that causes Legionnaires' disease and Pontiac fever, may enter the body through breathing in mist droplets containing the bacteria. Carrying out cleaning with spray equipment such as pressure washers can create such mists that may be inhaled [46]. Legionella is able to multiply in water between 20 and 50°C.

Cleaning workers may also be exposed to biological agents from blood and body fluids [21] [47]. The cleaning groups most at risk are cleaners in hospitals, nursing homes, clinics and laboratories, as the most dangerous biological risk factors for cleaners' health are blood-borne viruses such as hepatitis C (HCV) and B (HBV), and Human Immunodeficiency Virus (HIV), both HIV-1 and HIV-2 [45]. The International Agency of Research on Cancer (IARC) has classified HCV, HBV and HIV-1 as carcinogenic to humans (group 1) and HIV-2 as possibly carcinogenic to humans (group 2B).

Contamination with blood-born pathogens may occur when infected blood or body fluid enters the body for example through wounded skin, through the mucous membrane that lines body cavities - for instance the nose and eyes - or enters immediately into the bloodstream, for example if a needlestick injury occurs or small patters of blood or body liquid come into the eyes or other mucous membranes [9] [45]. Since the HIV epidemic continues to grow, every time cleaning workers come upon a situation where they might be in contact with blood, it is more likely that the HIV and other infectious viruses are present and the risk of exposure is greater than in the past. Since the transmission route of HIV is blood, cleaners who have to handle medical wastes, possibly contaminated needles and sharps, workers cleaning public toilets and sinks, or who have to clean blood are at risk and should wear rubber gloves and ensure splash protection [45]. An additional preventive measure would also be vaccination against blood-borne viruses such as Hepatitis B. On 17 July 2009, the EU social partners HOSPEEM (European Hospital and Healthcare Employers' Association) and EPSU (European Public Services Union) signed a "framework agreement on prevention from sharp injuries in the hospital and health care sector" which applies to all workers "in hospital and healthcare sector-directly related services and activities", thus including cleaning workers in this sector [48]. A lot of practical information material on how to prevent needlestick injuries and how to handle sharps is available from the Agency's website¹⁸.

¹⁷ Feedback from a National Labour Inspectorate via the Agency's network of Focal Points.

¹⁸ Available on the website of European Agency for Safety and Health at Work (<http://osha.europa.eu>), for example "Risk assessment and needlestick injuries", E-facts 40 (<http://osha.europa.eu/en/publications/e-facts/efact40>) and a collection of related links to major OSH organisations: <http://osha.europa.eu/en/search?SearchableText=needlestick>

More examples concerning biological risk factors in the group of cleaning workers is listed in **Table 5**.

Table 5: Biological risk factors in cleaning work

Biological agent	Health outcome	Workers at risk	Preventive measure	Reference
Fungi (<i>Aspergillus fumigatus</i>)	Hypersensitivity reactions, pneumonitis with asthmatic symptoms Lung mycosis, bronchial asthma;	Medical, hospital or laboratory cleaning staff	Wearing respirators during work in a dusty area; dusting reduction; ventilation improvements,	[42] [49]
Fungi (<i>Puccinia graminis</i>)	Bronchial asthma, Allergic nose catarrh	Agricultural, hotels or domestic, school cleaners		[49]
Mould	Dermal allergies, asthma, Sick-Building Syndrom	All cleaning staff (particularly during emptying of dust collectors or filters)	Personal protective equipment	[42]
Pathogens from rodent droppings and various types of disease-carrying vermin	Diseases depending on the type of pathogen	All cleaning staff	Periodical pest control; personal protective equipment, in particular respiratory protection	[42]
Micro-organisms contained in human excreta, blood and body fluids	Risk of virus infection, HIV, hepatitis	Mainly possible for medical, hospital, laboratory, schools, universities, domestic cleaners and all groups of cleaning workers during cleaning of sanitary ware	Personal protective equipment; compliance with safety and hygiene instructions	[24]
Bacteria (<i>E. faecalis</i> ; <i>e. faecium</i>)	Inflammation of gallbladder, cholecystitis; cystitis	Hospital medical laboratory and others	Compliance with safety and hygiene instructions at hospitals; hand washing, disinfection, sterilization	[49]
Bacteria (<i>Escherichia coli</i>)	Enteritis; diarrh(o)ea	Hospital medical laboratory, schools, universities, domestic cleaners and others (mainly during sanitary ware cleaning)		[49]
Bacteria (<i>Staphylococcus aureus</i>)	Allergic dermatitis; purulent infections; inflammatory conditions of respiratory and other organs, food poisoning;	Hospital, medical cleaners	Preventive equipment, compliance with safety and hygiene instructions at hospitals; hand washing, disinfection, sterilization	[34] [49]
Bacteria (<i>Streptococcus pyogenes</i>)	Angina, skin purulent infections; rheumatic diseases,	Hospital and medical cleaners	Personal protective equipment disinfection, sterilization, compliance with safety and hygiene instructions at workplace	[49]
Dermatophagoides spp.	Bronchial asthma, allergic nose catarrh; conjunctivitis; dermatitis	Domestic, office, school or hotel cleaners	Saprophytes fighting, frequent vacuuming and ventilation	[49]
<i>Glycyphagus domesticus</i>		Domestic, hotels, office and kitchen restaurant cleaning personnel	Storing of food products in dry clean rooms with good ventilation; Efficient hygienic measures, adequate disinfection, Personal protective equipment	[49]
Other Pathogenic Microorganisms; Viruses	HIV, hepatitis, tetanus,	Mainly medical, laboratory cleaners	Personal protective equipment; Vaccination against some blood-borne viruses, e.g. Hepatitis B	[42]

4.3. Physical working conditions

Physical hazards encountered in cleaning work encompass among others falls from ladders and elevated platforms, wet or slippery floors, falling objects, sharp objects, moving or rotating machinery parts, not only from the work equipment used but also from the environment where the cleaning work is performed. The hazards linked to the work equipment, such as buffers, mops or vacuums, are strongly related to the particular tool used and also to whether it is adapted to the characteristics and specific

needs of the worker in terms of anthropometry, physical strength, etc., or else musculoskeletal disorders (MSDs) could be the consequence. Other physical risk factors are linked to the design of premises being cleaned, the weight and design of furniture that cleaners have to handle, etc.

4.3.1. Postural and ergonomics risk factors

Cleaning is physically demanding and labour intensive work. Studies on cleaning all acknowledge the significant physical risks associated with cleaning work [7] [50] [51]. Most cleaners have to perform different types of tasks during one single working day. Although this can imply that there is a high variety of tasks and postures, which are only maintained during shorter periods, still, these postures are frequently and repetitively adopted. Cleaning tasks have been identified as strenuous and demanding for the musculoskeletal and cardio-respiratory systems [50]. According to Woods and Buckle [20], the main ergonomic risk factor in cleaning is the postural workload.

Cleaners work often **bent forward and with twisted backs**. They daily perform high numbers of **repetitive movements** of the arms and a **high static and dynamic output of force** is regular, for example when mopping. These types of muscular activities contribute to muscle fatigue and may lead to musculoskeletal disorders [52].

The **weight of loads** handled by cleaners is an important risk factor to consider [53]. According to a study by Aickin, the weight handled by cleaners ranged from 2kg to 42 kg. In another study [54], the loads lifted and carried by workers were found to be between 5 and 8 kg. The heaviest lifting and handling activities were moving furniture and handling floor polishers. However, what made the lifting especially problematic was the combination with awkward postures adopted to handle the load. Weights were often lifted in twisted bent and other awkward postures. Other factors such as the duration, repetition of handling the load as well as the individual characteristics of the worker also play a role.

The main ergonomic risk factors leading to MSDs and associated with cleaning tasks are [5] [52] [55]:

- Awkward working postures, especially for the back and arms, for example when reaching and stooping, or when the work is performed in confined places, such as in public transport, which forces awkward postures;
- Application of high forces (e.g. scrubbing, squeezing, moving and controlling (power) equipment);
- Repetitive movements - sometimes performed during up to one hour - and insufficient resting periods;
- Lifting and carrying loads (especially in industrial cleaning);
- Static workload, for example when working with arms over shoulder level over longer period of time to clean dust, or forced by the use of equipment for example when high-pressure spraying;
- Poor ergonomics design (shape, size, adjustment and angle) of equipment and equipment handles.

Cleaners are exposed to a combination of risk factors of different nature. In addition to the ergonomic risks mentioned above, cleaning work is often also characterised by a high work intensity – high workload, working under time pressure, difficulties in keeping up with work - a poor work organisation and high psychological demands (see also section 4.4), which are all factors associated with the development of musculoskeletal disorders [55] [56] [57].

Specific sectors

Schools

According to research from Aickin on school cleaners, the physiological demands of the work are highest when scrubbing, followed by mopping, vacuuming, office cleaning and toilet cleaning. There was a significant difference in risk levels between outdoor cleaning and indoor cleaning. Outdoor cleaning requires lifting and carrying heavier loads as well as transporting cleaning equipment over uneven ground and steps. [53]

Hotels

Seifert and Messing [58] conducted a study in two Canadian hotels and found that new marketing strategies of the hotel management lead to the intensification of work. Large amounts of gadgets such as coffeemakers, cosmetic trays, food products and ironing boards were introduced in hotel rooms and need to be checked, cleaned and tidied up. In addition, there is a trend towards larger beds, heavier mattresses and third bed sheets which significantly increases the physical work to be carried out by the room cleaner. The researchers calculated that hotel room cleaners lift mattresses eight times per room on the average to arrange the bed sheets. In addition, because of the bigger beds, cleaners have to lift the mattress higher than before. Other difficulties reported are associated with the introduction of decorations such as mirrors hard to reach or furniture with porous surfaces which collect more dust. The problems induced by the remodelling of rooms are confirmed by a North-American study from a trade union [59].

■ **Ergonomic risk factors related to the equipment and the design of buildings**

A study by Woods, Buckle and Halsman [20] found that the main issues of concern for cleaners were the lifting or carrying of cleaning machines (mostly vacuum or buffing machines), the unsuitable handle shapes and size, and the difficulties to adjust them to their needs. This can lead to awkward working postures with non-ergonomic joint angles. The forces required vary with the type of equipment handled, for example from dust control mop requiring minimal force to move over the floor surface, to other equipment requiring much more force such as wet mop on a very dirty surface [54]. The largest forces were found when pushing and pulling trolleys to carry cleaning equipment, bed linen and towels etc.. Research by Woods and Buckle [50] also emphasises the fact that the cleaning equipment is often not adapted to the physical characteristics and capacities of workers, and that the conditions in which it has to be handled – e.g. provision of cleaning equipment and machines with poor performance, work in confined workplaces, lack of essential work accessories such as gloves - makes the work even more difficult.

It is important to take into account that the safe use of cleaning equipment and tools does not only depend on their design (e.g. weight and shape), but also on [50]:

- whether it is adapted to the characteristics of the intended user group (such as anthropometry and physical capacities) and their individual needs;
- the tasks performed when using the tool;
- the ergonomic arrangement of the work environment such as the quality of the flooring surface, the layout of the workplaces, etc.;
- the work organisation in terms of duration, frequency, etc. of a specific tool in a specific working environment;
- interaction with other equipment;
- training and handling instructions.

Besides, the inadequate machine maintenance was also indicated as an additional risk factor [20] [54]. In the case of badly maintained machines (such as buffing machines), the majority of workers reported a significant “jerk” when starting the machine, which they have to compensate and control using their physical force. Increased vibration was also noticed. Handling cleaning equipment requires the use of forces in most of cases, which leads to discomfort and pain in the neck, shoulder, elbow, back and knees.

New cleaning techniques and equipment are progressively developed and made available on the market. However, according to Woods, Buckle and Halsman [20], although newer and more ergonomic cleaning systems are available on the market, companies do not always buy the best available work equipment for their staff. This might be due to the fact that people in charge of purchasing the cleaning equipment are often not aware of the needs of the cleaning staff, of the impact that poor ergonomic equipment may have on workers' health, and of the types and state-of-art equipment available on the market. The study also deplores that cleaners are most of the time not consulted in the procurement of cleaning tools -neither are they on the purchase of furniture in the rooms to be cleaned, nor on the design of buildings. Seifert and Messing [58] found that even when the cleaning equipment purchased is intended to be used by the cleaners only, they are not involved in its choice nor are they allowed to pre-test it. Krüger et al. add that the ergonomics of cleaning tools is not evaluated and that there is a lack of suitable and reliable methods for a systematic ergonomic assessment of these [9].

Several studies confirm that the interior of buildings is not designed so as to facilitate the cleaning work and often requires cleaners to work in awkward postures, for example because of confined sanitary rooms difficult to clean, poorly laying of cables behind desks obliging cleaners to squat and crawl to lift the cables, etc. [9] [50] [52] [58].

If the cleaning tools and design of buildings have ergonomic shortcomings, this may for example have a negative influence on the worker's posture, make their work more strenuous, increase their workload and consequently decreases the quality of the work. Technical specifications and cleaners' consultation for the purchase of cleaning equipment, workers' training on the safe use of the equipment, proper maintenance plan and procedures for the equipment used, and monitoring of workers' health would help to significantly reduce the development of MSDs in cleaners. Some tools are available to help in the procurement of ergonomic cleaning tools. For example, a simple checklist has been developed to assist purchasers to select the best cleaning equipment based on the results of an Australian study of more than 3,000 cleaning workers where a number of problems with common cleaning equipment were identified [60]. Unfortunately, it seems that even when ergonomic equipment is available, cleaners are sometimes poorly trained or not trained at all to use the equipment, which increases the risk of being injured [20].

In conclusion, an important risk factor in the development of MSDs seems to be the inadequacy of the cleaning equipment and the lack of consultation with the end users - the cleaning workers - in its choice. When it comes to choosing the cleaning equipment, workers report that they are not involved in the procurement process, that maintenance and replacement schedules are unsuitable or not established and the equipment is badly maintained, and that there is some uncertainty over the roles and responsibilities of the different parties – host company or employer - regarding equipment purchase, maintenance, and storage [54]. In addition, although in the recent years more attention has been given to ergonomics in the sector, there are no criteria that have been established to define an “ergonomic” working tool [6]. For example, little information exists on the “proper” design of vacuum cleaners, and there are no criteria to customise the design of the vacuum cleaner to the needs of the user [52]. This might complicate the task of employers and host companies in the choice of ergonomic cleaning equipment for the companies [6]. Workers' consultation on the choice of ergonomic equipment adapted to their needs is all the more important considering the diversity of the cleaning workforce (e.g. women, ageing workers) and their specific needs. Last but not least, Kumar concluded from his review of available studies on cleaning that there are no studies adopting a global approach and assessing all possible factors that can contribute to musculoskeletal discomfort or disorder [52].

■ ***Ergonomic risks linked to specific tasks***

Cleaning techniques differ over Europe. Krüger et al. mentioned that while wet mopping is one of the most time consuming and physically demanding tasks in professional cleaning in Denmark and Germany, it is seldom used as a cleaning method in Finland due to the physical load it causes [9].

Kumar and Kumar [52] brought together a number of studies describing cleaning tools and methods and the possible risks and consequences associated (Table 6)

Table 6: Risk factors and possible health outcomes [52]

Type of tool / activity	Risks / Consequences	Authors
Mopping	Movement controlled by wrist, requires high forces. This combination of repetitive movement and high forces can lead to MSDs in hand/wrist area.	[61] [62] [63]
	High static load on the upper arm and back muscles	[62]
	Movements in the lower arms, elbows and wrists leads to structural changes in carpal tunnel region	[64]
	"Figure" eight mopping (i.e. moving the mop in a figure eight pattern across the floor) leads to a higher oxygen consumption level compared to back and forth mopping	[62]
Wet mopping	Higher cardio respiratory load compared with damp/dry mopping	[65]
Single disc cleaning machines	Discomfort in hands (report by 39%of cleaners), shoulders (19%), wrists (7%), lower back (7%) and arms (6%).	[66]
Broom: Length of the handle	Long-handled brooms are less likely to cause MSDs than short handled ones.	[67]
Buffing machine	The force needed to operate a buffing machine can be very high when the machine is defectuous and not maintained	[50]
Vacuum cleaners	Potential inappropriate gripping, unintentional operation of the mechanical suction feature, poor workers' training on how to operate power, etc. can lead to unexpected movements/jerks from the vacuum cleaner which may hit the worker, and even accidents.	[68]

Goggins has listed the main risk factors in common cleaning tasks and described possible preventive measures (Table 7) [6].

Table 7: Task, risk factors and possible prevention measures [6]

Task	Risk factors	Examples of possible solution
Dusting & scrubbing	Reaching overhead	Long handled tools
	Bending, kneeling, squatting	Angled or pivoting heads
	Bent wrists, repetitive motions and high grip forces	Adjustable handle lengths, cleaning heads as light as possible (e.g. microfiber), battery powered scrubbers.
Vacuuming	Repetitive motions (hand, arm)	Lighter weight canister
	Grip force	Adjustable handles
	Pushing and pulling, lifting and lowering	Self propelled upright vacuums
	Bending wrist and back	Long hoses
	Noise (increasing stress and muscle tension)	Lower noise levels
Mopping	Heavy awkward lifting (buckets)	Adjustable , light-weight equipment, wheeled buckets
	Bending	More ergonomic location of sinks /taps
	Squatting to lift the bucket from floor level to waist-level sink	Improved work practices and work organisation
	Wringing	
	Lifting and carrying wet mop	
	Repetitive motions	
	Slipery floors	

Task	Risk factors	Examples of possible solution
Buffing	Awkward position due to design of buffing machines Torque when starting up, transfers vibration to the arms of the operator Machine heavy to lift Makes floors slippery with risk of slips and falls	Self-propelled floor machine with walk behind and ride-on models Reduce vibration through better machine design, regular equipment maintenance, procedures for taking defective equipment out of service
Handling trash	Lifting heavy bags out of (high) trash bins, creating a vacuum underneath and leading to increased need of force (especially in HORECA sector) high pushing and pulling forces	Replacing large trashcans with smaller/lighter cans, reduce suction by vent holes in the sides Relocating dumpsters and compactors so that they can be accessed from above
Moving furniture	Lifting, carrying, pushing and pulling pieces of furniture School custodians: fold up long cafeteria tables to clean around, move desks of pupils Domestic cleaner workers and housekeepers in nursing homes: large pieces of furniture Maintenance and facilities staff in residential care: moving appliances such as stoves and refrigerators.	Lighter furniture, ideally on wheels Spring assisted folding tables, tables with benches that flip out (cafeterias), lightweight folding tables Wheeled equipment for moving tables, desks, stacks of chairs Glides and air skids

4.3.2. Vibrations

Vibrations can reinforce negative effects of other physical strains such as awkward postures, handling heavy loads, repetitive movements, etc.. There is scientific evidence that the use of cleaning machines, such as electrical machines used to clean floors, floor-buffing machines and other hand-held powered equipment that exposes cleaners to hand-arm vibrations can lead to musculoskeletal problems – especially when combined with (static) muscular load - but also disturb the neurological and locomotoric functions of the hand-arm system and could in the long run result in disorders such as hand-arm vibration syndromes (HAVS). The term “HAVS” includes different health problems from smarting pain, numbness, loss of sensation, restrictions on movements and pains in the hand and arm joints, to carpal tunnel syndrome and Raynaud’s disease (also called “white”, “blue”, or “dead finger disease”) [5] [69].

The level of risk depends on the characteristics of the machines and the period for which it is used. According to focus group meetings organised by Woods and Buckle, vibrations emitted by cleaning machines were often seen as a result of a misuse thereof and their poor maintenance rather than because of their inherent design. However, a vibration assessment on three new buffing machines indicated that even new machines emit high levels of vibration at their initial start-up of the machine. [70].

4.3.3. Noise

In the few studies found examining cleaners’ exposure to noise [70] [66] [71], noise levels were found not to be excessive and below the upper exposure action value of 85 dB(A) over a daily exposure as

set in the European Directive on noise¹⁹. However, some cleaners declared to be “annoyed” by the noise they are exposed to in their work [66]. In addition, according to the two-year investigation on the risk factors linked to the design of cleaning equipment by Woods and Buckle in UK cleaners, some cleaners report to sometimes collide with other people while buffing as they could not hear them approaching because of the noise produced by the machine [70].

4.3.4. Slips, trips and falls

Slips, trips and falls are one of the most frequent causes of accidents in the sector. The main factors of slips, trips and falls risks identified are [5]:

- poorly maintained stairways;
- working at heights (e.g. working on a ladder);
- flooring with too low slip-resistance;
- wet and dirty floors;
- worn grip of footwear sole;
- unexpected obstacles in the way (e.g. low furniture, waste bins, wires of electrical cleaning equipment or any other powered equipment [72]);
- poor lighting;
- and lack of safety signs.

Most falls in the cleaning sector are falls from height, followed by falls from the same level. This is confirmed by a Belgian report on occupational accidents [73] in which the most common accident situations in the cleaning sector were studied. More than 20% of the permanent injuries in cleaners were caused by slips, trips and falls. Almost half of falls happened in staircases, either when workers were cleaning them, or when they were carrying loads (e.g. waste bins) in the staircase. Other cases were falls from a ladder or stepladder for example when cleaning shelves or windows. It is important to check that the ladder rungs are not slippery and that the ladder is well maintained, positioned and secured before using it [74]. Leaning the ladder against unstable objects such as glass panels or trees put cleaners at risk²⁰. It is also important to wear suitable shoes with a good grip to use a ladder. In addition, when ladders are used in very exposed places like staircases thus blocking walkways or even escape routes, a good coordination between cleaners and the host company is essential. Slips and trips at floor level happened because of wet or slippery floors, when carrying loads or because of unexpected obstacles in the pathway [73].

Slip-resistant flooring surfaces are essential to avoid slips and falls risks and adequate and regular floor cleaning is essential to keep floorings' slip-resistant properties. However, the process of cleaning itself can create slips, trips and falls risks. For example wet mopping results in wet and potentially slippery surfaces, which can put cleaners at risk. Also, if most floors have a good slip resistance when clean and dry, the presence of dirt affects the slip resistance to a great extent, which is also a risk for cleaners cleaning the area. Indeed, in case of a non-rough floor, the dirt forms a film over the flooring and there is no contact possible anymore between the footwear and the floor, which increases the risk of slips and falls. [72]

4.3.5. Electrical hazards

Defective electrical tools and equipment, appliances, wiring, switch panels and electrical outlets or transformers are a source of electrical hazards. Employers have a duty under the workplace equipment directive to ensure equipment is well maintained. Once the right equipment has been selected to minimise risk, the equipment has to be well maintained in order to ensure that hazards do not develop, such as electrical hazards from worn cables. Annual electrical Portable Appliance Testing (PAT) can be used to address general electrical hazards associated with cleaning equipment such as vacuum cleaners and rotary buffers. For high risk equipment such as rotary disc machines where damage to

¹⁹ Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC). OJ L 42, 15.2.2003, p. 38–44.

²⁰ Feedback from a National Labour Inspectorate via the Agency's network of Focal Points.

cables is common, a brief visual check of electrical cables before each use of the equipment may be prudent [75]. In addition, cleaning workers should inspect the equipment for any damage prior to use and of course be properly trained in using this equipment [76].

4.3.6. Poor thermal conditions

Heat stress can occur in hot environments [76] [77], which is mostly the case for cleaning tasks in restaurant kitchens, cleaning of washing rooms, etc. Working in hot and humid atmospheres can result in heat rash, which is caused by skin and clothing remaining damp due to unevaporated sweat. Possible symptoms are skin itching, skin prickling, clusters of red bumps, etc. The rash may occur on small parts of the skin or the entire body. If large parts of the body are involved, the sweat production might be compromised resulting in a decreased capacity to work in the heat. Impairment of the sweating mechanism can also lead to systemic effects known as sweat retention syndrome. Milder exposure to heat might also lead to prickly heat, intertrigo (chafing), skin maceration and supervening bacterial or fungal infection, especially in overweight and diabetic individuals [77].

Direct contact of the skin with external heat sources such as hot objects or surfaces [71] might result in occupational thermal injuries such as contact burns and heat urticaria. The latter is characterized by a well-demarcated urticarial lesion provoked by heat in direct contact with the skin.

4.3.7. Electromagnetic fields

The use of MRI (Magnetic Resonance Imaging) is nowadays common in medical applications. Not only medical staff but also cleaning and maintenance staff can be exposed to high levels of static magnetic fields inside MRI rooms or inside the bore of the magnet. The static field of sometimes very high intensity is permanently present, even when the MRI is not in use, as it results from the simple presence of the magnet. The level of the worker's exposure depends on the type of magnet and the design of the MRI scanner. The closer to the magnet's housing, the higher the exposure. In addition to the static field, the MRI device emits a gradient field that results from the pulses of magnetic field of high rate of alternative rises and falls, but when the MRI device is in use for patients' examinations only and to which cleaners are therefore less likely to be exposed [78].

At the moment there is still a lack of knowledge on the interaction mechanisms of MRI-emitted electromagnetic fields with tissues and resulting biological effects. It is essential that exposure assessment includes both gradient and static fields, taking in account the fact that worker's movements in a spatially heterogeneous static field also result in a gradient field exerted on the worker. Exposure assessment should not only focus on medical staff but also include maintenance technicians, cleaners and any other possible workers' groups having to work in an MRI room. Studies should also look at different influencing factors such MRI with open and closed magnets, low and high field magnets, diagnostic and interventional use of MRI, various types of medical procedures, etc.. [78]

Besides, cleaners and maintenance workers can be exposed to static magnetic fields of Nuclear Magnetic Resonance spectroscopy (NMR-spectroscopy), of which the magnet capacity is generally higher than in the MRI scans. The research by Decat concluded that the exposure levels measured represent a risk for wearers of metallic implant such as pacemakers. Still, very few studies have looked at worker's exposure to magnetic fields from NMR spectroscopy and there is a need for more exposure data on this issue. [79]

4.4. Work organisation and psychosocial factors

4.4.1. Work organisation: a need for flexibility

Since the 1960s, businesses have increasingly outsourced their cleaning activities to companies specialising in cleaning in order to cut their cleaning expenses [9] (see also part 2.1 Competition and subcontracting). At the same time, cleaning companies are put under an increasing pressure to deliver more flexible and cheaper services. As a consequence cleaning companies often choose a work organisation that allows responding to these demands and thus demand themselves a high flexibility from their employees [5]:

- flexibility at the level of the employment schemes of staff (fixed-term contracts, agency temporary employment, etc.) in order to respond very quickly to the demands from the customers;
- flexibility at the level of the working time patterns (part-time work, overtime, change of working shifts at short notice, etc.);
- flexibility in the tasks to be carried out, multi-tasking, etc. to accommodate to the clients' needs.

Often cleaning workers do not work in a specific department but help out at demand where they are needed [80]. Cleaners' capacity to adapt to the changing needs of the company is considered important. Over the years, the sector has evolved towards jobs requiring a significant mental capacity to adapt to different situations [5].

4.4.2. Working time

▪ *Working time patterns*

According to a study by EFCI [1], cleaning workers work most of the time outside the usual daily working periods. Morning (6am- 9am), evening (6pm - 9pm) or night cleaning seems obvious because most workers are then off home and activities in organisations and enterprises are thus closed down. This is especially the case for office cleaning but also for commercial buildings or buildings with public access. In 2003, in the 18 countries covered by the EFCI survey, the daily cleaning in the EU was carried out either early in the morning (26%) or late in the afternoon/at the beginning of the evening (43%) – in only 25% of cases cleaning was performed during daytime. This makes cleaning jobs even more strenuous.

However, Sweden, the Czech Republic, Poland, and Denmark differ from the average. While in Sweden 70% of the cleaning is executed during daytime, in the latter countries daytime cleaning covers almost 50%. In the rest of Europe daytime cleaning is extremely limited. If Sweden, the Czech Republic, Poland, and Denmark are not taken into account, the average percentage of 25% for daytime cleaning in Europe is reduced to 14% [1]. In Finland, most cleaners have been working during day time in schools, universities, shops, hospitals, offices, etc. since the 1970's [81].

Night-work cleaning is not widespread in the EU, maybe as a consequence of the national legislation and sector collective agreements establishing higher wages for workers and/or additional charges for employers in case of night-work. In fact, night-work cleaning remains limited to specific workplaces such as cleaning in industrial premises, hospitals or airports [5].

Although cleaning outside the usual working hours (on average between 9 a.m. and 5 p.m.) might seem a good solution to avoid disturbing daytime office activities, it implies important drawbacks for the cleaners. Several negative effects of cleaning in the evening or at night for cleaning workers as well as for the cleaning companies have been mentioned: [82] [83]

- Cleaners do not always consider their job as a real job but more as kind of a “gap-filler”, as they work outside the normal hours when no one else is around;
- There is a lack of contact and communication between the different parties involved (the client, building occupants, cleaning staff and the operational manager). This can be detrimental for the cleaners because there is nobody to ask or to alert for example in case of a technical problem; and for the building occupants as they have no possibility to show them appreciation for their work or to communicate potential problems directly to cleaners regarding their work;
- Cleaners who have to work late tend to get socially isolated at work because of the lack of relationships to and social support from colleagues;
- Early morning and late at night working time pattern may make it more difficult to balance work and life. However, when irregular working time patterns are freely chosen by the worker and not forced, some positive effects are seen such as the possibility to have other private activities during the day (e.g. flexibility for childcare, studying, etc.) [56];
- They have to commute at “unsociable” hours, which first makes it more difficult to come to work by means of public transportation and which also might be less safe as streets, public transports, train stations, etc. might be less frequented;
- The premises where they work are sometimes (almost) empty (e.g. late at night) and they might be victims of violence;

- The ventilation, air exhaust or air conditioning system, may be turned off and the air not renewed in the work areas, which may increase the exposure to chemical substances [9];
- The emergency escape routes in buildings that are closed outside the normal working hours (such as schools, universities, shopping malls, banks) may be locked²¹ - although those should in theory always enable exit.

A Dutch survey data report for EWCO (European Working Conditions Observatory) also concluded that evening or night work can cause fatigue and disrupt an employee's life [84].

In addition to the negative aspects for workers, cleaning during the evening/night has also negative effects from an economic cost-benefit perspective for host companies, for example:

- there can be a decrease in job satisfaction and hence motivation and efficiency among cleaners because of working late and alone;
- a higher energy bill has to be paid by the host company as lights are kept on in the evenings/at night during the cleaning activities;
- there is often a duplication of services (e.g. a day-porter, or matron, stocks the restrooms during the day while a cleaner cleans the restrooms at night).

Daytime cleaning

Daytime cleaning could have, if well organised, several positive effects for the cleaning companies as well as for the host-companies. According to an article by Messing [40], daytime cleaning would indeed provide more opportunities to work on a full time basis and would contribute to increase professionalism in the sector. The workers would have more access to professional training, the job would be less anonymous and a better work-life balance would be possible.

More day-time cleaning would also encourage the development of new technologies that would benefit the health and safety of the cleaners, for example the development of low-noise vacuum devices, micro-fibre cleaning fabric attracting dust and dirt and avoiding its re-suspension into the air and reducing the need for chemical cleaning agents, etc.

The benefits of day cleaning are also manifold for employers and include: [82] [83]

- a higher job satisfaction and motivation among the cleaning staff which means a lower staff turnover rate, i.e. lower cost in recruiting and training workers;
- an increase in efficiency (elimination of duplication of services so that staff can be streamlined, being more able to accommodate the cleaning of each room to the needs of its occupant or to the use of the space, etc.);
- an improvement in the appreciation of the work performed by the cleaners as the occupants actually see the cleaning being done, as well as an increase in the buildings' occupant of the feeling of common responsibility in keeping the premises clean, which means less cleaning work necessary and less workload on cleaners;
- a greater understanding from the client of the cleaning work being done and to be done, facilitating the procurement of cleaning services and the inclusion of quality-based and OSH-based selection criteria;
- savings in energy as the premises do not need to be lightened at night for the cleaning work.

The transition from night/evening to day-cleaning could be implemented in various cleaning workplaces. Such conversion requires however certain practical arrangements (e.g. use of low-decibel vacuum cleaners in order not to disturb the client with noise or planning noisy tasks such as vacuuming done early in the morning and more "silent" tasks at the peak hours of premises' occupancy) and a real

²¹ Feedback from a National Labour Inspectorate via the Agency's network of Focal Points.

cultural change. A range of factors need to be taken into account when organising the day-time cleaning, for example [82]:

- the number of people who need to walk through the area to be cleaned and would disturb the cleaning;
- the type of machinery housed in the facility that need to be in function in the area to be cleaned;
- the equipment (desks, chairs, etc.) used by the premises' occupants;
- the events that take place in each room.

A good planning and organisation is thus needed.

Therefore, day-time cleaning appears to be an excellent option to turn cleaning services into a higher quality occupation. It makes it possible for cleaners to work full-time and thus receive decent wages, while having a better work-life balance, and hence to have a better job satisfaction, motivation and performance. In addition, there are nowadays technical solutions (e.g. wireless and silent vacuum cleaners) that enable the cleaning tasks to be performed during daytime without disturbing the premise's occupants. However, the EFCI study suggests that clients still remain very reluctant to choose day-time cleaning. The social partners EFCI and UNI-Europe have already been and will further be active in encouraging the wider implementation of day-time cleaning in companies. In their joint recommendations for the industry, the EFCI and UNI-Europe consider the development of day-time cleaning as one of their priorities of action for the coming years. [1] [19]

▪ ***Duration of work***

Part-time work remains the most frequent form of employment in the industry and covered 66% of the cleaning workforce in 2003 [1] and 70% in 2006 [3]. However, the number of part-time cleaners has been steadily decreasing, from 80% in the late 80s to 75% in 1995 and 66% in 2003.

According to research by Krüger et al. [9], there is a difference between cleaners employed in the public and private sectors. In 1997, in the public sector most of the cleaners were employed on a full-time basis, while 80 to 90% of workers in the private sector worked part-time.

The average number of hours worked per week is rather low as a consequence of the high number of cleaning workers working only part-time. The average duration is estimated at 23 hours a week. The weekly duration has increased by three hours (from 20 hours to 23 hours) from 2002 tot 2003. [1] In Finland majority of the cleaners work full-time job with an average daily working time of eight hours [85].

Psychosocial and physiological effects of cleaners' working time patterns

According to research of Munar Suard et al. [5] different types of interrupted rosters are used to attain the equivalent of full-time employment. In some cases, cleaners work very early in the morning, with a second shift (late) in the evening and do domestic cleaning in between in private households, for example. Others commute from one host company to the next one. This often means that cleaning workers dedicate ten to twelve hours a day to their work including the commuting times. Long commuting ways, commuting early in the morning or late in the evening, or commuting during peak hours with busy traffic is a factor of stress and fatigue [2]. Any delay because of a previous shift finishing a bit later or because of busy traffic on the road between two workplaces may have a direct impact on the next shifts that may have to be rescheduled and may have negative effects on the relationship with the customer. It may also mean that the cleaner will finish his/her day later to compensate for the delay, which affects the cleaner's social and family life.

In addition, research shows that atypical working hours such as shifts early in the morning and late in the evening can be very disruptive for workers' work-life balance [56]. Evening shifts hinder an active social life and workers often have the feeling that they do not have control over their social life [86]. This is reinforced by a precarious employment situation such as casual and temporary work [56]. Research on the relationship between working hours and OSH in precarious jobs in hotels and restaurants revealed that evening work combined with precarious employment contributes particularly to work-life conflicts. Consequent adverse effects on workers' health included poor sleep, disrupted social and family life, irregular and unhealthy meals, and irregular exercise [55]. Fatigue is also one of the frequent complaints of workers with atypical working hours. A disrupted body biorhythm combined with fatigue

and sleep deprivation may lead to inefficiency, especially during morning hours [56]. Night work in particular alters workers' biorhythm [40]. Also, a higher incidence of injuries is noticed for evening and night shifts than for day shifts. This is thought to be caused by increased fatigue and long working hours impacting on worker's behaviour and attention during work. [56]

4.4.3. Work load and work intensification

The workload in the sector is very high compared to other sectors. Work intensification has increased partly as a consequence of the demands for an increasing productivity and flexibility, and the high competition in the sector [50]. Indeed, due to the economic context, the sector is compelled to introduce cost-cutting actions, which often means that fewer cleaning workers do the same amount of work [5].

The intensification of work and the high pace of work are among the most important stressors. Finnish studies mention that 50% to 70% of cleaners report overstrains due to an excessive amount of work. About 50-70 % of their working time is manual work [9] [59]. Monotonous and repetitive tasks are widespread. 52% of the cleaners mentioned having to conduct the same or very similar tasks every 30 seconds or less throughout the day [50].

In a study on musculoskeletal ill health amongst UK cleaners, 56% of the workers reported a high workload and time pressure. 26% reported that they had difficulty to do a good job in the allocated time. 25% of the respondents answered that they never had enough time to do their job, and 51% said that it was sometimes a problem. The majority reported that they had to work fast (46% often and 47% sometimes) or intensively (47% often; 39% sometimes) in order to complete the work. In addition, the managers/supervisors mentioned being under constant pressure because they fear that they have to compete with potential contractors with more resources [50].

In a German questionnaire survey on stress in cleaners, 13.6% answered that they completely agreed on the fact they had too much work, and 16.2% that they more or less agreed. 16.7% said they were under time pressure during the execution of their work, and 18.9% answered that they were under heavy time pressure [87].

The workers interviewed for the study of Munar et al. [5] often mentioned that they were not sure to be able to cope longer with the adverse working conditions and high work load. They felt that the companies expected more cognitive and mental investment into their work from them (for example being autonomous, making decisions, etc.) without providing either the necessary organisational and material means or the necessary time. This can lead to considerable stress in workers.

However, an intervention study [88] found that even though cleaning is often a monotonous, repetitive job with little possibility of personal development and lack of collaboration between workers, some cleaners experience positive elements in their work and see their job as meaningful. They take pride in the area they are responsible for looking nice, even when this means that they have to work more than the working plans actually demand. Many of them actually do more than the client is paying for, for example, they wash the floors when they are dirty even though they are required to wash it once a week only. A widespread reason given by cleaning workers is that they want to keep their area nice "as if it were their home".

4.4.4. Repetitive work

A study of 1,216 cleaners working in different premises and organisations shows that university cleaners (about 35% of the studied cleaner population), in order not to be interrupted in their work by students walking through the area they are cleaning, try to finish buffing before students enter the building. This means that, in some cases, a cleaning task is performed over a long period of time without alternating tasks or breaks [50]. This leads to repetitive movements and sustained grip forces. Combined with postural strains, sometimes heavy manual handling and the poor design of the equipment, this can lead to overexertion and musculoskeletal disorders (MSDs) [6].

Woods and Buckle suggest investigating the possibility to alternate physically demanding tasks with lighter jobs and to vary tasks in order to reduce the amount of repetitive work; or to conduct these tasks for a shorter period of time and over a smaller surface to be cleaned. For example, physically demanding tasks could be spread over the week instead of having to be conducted within one day. [50]

An alternative would be for workers to rotate between the areas to clean, thus achieving variation in their work without having to change the overall cleaning plan of the premises. This presents an obvious possibility for variation and increased cooperation between cleaners. However, some cleaners are resistant to this option. Indeed, some workers rather have their own areas, mainly because they do not believe that their colleagues would do the work in the same way as they do. They hence fear that rotation would result in more work for them because they would also have to do the tasks that their colleagues overlooked – which shows that many cleaners are very committed in doing quality work. [88]

4.4.5. Job control

Cleaning work is generally not only controlled by the cleaners' supervisor but also by the client's demands. In some cases, cleaning workers are able to develop their own working procedures and plan their own working "routes". In other cases these are pre-fixed. Sometimes software programs are used to calculate the work programmes taking into account the furniture, floor surfaces and other activities taking place in the space to clean. The software enables to calculate the time needed to perform the work in function of the surface to clean and the desired frequency of cleaning. However, this can lead to an underestimation of the task and workload if the programme is not regularly updated [40].

According to a study of Woods [50] who conducted questionnaire surveys amongst 1,216 cleaners in the UK and carried out 130 workplace assessments, the majority of the respondents said that they were able to decide how to do their work (55% often, 31% sometimes), but had low control over what they did at work (53%) and over when to take their breaks (31%). Moreover, most of times they have no say over the design of their work arrangements (schedules, breaks, etc.).

A study by Messing et al. in a hospital highlighted the fact that the cleaning work is not taken into account when planning the hospital's work, and that cleaners are not consulted for the planning of their own work, and that this contributes to increasing their workload. Indeed, this leads for instance to conflicts between the cleaning schedule and the patients' eating times or medical examinations and often means that cleaners have to interrupt their work and come back to the rooms they were cleaning afterwards, which creates an additional workload. Moreover, hospital cleaners are generally not consulted when purchasing furniture or designing workplaces that are, as consequence, not adapted to their needs, which hence increases the penibility of their work and the occurrence of musculoskeletal problems [89].

In a German survey of 238 cleaners conducted in 2000 [87], 66.8% answered that their supervisors did not at all listen to their ideas and suggestions, and 74,1% said they were not at all informed of the important news about their company.

▪ *Unplanned situations*

Cleaning workers sometimes have to adapt rapidly to unexpected situations or to modify their work planning throughout the day to meet the expectations of clients and superiors [10]. These are partly linked to the specificities of the sector regarding work organisation as well as to a variety of unpredicted circumstances, for example:

- last-minute tasks;
- shifts in the list of priorities;
- conflicting orders from managers;
- absent colleagues;
- newcomers who are not yet fully familiar with the work and need support, etc.

In order to react to unpredicted situations and to satisfy their managers, cleaners sometimes bypass the pre-planned but inadequate organisation. The fact that cleaners succeed in performing their job even in such situations, at the price of an increased stress level, gives managers the wrong impression that the organisation is good. Therefore, paradoxically enough, the more efficient the worker is, the less visible his efforts to be efficient are. This invisibility and lack of recognition often have negative effects on the worker's mental health. There is hence a need for dialogue between the different parties playing a role in the organisation of the cleaning work in order to remedy to such situations. [5]

▪ ***Lack of clarity regarding the task, conflicting roles***

The study by Munar et al. [5] also reveals conflicts between the objectives of the work, the role of the worker and the extent of his responsibilities. Indeed, many companies are demanding in terms of cognitive and mental investment from the worker. For example, the cleaning worker is indirectly encouraged to take “intelligent” decisions, such as deciding not to clean a surface that has been cleaned the day before and is still clean, in order to increase efficiency and do useful work and on time. However, instead of being rewarded this may be sometimes considered by some persons as “dishonest” and not doing the work paid for. In addition, even when autonomy, initiative and intelligence are encouraged, the pressure for being productive and time constraints are so high that the worker does not have the feeling that he has a say in the way his work is done.

The intervention study by Bering in a cleaning company [88] found that workers can attach different meanings and expectations to their job and different opinions on how this work should be done and organised and should develop. Understanding these different orientations can help making balanced decisions on work organisation.

According to Krüger et al. [9], several psychosocial risk factors based on the demand-control-support model of Karasek and Theorell can be identified for the cleaning sector. According to the model, risks to health are most likely to arise when high job demands are coupled with low decision latitude. Decision latitude seems to be a stronger predictor for job strain than job demands. All these factors influence one another. For an equal level of social support, the combination of a high workload with a lot of control over the work will less lead to stress than the combination of high workload and low autonomy over work.

Focus on specific jobs

Work organisation in hotels

Hotel housekeepers often work under a room quota system, where it is required to clean a certain number of rooms per day. The quotas sometimes do not take into account the tasks that have to be done in between such as going from one floor to the other, stocking the cart, etc.. Another problem reported is the fact that the required cleaning material is sometimes lacking which leads to delays.

Other reported problems are the chronic under-staffing, and the tasks requiring them to handle luxury items such as heavy mattresses, which is strenuous, or fragile items to clean such as coffee pots, which is time-consuming. This obliges them to increasingly skip their breaks and meals in order to finish their work timely. The fact that they have to rush to get the work done also exposes them to higher risks of injuries [59].

Another study carried out in Quebec also mentions the increase in workload in the last ten years. According to the researchers, this is due to the fact that certain tasks (e.g. turning mattresses, cleaning fans, electric heaters and corridors) that were earlier done only during periods of low occupancy, have become daily routine. No additional specific staff or time has been assigned to these tasks [58].

Cleaning in the healthcare sector (NHS)

A research report by the Health and Safety Executive in the UK found that cleaning in the NHS Trusts (healthcare sector) was mainly performed during the “quiet hours”, i.e. when there are for instance no visitors in the building. Interviewees indicated that collaboration with team members such as nurses and ward managers is extremely important to know when the quiet times were likely to be. It is also important not to disturb the rest of the patients while cleaning. This is rather difficult when the cleaning equipment provided is noisy. In order to avoid visitors’ walking on wet floors, the “half and half” practice is often used. This means that one half of the corridor is separated with barriers and signs when being cleaned. After this, the process is repeated on the other side. [90]

4.4.6. Job insecurity

Researchers have conceptualised and measured job insecurity in different ways. A common definition of job insecurity is based on the general concern about the sustained existence of one’s job in the

future. Two main types of indicators are used to measure job insecurity: related to cognitive aspects, i.e. the perceived probability of job loss; and related to emotional aspects, i.e. the fear of job loss.

According to the study in Belgian cleaning companies by Munar Suard [5], both the perceived probability of losing one's job, as well as the fear of job loss are important issues in the cleaning sector. Job insecurity in the cleaning sector from the perspective of the workers manifests itself at different levels.

At a *macro sociological level*, the insecurity is the consequence of the workers' feeling of vulnerability vis-à-vis the labour market. On average, the level of education of cleaners is low and leaves them with little possibilities of changing jobs easily. Due to their precarious situation on the labour market and the high economic pressure faced by the sector (outsourcing, high competition, less customers as companies move to countries where labour is cheaper, etc.), cleaners also have the feeling that they are not in a position to ask for better wages and working conditions. They feel forced to accept atypical working hours and precarious contracts. Other research work [56] confirmed that better-educated employees feel less job insecurity than those who have a lower level of education, which is probably due to the fact that better-educated people consider it easier to find a new job after dismissal.

At *company level*, job insecurity is linked to uncertainties about the future of the company. This may be linked to fears that the company merges into a larger entity, undergoes re-structuring, reduces its staff, etc.. [5]. According to longitudinal studies carried out in three Finnish organisations, the level of job insecurity in a company depends on its actual economic situation. Other important factors are the history of the company with regards to previous re-structuring(s) associated with job cuts, and the type of employment contracts (non-permanent jobs are connected with greater job insecurity) [91]. And indeed, as the cleaning sector is subjected to a high economic pressure, cleaners often work on the basis of a temporary contract and a high level of uncertainty about employment was observed [5]. The feeling of job insecurity in cleaners is also found to be linked to their feeling of being not (well) represented by union representatives. This is, among other reasons, due to the fact that cleaners are dispersed over different workplaces, as well as to the lack of trust towards their representatives who in many cases also are team supervisors and hence "wear two hats" with contradictory roles [5].

Furthermore, there is also a sense of insecurity at the *administrative level*. Especially in larger companies, workers report many administrative mistakes concerning paychecks such as non-registered working hours and transport costs, problems with the financial compensation for working clothes, etc.. The study also mentions that when their contract ends and they are offered another one within the same company, the working conditions (in terms of working hours, work intensity and remuneration) as well as the OSH conditions often deteriorate [5].

4.4.7. Social relations and support

Cleaners often work alone and receive in general poor social support from colleagues and managers. Lack of respect from staff at the host companies, from other building occupants (e.g. patients in hospitals) and the general public, and from student co-workers who do not identify with the job and whose aim is to earn "pocket money" are also factors that are often mentioned and affect cleaners' well-being and mental health [5] [50] [89].

▪ Lone work

Cleaners often work alone [6] [9] [50] [58] and each of them is responsible for a specific area. Lone work increases the feeling of isolation and hinders the development of a 'group feeling' or the possibility to create confidence in relationships between colleagues [6]. According to Gamperiene et al. [92] the lack of frequent contact with colleagues (less than every day) was associated with mental health problems.

In order to resolve this, a Nordic project [50] has introduced team-based cleaning with varying degrees of self-steering teams. In addition to reducing the amount of time a cleaner works alone, the purpose was also to reduce physical and psychological strains as well as to improve the occupational skills of the workers through training. Furthermore, the researchers found that it increases responsibility at work in order to develop personal skills with regards to being able to work in a team [9].

▪ ***Support from colleagues***

Since the sector is characterized by a high level of lone work and a high staff turnover, cleaners do not have the possibility to build up good social relationships with their colleagues. Because many cleaners are under temporary contracts, the situation at the individual workplaces changes quickly and many temporary workers do not feel involved in the company [6]. According to Seifert [58] the precariousness of the job as well as the intensification of work have a distorted effect on the working relations and can cause social problems amongst cleaners, who search for strategies for self-protection sometimes even to the detriment of their colleagues. The high absence rate for example tends to be a source of tension between the colleagues as the remaining colleagues have to take over the jobs of the absent workers [5].

Due to the high intensity of the work (as a consequence of time pressure, frequent staff shortages, etc.) cleaners do not have the possibility to get help from their colleagues or to help their colleagues to complete the work in time. Research from Woods and Buckle who conducted questionnaire surveys of 1,216 cleaners throughout the UK stated that a third (35%) of the respondents reported that support from others was unavailable to complete work if time was limited, and another 51% mentioned that help was only available occasionally. Nevertheless, the importance of the perceived help and support from colleagues (71%) and supervisors (62%) was generally rated highly on the questionnaire, although 'unsympathetic supervisors' (20%) and lack of interest for the problems from the management (8%) were reported at the workplace [50].

Nolting et al. found, from the cleaners they questioned, that only 24% could ask their colleagues for help when they have problems during work, 61% said they could not at all ask for help. Only 21% report that there is collaboration between colleagues in the department while it is not the case for 59% [87].

Finally, the diversification of ethnic and class composition in the cleaner population sometimes creates group solidarity but also conflicts. The researchers found distinctive characteristics leading to cleavages between cleaning workers based on seniority, status and nationality. Stereotype prejudices circulate amongst the cleaners of a same "group" about the other groups and lead to tension between them [58].

▪ ***Support from the management***

The supervisors check the quality of the work and are responsible for the operational management at the work site [5]. They are in direct contact with the cleaners as well as with the client and the management of the cleaning company. Generally they manage a group of 10 to 15 cleaners [9]. In Norway, the cleaning sector is characterised by a rigid hierarchical structure and work organisation, which is partly due to the absence of permanent workplaces [92].

The supervisor often has to cope with a lot of pressure, taking orders from his management as well as pleasing the customer and manage the workers [9]. The pressure that supervisors experience from their superiors and from the host companies is transferred further down the line towards the cleaners on the lowest level of hierarchy. In the study by Munar Suard, the cleaners depict their direct supervisors sometimes as "authoritarian", controlling and unfair, with little respect for their team, encouraging favouritism and giving rise to distrust between co-workers [5]. According to the study of Nolting et al, almost 50% of the workers indicated that they did not have any support from their management, while only 29% feel that they can count on support from the management [87].

The supervisors are sometimes former cleaners who were promoted. However, when the supervisor comes from a different occupation and does not have experience in cleaning at the operational level, this can cause problems when he plans and organises the schedules for his team members [9]. However, the conditions for a good relationship between workers and their superiors are often based on [5]:

- competent supervisors who know the specificities of the work;
- a mutual understanding and a shared vision of the difficulties of the socio-economic context in which the sector is operating;
- and supervisors who are capable to lead and are not afraid of self-criticism, as well as capable workers who recognise and respect the capabilities of their supervisors.

The study of Gamperiene et al. [92] suggests that cleaners' mental health depends the most on the quality of the leadership of their supervisor and the collaboration with co-workers, more than on the

factors such as time pressure, control over the pace of work, information, and lack of knowledge and experience of one's job.

▪ ***Relations with clients/host companies***

The most important stressors in relation with the client are the disrespect that clients sometimes show for cleaners. This can range from simply ignoring them to, in some cases, an open racist behaviour toward them. This is linked to the low social status and recognition of the work [5]. In addition, on direct request of the client, cleaners sometimes have to carry out tasks that are not included in their task list [5]. The often contradictory demands between the different hierarchical levels make it difficult for them to anticipate and plan their work [9]. The workers nevertheless are aware that it is important to keep the client happy in order to keep their job even if the treatment they experience is not very motivating. Complaints from clients, whether fair or not, are a serious factor of stress for the worker [5].

According to Messing, staffs that are not part of the regular staff (such as outsourced, subcontracted cleaning workers) are at risk from being excluded from the social networks of their workplace. It is possible they are not invited to attend training and information sessions on health and safety taking place in the host company. Due to their specific position in the company, they are often not consulted before making purchase or planning decisions. However, it is important that cleaners are included in any health and safety promotion activities in the workplace and consulted on any decision that can affect their health and safety [40].

▪ ***Relationship with workers' representatives***

Cleaners often have the feeling that they are not represented enough, or efficiently enough, by their delegates. Trust in their representative is poor. The reasons mentioned are [5]:

- Sometimes delegates are not chosen by means of social elections but are simply nominated;
- The delegates are often the supervisors themselves, who hence cumulate two different functions with conflicting responsibilities and interests;
- The different cleaners of a same cleaning company are often dispersed over different workplaces and have little contact with their representatives.

▪ ***Poor social recognition***

Krüger et al. [9] mention that professional cleaning is often considered as unskilled extra work that everyone knows how to do. The fact that cleaning receives poor social recognition is a factor affecting negatively the cleaners' motivation and identification with the work. Even some cleaners themselves are of the opinion that cleaning is a job that does not require special qualifications and that anyone can do it [88]. Low appreciation of the job tends to harm workers' satisfaction and lead to stress, with subsequent negative effects on mental and physical health [50].

4.4.8. Learning possibilities and carrier development

Cleaners generally have a low level of education when entering a job and they are generally offered very few training opportunities, neither on (new) cleaning techniques nor on occupational health and safety. The reasons are multiple:

- a large proportion of cleaners are migrant workers (30%) who frequently have problems with communication in the national language of the country where they work; and
- the lack of interest from the employers in training their staff because of the high staff turnover.

There is also lack of relevant training centres and material such as guides or recommendations which can ensure proper training and self-education of people employed in the cleaning sector. According to Woods et al. [50] training in the sector was qualified as 'very poor', 'very informal' and 'too short' by 26% of the respondents. Focus group participants agreed that training was essential for example for the set-up and operation of machines. Limited information on maintenance procedures was another problem highlighted.

Occupational health and safety training often seems to be the benefit of workers from the larger companies and above all of full-time employees [2]. In addition to the reasons mentioned above, possible explanation for the lack of training in smaller companies can be:

- organisational problems in releasing workers for training during working hours;
- low attractiveness of the training courses for the cleaners as they are not always organised during working hours - the worker has to put in effort to follow the course but does not see a direct result in terms of improvement of his/her status or wage;
- the high employment turnover and the part time work makes it more difficult to organise training.

The lack of training provided to workers in the sector may also be linked to the way cleaning work is perceived. As mentioned above, professional cleaning is often considered as unskilled extra work and needs no basic training or health and safety training [9]. Cleaning is perceived as a job that everyone knows how to do. This also creates a misbalance between the low status attributed to the job on the one hand, and the expectations of cleaning companies towards their staff in terms of organisation and flexibility on the other hand. Cleaners have to become more professional as a consequence of new work organisation schemes but still have limited possibilities to any career advancements and have little access to professional benefits [9] [10]. Paradoxically, mainly better-qualified workers benefit from good training courses [2].

Last but not least, workers often feel that the skills they develop in their work are very closely linked to the specific cleaning activities that they daily perform, and that they do not really have the possibility to build up new skills that can be used in other jobs outside the sector. Since workers are most of the time deprived of training and learning possibilities, their status and career possibilities are limited [5].

4.4.9. Stress management

The majority of the surveyed cleaning companies in the study of Munar et al. [5] do not have a specific prevention policy regarding stress. They do not really perceive stress as a real problem with important consequences for health and safety. It is difficult to know whether this is due to a lack of awareness and recognition from the management, or to the fact that workers themselves tend to underestimate and underreport the problem. Indeed, the cleaners often speak of “nervousness” instead of “stress”.

5. Occupational safety and health of cleaners

The scope of this report was not to look for data on health outcomes in cleaners from all EU Member States but to provide an indicative picture of the situation through examples from a few Member States where some data are available. Systematic and exhaustive data on occupational and work-related accidents and diseases in cleaners are currently not always available as monitoring and collecting such data is a complicated issue. One reason is the fact that cleaning is a job found in many different sectors. In addition, an important number of cleaners are employed illegally and are not declared to the authorities, and therefore can not be included in occupational health surveillance and OSH monitoring systems.

Little quantitative data has been found on absenteeism, for example. In Belgium in 2006, the absence rate in the cleaning sector²² was 12.88% [93]. **The sector ranks as the fourth sector with the highest absenteeism.** The average number of cases of absenteeism due to accident or disease was 1.27 per employee in the same reference period. The average duration of the absence was 25.63 days²³. 30 to 40 % of the total absence rate in Belgium is caused by musculoskeletal disorders.

5.1. Occupational accidents

Figures on occupational accidents for cleaners at a sector level are difficult to find. The figures below are from Belgium, Germany, Portugal and the UK. Although these figures cannot be extrapolated to the European level, they can provide an indication and insight into the main trends and causes of accidents in the sector.

■ **Belgium:**

In Belgium, according to accident figures of the cleaning sector (figures collected within NACE 7470-Industrial cleaning), the relative number of accidents increased between 1999 and 2001 by 18.2% (from 38.16 to 45.13 per 1,000,000 hours of exposure) and decreased between 2001 and 2004 by 31.93% (from 45.13 to 30.72 per 1,000,000 hours of exposure). The gravity rate also decreased. In 2000-2001 the technical committee for prevention (Fund for occupational accidents – FAO) started a campaign in order to draw attention of the sector to the importance of OSH prevention and to decrease the number of accidents. A range of different partners collaborated in the campaign (social partners, insurance companies, association of prevention consultants, a prevention institute, and technical inspection services). It is possible that this explains the decrease in accidents after 2001. [73]

However, in Belgium, accidents in cleaning sector still happen more frequently and are more serious than on average in the overall economy. Indeed, the incidence rate²⁴ in 2004 was 30.72 (for comparison: the average frequency rate in the rest of the sectors is 26.63), the gravity rate²⁵ is 0.90 (all sectors: 0.64) and the global gravity rate²⁶ including the number of calendar days lost is 3.50 (all sectors: 2.40).

²² The absence rate is the number of working days per 100 that was not worked due to illness or accident. This percentage is always calculated on a specific group of workers (e.g. all blue collar workers in Belgium) during a certain reference period (e.g. a calendar year)

²³ The average duration of absence due to accident or disease is calculated upon the total amount of days of absence due to accident and disease during the reference period and divided by the number of reported cases of accidents and diseases in the same period. This figure may not be seen as an absolute figure, since there is no information available on the real duration of every absence.

²⁴ Incidence rate = (number of accidents * 1,000, 000) / total number of hours exposure to the risk

²⁵ Gravity rate = (number of (calendar) days of incapacity * 1,000) / total number of hours exposure to the risk

²⁶ Global gravity rate = (number of (calendar) days of incapacity + number of fixed days) * 1,000 / number of hours exposure to the risk

Table 8: Occupational accidents in the cleaning sector in Belgium between 1999-2004 [93]

Year	Hours of exposure	Number of accidents	Number of fatal accidents	Number of lost days	I.R.	G.R.	G.G.R.
1999	42,504,630	1,622	2	44,476	38.16	1.05	4.46
2000	43,848,041	1,945	2	51,489	44.36	1.17	4.66
2001	44,603,674	2,013	1	48,435	45.13	1.09	3.13
2002	43,629,656	1,797	0	50,366	41.19	1.15	3.64
2003	44,047,809	1,487	1	39,961	33.76	0.91	3.04
2004	44,927,645	1,380	3	40,616	30.72	0.90	3.50

The Belgian legislation determines a fixed number of lost working days depending on the gravity of the injury. For example, every fatal accident is counted as 7500 days lost.

I.R. = incidence rate²⁷

G.R. = gravity rate²⁸

G.G.R.: global gravity rate²⁹

Source: FAO (Fund for occupational accidents)

Table 9 below shows that from the 1,525 occupational accidents in 2005, 157 resulted in a permanent disability, 809 in a temporary incapacity and 559 had no incapacity as a consequence. In 657 cases the victim was female and in 868 cases male. Although women represent the largest part of employees in the cleaning sector, more men have had an accident than women. According to the study of Munar Suard [5], this can be explained by the gender related distribution of the work. Men are mainly active in the sub sectors that contain a higher risk like industrial cleaning, refuse cleaning and window cleaning.

Table 9 also shows which types of injuries are the most common in the cleaning sector. In 2005, contusions as well as strained muscles represented a large group of the accidents (43%). Places of the body that are mostly injured are fingers, feet and ankle, hands and back. These body parts are indeed easily strained, crushed or bruised.

Table 9: Distribution of occupational accidents in the cleaning sector in Belgium (Nace-Bel 74700) by nature of lesion, gender and consequences; 2005 [93]

Nature of lesion	No consequence			Temporary incapacity			Permanent disability			Total
	Women	Men	Total	Women	Men	Total	Women	Men	Total	
Fractures	7	22	29	16	24	40	14	19	33	102
Dislocation	4	2	6	7	4	11	1	0	1	18
Sprain/strained muscles	27	34	61	71	86	157	16	20	36	254
Shock & internal traumata	8	18	26	20	23	43	5	5	10	79
Amputation	0	0	0	0	2	2	0	1	1	3
Other wounds	55	83	138	63	112	175	2	15	17	330
Superficial traumata	16	46	62	16	33	49	2	2	4	115
Contusion and sprains	68	81	149	123	100	223	19	11	30	402
Burns	8	23	31	7	20	27	0	5	5	63
Poisoning	1	1	2	1	1	2	0	0	0	4
Suffocation	0	0	0	0	1	1	0	0	0	1

²⁷ Incidence rate = (number of accidents * 1,000, 000) / total number of hours exposure to the risk

²⁸ Gravity rate = (number of (calendar) days of incapacity * 1,000) / total number of hours exposure to the risk

²⁹ Global gravity rate = (number of (calendar) days of incapacity + number of fixed days) * 1,000 / number of hours exposure to the risk

Nature of lesion	No consequence			Temporary incapacity			Permanent disability			Total
	Women	Men	Total	Women	Men	Total	Women	Men	Total	
Multiple lesions of different nature	4	4	8	5	6	11	3	1	4	23
Other traumata and non-defined traumata	23	24	47	40	28	68	5	11	16	131
Total	221	338	559	369	440	809	67	90	157	1,525

Source: FAO (Fund for occupational accidents)

■ Germany

Accident figures in Germany were compiled according to the German code 93 (which corresponds to ISCO 88: 9131 and 9132)³⁰. The accident figures increased seriously from 2002 to 2003 (23%) and then decreased from 2003 onwards. Most accidents with absence from work happen in the age category from 50 to 59 years old, followed by the age category from 60 to 64 years (Table 10). This trend has not changed over the years. Most accidents with incapacity happen in the age category from 60 to 64 years. Most fatal accidents happen in age category 50 to 59 years. As these figures are absolute numbers and there are no employment data in this sector broken down by age group, it is not possible to know whether the higher accident rates for those two age categories are a consequence of a higher number of cleaning workers in these age groups, or because cleaners aged between 50 and 64 year old have more accidents than other age groups.

The hands are the body part most commonly affected, followed by multiple location injuries, feet, upper limb and trunk (Table 11). The most important physical causes are slip and falls (28%), moving objects (13%), falls on uneven ground or from height (6%), and hand tools (6%) (Table 12). Most important consequences are contusions (34%), other lesions (28%), sprains (19%) and fractures (12%) (Table 13) [94].

A German study also reports **higher rates of occupational accidents among immigrant cleaners than among native workers** [95].

Table 10: Number of occupational accidents in cleaners by gravity and age in Germany [94]

Age groups	2002			2003			2004			2005		
	With absence from work	With incapacity	Fatal	With absence from work	With incapacity	Fatal	With absence from work	With incapacity	Fatal	With absence from work	With incapacity	Fatal
< 20 years	187	0	0	170	0	0	102	0	0	220	0	0
20- 24 years	480	2	0	587	2	0	605	2	0	425	5	0
25 - 29 years	1,366	3	0	1,938	8	0	1,745	3	1	1,389	2	0
30 - 34 years	1,236	7	0	1,776	8	0	1,516	6	0	1,308	5	0
35 - 39 years	1,633	9	0	1,841	16	1	1,881	6	0	1,147	11	0
40 - 49 years	1,866	7	0	2,323	15	0	2,053	15	0	1,603	11	0
50 - 59 years	3,707	28	2	4,819	51	2	4,197	38	0	3,403	49	1
60 - 64 years	2,610	61	0	2,808	69	2	2,818	64	1	2,658	66	2
> 65 years	511	26	0	499	26	1	572	30	0	468	22	0
Not specified	210	18	0	250	40	1	330	34	1	175	34	0
Total	13,806	161	2	17,011	235	7	15,819	198	3	12,796	205	3

³⁰ The German Code 93 includes: cleaners in general (Reinigungsberufe) such as washers, launderers, pressers, domestic cleaners, window & building cleaners, street cleaners, vehicle cleaners, machine cleaners, garbage collectors. Sub-division 933 includes: domestic cleaners (Raum-, Hausratreiniger). Sub-division 934 includes: window & building cleaners (Glas-, Gebäudereiniger). Only employees subjected to social insurance contribution are included.

Table 11: Distribution of occupational accidents in cleaners by body part injured in Germany, 2005 [94]

Body part injured	Accidents	% of total
Hand	2,739	21.0
Multiple locations	2,547	20.0
Feet	1,797	14.0
Upper Limb	1,305	10.0
Trunk	1,303	10.0
Lower limb	1,169	9.0
Head (excluding the eyes)	1,005	8.0
Eyes	499	4.0
Not specified	373	3.0
Internal lesions	60	0.5
Total	12,797	

Table 12: Distribution of occupational accidents in cleaners by cause in Germany, 2005 [94]

Cause of the accident	Number of accidents	% of total
Slips and falls	3,645	28
Object moving accidentally	1,673	13
Falls on uneven ground/from height	754	6
Hand tools	713	6
Lifting a load	267	2
Manual handling	220	2
Machines	204	2
Traffic accident	0	0
Contact with dangerous products	0	0
Electric installation	0	0
Other	5,322	42
Total	12,798	

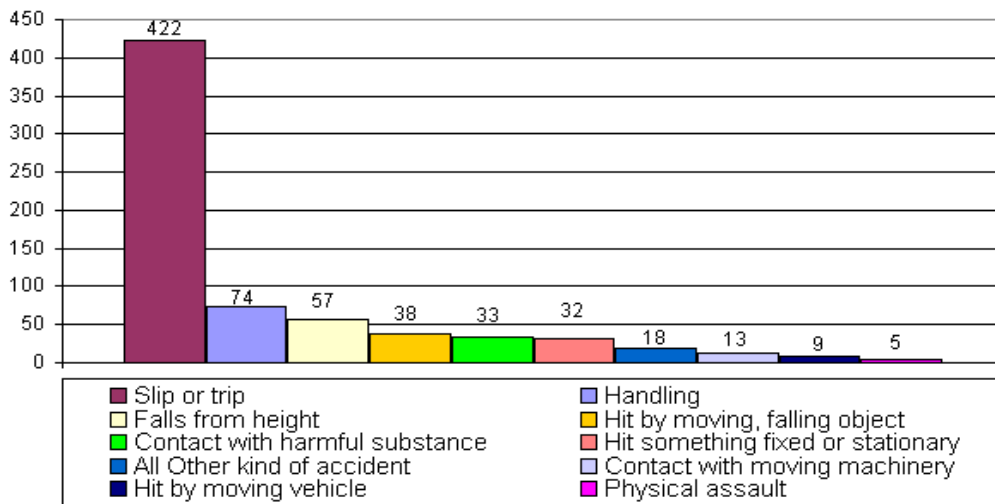
Table 13: Distribution of occupational accidents in cleaners by type of lesions in Germany, 2005 [94]

Type of lesion	Number of accidents	% of total
Contusion	4,359	34.0
Distorsion	2,425	19.0
Fracture	1,525	12.0
Sharp or loose foreign body	324	2.5
Burns	131	1.0
Asphyxiation	30	0.2
Amputation	15	0.1
Luxation/dislocation	15	0.1
Intoxication	14	0.1
Other lesions	3,565	28.0
Not specified	389	3.0
Total	12,792	

▪ **United Kingdom**

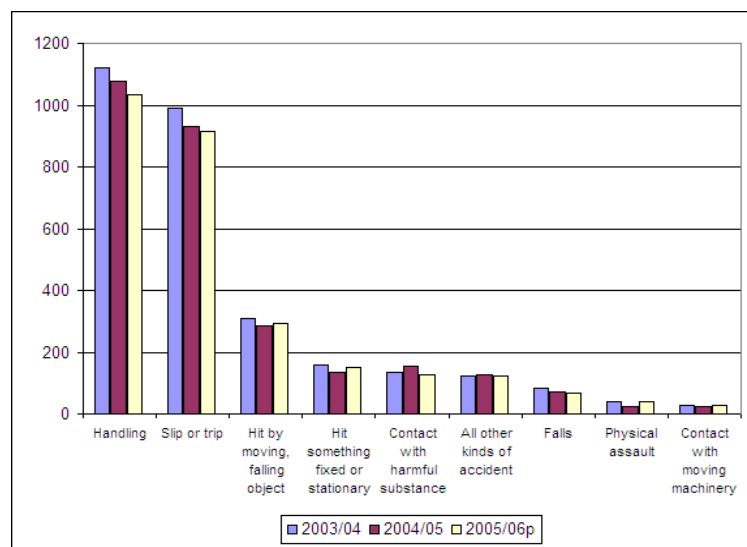
In the UK, the yearly provisional number of occupational accidents to cleaners reported to the Health and Safety Executive (HSE) and Local Authorities for 2005/2006 amounted to approximately 3,500, of which over 700 were classified as major accidents, resulting for example in dislocations or broken bones. An analysis of the major accidents to cleaners in the U.K. between 2003 and 2006 revealed that slips and trips (more than 400 cases classified as major accidents per year), manual handling (more than 50 major accidents each year) and falls from height (more than 50 major accidents each year) were the most common types of accidents (Figure 2). Approximately 2,700 cleaners per year are victims of occupational accidents in the UK with more than three days absence from work. **Slips and trips followed by manual handling are also the main types of accidents with over three days of absence from work (more than 900 accidents per year in each category) (Figure 3). Manual handling is the cause of over one third of accidents (34%) [96].**

Figure 2: Number of major accidents to cleaners from 2003 to 2006p in the UK [96]



p = provisional

Figure 3: Number of accidents with over 3 days sick-leave in cleaners for the period 2003 – 2006p in the UK [96]



p = provisional

▪ Portugal

An analysis of 927 occupational accidents in the Portuguese cleaning sector for the period 2001-2003 showed which event (defined as the “activity deviation”, i.e. the last event that deviated from the “normality”/the regular activity before the accident happened) led to the accident (Table 16, and what contact caused the accident or mode of injury, i.e. the contact or the “Material Agent” that injured the cleaner victim of the accident (Table 15) [11]. **Slips and falls were the most common cause of accidents** (25% of accidents).

Table 14: Distribution of accidents in cleaners by event (activity deviation) causing the accident in Portugal [11]

ESAW code*	Activity deviation	% accidents
52	Slipping, Stumbling and falling, Falling from the same level	25.0
64	Uncoordinated movements, spurious or untimely actions	14.0
51	Falling to a lower level	10.3
75	Treading badly, twisting leg or ankle, slipping without falling	6.7
44	Loss of control (total or partial) - of object (being carried, moved, handled, etc.)	6.6
71	Lifting, carrying, standing up	5.9
22	Liquid state - leaking, oozing, flowing, splashing, spraying	4.4

* European Statistics on Accidents at Work

Table 15: Distribution of accidents in cleaners by contact causing the accident in Portugal [11]

ESAW code*	Contact - Mode of injury	% accidents
31	Vertical motion, crash on or against (resulting from a fall)	37.3
71	Physical stress - on the musculoskeletal system	17.0
32	Horizontal motion, crash on or against	7.5
51	Contact with sharp Material Agent (knife, blade, etc.)	5.7
42	Struck - by falling object	5.5
52	Contact with pointed Material Agent (nail, sharp tool etc.)	1.2

* European Statistics on Accidents at Work

5.2. Official data on occupational diseases

Official data on occupational diseases broken down for cleaning jobs could be collected from Belgium only [93]. The data presented below correspond to occupational diseases notified and recognised as such by the national authorities.

From the 70 new cases of occupational diseases in cleaning workers in 2006, 20 resulted in a temporary incapacity, 11 in a permanent disability, and 39 in a financial compensation (reimbursement of the medical costs due to the disease (Table 16). No clear trend in the disease figures can be seen for the period 2001 to 2006, where the number of occupational diseases fluctuated between 50 and 79 cases. **About half (47%) of occupational diseases were found in cleaners over 45 years old, and about 90 % cases were women** (Table 17; Table 18).

Table 16: Occupational diseases in cleaners in Belgium from 2001 to 2006, by consequence [93]

Year	Temporary incapacity	Permanent disability	Financial compensation (medical costs)	Total number of diseases
2001	19	10	32	61
2002	21	14	40	75
2003	30	19	30	79
2004	12	5	33	50
2005	18	9	33	60
2006	20	11	39	70

Source: FBZ - Fund for occupational diseases

Table 17: Occupational diseases in cleaners in Belgium from 2001 to 2006, by age [93]

Age group	2001	2002	2003	2004	2005	2006
20-24	1	1	0	1	3	1
25-29	6	8	3	2	2	7
30-34	8	9	6	5	10	6
35-39	15	18	16	8	9	12
40-44	10	15	18	17	12	11
45-49	10	9	18	8	11	19
50-54	5	5	9	4	8	7
55-59	4	7	7	5	3	3
60-64	1	1	1	0	1	2
65+	1	0	1	0	1	2

Source: FBZ - Fund for occupational diseases

Table 18: Occupational diseases in cleaners in Belgium from 2001 to 2006, by gender [93]

Year	Male	% of total	Female	% of total	Total
2001	2	3.28	59	96.72	61
2002	8	10.67	67	89.33	75
2003	4	5.06	75	94.94	79
2004	4	8.00	46	92.00	50
2005	4	6.67	56	93.33	60
2006	9	12.86	61	87.14	70

Source: FBZ - Fund for occupational diseases

Table 19 shows the occupational diseases by cause. **The most common diseases are by far skin diseases, followed by tuberculosis**, which belong to the group of the respiratory diseases.

Table 19 shows that most of the diseases are either skin disorders or respiratory disorders. For example, in 2006, **almost half were skin diseases** (48.57%, corresponding to 34 cases) and **above one third were affections of the respiratory system** (34.29%).

Table 19: Occupational diseases by cause from 2002 to 2006 [93]

Occupational disease - cause	2002	2003	2004	2005	2006
Affection of nerve function caused by pressure	2	7	5	7	5
Diseases caused by exposure to nickel (combinations)	2	1	1	1	29
Skin diseases	51	52	24	25	3
Allergic affections caused by natural latex after at least 1 month exposure to the risk at work	4	7	2	2	7
Infectious diseases - for workers in the preventive healthcare, medical care, nursing at home, laboratory work, and other professional activities in healthcare institutions where an enhanced risk of infection exists	1	4	1	4	1
Diseases caused by exposure to chlorine	1	6	14	1	22
Tuberculosis - for workers in the preventive health care, medical care, nursing at home, laboratory work and other professional, and other activities in healthcare institutions where an enhanced risk of infection exists	10	1	1	15	1
Affections of the periarticular bursae caused by pressure, under skin cellulite	2		1	2	1
Not specified	2	1	1	3	1
Total	75	79	50	60	70

Source: FBZ - Fund for occupational diseases

Table 20: Occupational diseases by type of pathology, from 2001 to 2006 (source: FBZ - Fund for occupational diseases) [93]

Year	carpal tunnel	skin disease	hepatitis	nose-throat-ear disorder	respiratory disease	bones, joints, discus disorder	tendinitis	bursae disorder	general affection*	eye disorder
2001	0	48	1	0	7	0	3	0	1	1
2002	2	57	0	0	13	0	1	2	0	0
2003	7	60	0	0	9	1	2	0	0	0
2004	5	25	2	1	15	0	1	0	1	0
2005	7	31	3	0	16	0	1	0	1	0
2006	5	34	1	1	24	0	1	0	4	0

* Kidney infections and neurological pathology which do not occur in other groups

Source: FBZ - Fund for occupational diseases

5.3. Work-related diseases

5.3.1. Prevalence of work-related diseases in cleaners

Studies collected from four Member States (Belgium, Denmark, Germany and the UK) as well as Norway pointed out the **high levels of morbidity and disability among cleaners**.

■ **Belgium:**

According to figures from the Belgium society of cleaning companies (ABSU), the average absence rate for long-term illnesses (lasting more than one month) was 3.78% in 2004-2005. This means that 435,758 working days were lost due to work-related diseases (for a total of 10,049,851 actual working days). **The cleaning sector is ranked the fourth sector with the highest absence rate. 30 to 40% of work-related diseases in cleaning staff are MSDs [97]. Skin and respiratory disorders are also among the major work-related disorders found in cleaners.** For example, in 2006, about 49% were skin diseases and about 34% were respiratory diseases, including tuberculosis. [93]

■ **Denmark**

A Danish study of 1,116 female cleaners in schools, offices and health care [98] found an overall prevalence rate of 91% when looking at health disorders over the 12 previous months. Considered on their own, **musculoskeletal disorders had a prevalence rate of 75%** during the same 12-month reference period; **the prevalence rate of skin disorders was 54%; and 45% for irritations of the respiratory tract.**

■ **Germany:**

In 1995 in Germany, **40% of the cleaners, including domestic cleaners, went on early retirement due to work incapacity, compared to 17% for the general workforce [99].** Another German study on cleaning workers in the public sector confirmed that **long-term diseases are more common in cleaning jobs than in other occupations [100].**

In 2000, the German Deutsche Angestellten Krankenkassen (DAK, health insurance) and the Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege (BGW, statutory accident insurer for the healthcare sector) carried out a survey on work-related psychosocial aspects in 23 types of occupations [87]. The survey included a total of 8,015 workers, of which 238 were cleaners in the sector (occupational group number 933 in the German classification of occupations) - 94.5% were female cleaners and 5.5% male). **The mental health of cleaners was worse by 9% than for the total German labour force, and their physical health worse by 7%.** Furthermore, cleaners suffered more from so-called “psychosomatic” disorders than the German labour force (50.9 % above the average). Back pain, neck/shoulder pain, “heavy legs” (unpleasant sensation of pains and tiredness in the legs), high sleeping need and (internal) restlessness were the most common disorders and complaints found under the category of “psychosomatic” disorders (Table 21) [87].

Table 21: Most common disorders [87]

Type of complaint	% of answers by severity		
	Highly	Moderately	Rarely
Back pain / low-back pain	42	33	25
Neck / shoulder pain	41	37	23
Heavy legs	24	36	40
High sleeping need	22	36	42
(Internal) restlessness	18	35	47

Source: BGW-DAK study, Germany 2000

A report issued by the German IKK-Bundesverband (private health insurer for the craft sector in Germany with five million members) [101] in Germany revealed that glass and building cleaners have a higher incidence of work-related diseases (5.3%) than the average workers they insured (4.1%), and even higher than the average for the healthcare and cleaning sector (3.9%) under which glass and building cleaners are also counted. The average duration of sick-leave for glass and building cleaners is also higher (15.2 days per employee) than for the health and cleaning sectors (12.2 days) and for IKK's insured workers (12.0 days). Long-term sick-leaves (over 6 week duration) in the glass and building cleaners represent 5.9% of all cases of work-related diseases and are responsible for 45.5% of all sick-leave days in these specific jobs, compared to 42.5% of sick-leave days for all IKK's insured workers.

The IKK study also shows that the number of sick-leave days due to MSDs is twice as high as the one due to accidents at work for glass and building cleaners, and 66.7% higher than the IKK average. The same situation was also observed for the number of sick-leave days due to other health problems, such as mental ill health (42.5% higher than IKK average), skin diseases (+25.8%), respiratory disorders (+17%), circulatory problems (+15.8%), injuries (+10%) and digestive disorders (+9.2%) [101].

▪ **Norway:**

A study by Gamperiene et al. [102] of a sample of 34,189 cleaners and 69,186 non-cleaners in Norway from 1980 to 1990 found that there was a **significantly higher incidence rate of disability amongst cleaners (13.4 per 1,000 persons a year (CI 95% 13.0–13.8)) than in non-cleaners (9.6 per 1,000 persons a year (CI 95% 9.3–9.8))**. However, the overall mortality rate was 4.2 per 1000 persons per year (95% CI 4.0–4.5), with **no significant difference between the two groups**.

The same study [102] also found that the incidence rates of disability and subsequent disability pensions are higher in female cleaners than in other groups of occupationally active women. The author saw three possible explanations:

- The higher morbidity in cleaning jobs is due to the job itself; or
- Women with poor health are hired predominantly in unskilled occupations and in particular in cleaning jobs; or
- Once in pain, it is more difficult to remain in cleaning jobs than in other occupations. This would mean that cleaners might be more likely to be offered a pension than other occupational groups with the same degree of disability.

▪ **United Kingdom:**

A questionnaire-based study of 5,000 cleaners in the UK also showed **that the prevalence of health problems such as musculoskeletal complaints, skin problems and psychosomatic disorders among cleaners was higher than in other professions** [50]. 23% of the respondents had been absent from work within the last 12 months as a result of aches and pains caused by work.

Previous research by Woods and al. found that **the prevalence of work-related diseases in cleaners was higher in the age group over 45 years old** [20].

5.3.2. Research on specific health outcomes

The following list itemizes the health problems affecting cleaners that were found in the scientific literature [20] [96] [98] [103] [104]:

- MSDs, including back pain, tensions in the shoulders and arms, pains in the joints;
- skin diseases, dermatitis
- respiratory disorders, including of the upper airways;
- circulatory disorders, including cardiovascular disorders;
- injuries, including needle-stick injuries;
- gastrointestinal complaints;
- infections in general;
- metabolic disorders;

- urinary disorders
- hepatitis;
- eye symptoms;
- disturbance of the general well-being, nervousness, sleeping disorders;
- and even cancers [105] [106] [107] [108] [109] [110] [111] [112] [113] [114].

According to a Finnish study on cleaners in the EU-15 in 1999, cleaning workers are worst affected by a declining workability with short and longer periods of absenteeism and frequent medical consultation than other workers' group [10].

5.3.2.1. Musculoskeletal disorders (MSDs)

Work-related musculoskeletal disorders (MSDs) are impairments of bodily structures such as muscles, joints, tendons, ligaments, nerves, bones and the localised blood circulation system, that are caused or aggravated primarily by work and by the effects of the immediate environment in which work is carried out. These disorders mainly affect the back, neck, shoulders and upper limbs (arms, hands, wrists and fingers), but can also affect the lower limbs (knees, hips, and feet) [115]. Symptoms of MSDs can be pain, discomfort, numbness and tingling sensations [52].

MSD risk factors:

Different groups of factors may contribute to MSDs, including physical and biomechanical factors, organisational and psychosocial factors, individual and personal factors. These may act uniquely or in combination. [115]

Factors potentially contributing to the development of MSDs [115]

Physical factors:

- Force application, e.g. lifting, carrying, pulling, pushing, use of tools
- Repetition of movements
- Awkward and static postures, for example with hands above shoulder level, or prolonged standing and sitting
- Local compression by tools and surfaces
- Vibration
- Cold or excessive heat
- Poor lighting – may for example cause an accident
- High noise levels, e.g. causing the body to tense

Organisational and psychosocial factors:

- Demanding work, lack of control over the tasks performed, and low levels of autonomy
- Low levels of job satisfaction
- Repetitive, monotonous work, at a high pace
- Lack of support from colleagues, supervisors and managers

Individual factors:

- Prior medical history
- Physical capacity
- Age
- Obesity
- Smoking

A number of occupational factors in cleaning have been identified as being associated with MSDs. An important MSD risk factor found in professional cleaning is awkward working postures, which can result from minor back problems to severe handicaps [52]. Static postural load is frequent and, in particular, awkward working postures for the back and arms are common. The proportion of working hours spent bent forward and /or with a twisted back is 36-56% [55]. During mopping tasks, cleaners' backs are bent forward with an angle of about 28° from a "normal" vertical position and their necks by 51 [52]. In addition, 3% to 14% of the working time is spent in squatting position [52].

Other risk factors that were associated with the development of MSDs in cleaners are linked to the work organisation as well to psychosocial issues and include [7] [50]:

- lack of control over work and breaks;
- high workload and time pressure;
- poor work schedules;
- little or no training;
- little appreciation by third parties of the cleaning work done;
- fear of making mistakes;
- limited career development
- high job turnover in cleaning.

It seems that there is no clear evidence on the correlation of low job satisfaction with MSDs and that more research is needed on this factor [52].

The importance of organisational factors is recognized by a Swedish study of two groups of hospital cleaners (cleaners working with a "traditional" work organisation pattern = 135; and cleaners working following an extended work organisation = 111) (Table 22) [116]. In the hospital with a "traditional" organisation (TO), the cleaners were organised in groups of 20 with a supervisor performing the administrative tasks (e.g. plan the daily work, composing working schedules, etc.). The cleaners worked on their own and every day in the same working area.

The group who followed the extended organisation (EO) changed from the TO to the EO two years earlier. The change was the result of a long process of thorough examination and discussion. In this group, cleaners worked in groups of 6–8 people. One person was appointed as the head of the group and had specific work tasks (e.g. some financial responsibilities, replacing staff during sick leaves and vacations, etc.). Unlike in the TO group, this person also took part in the daily cleaning work.

The study [116] found that hospital cleaners had a high prevalence of neck and upper limb disorders. Furthermore, the cleaners in the TO group had a higher physical workload, less beneficial psychosocial factors and more MSDs, in particular a higher prevalence of complaints and disorders diagnosed in the neck and shoulders, than in the EO group. This shows that a good work organisation has a positive effect on physical health.

Table 22: Characteristics concerning organization model, work content and support in female hospital cleaners with traditional (TO) and extended (EO) organisation [116]

Characteristics	Traditional organisation (TO)	Extended organisation (EO)
Organisation model		
<i>Group size</i>	Large groups, 20 cleaners	Small groups, 6–8 cleaners
<i>Management</i>	Supervisor (administrative work)	Group leader (administrative and cleaning work)
<i>Authority</i>	Limited—ruled by cleaning schedules	Group based agreements
<i>Working area</i>	Individual and shattered	Group based and coherent
<i>Work content</i>	Cleaning	Cleaning, planning, client contacts, other work tasks
Support		
<i>Training</i>	Introduction 2–4 h	Introduction 2–4 h
<i>Further training</i>	–	In total 40 h
<i>Feed back</i>	Scarce and individual	Frequent and group based

Further scientific studies acknowledge the fact that a poor work organisation and high psychosocial demands, combined with high physical demands, contribute to the development of MSDs. High work demands associated with cleaning work, characterised by working under pressure and difficulties in keeping up with work, combined with having to conduct the same task several times a day in awkward postures and poor ergonomic conditions, are determinants of a higher prevalence of pains and discomfort [55]. In fact, workers highly exposed to the combination of occupational physical and psychosocial risk factors are more likely to report MSDs than workers highly exposed to the one or the other type of exposure [57].

Although the introduction of work variation through job enlargement is often suggested to reduce MSDs, it appears that cleaning tasks do not always provide a sufficient variation in physical work conditions in order to create a less stressful work environment and to prevent MSDs – as well as cardiovascular damage - although in some cases improved mental health was noted [7].

MSD prevalence:

According to a **German** survey (n = 109), 72% of the cleaners (mostly school cleaners) visited a physician due to MSDs, and 61% took sick leave because of MSDs [98].

Research by Weigall et al. [54] found that of the workers interviewed:

- 83% experienced pain (aches or pain in neck, arms, hands, back, and legs) or discomfort during the last 12 months;
- 66% experienced pain (aches or pain in neck, arms, hands, back, and legs) or discomfort in the last 7 days;
- the highest prevalence rates for musculoskeletal pain and discomfort during the last 12 months were in the lower back (48.5%), wrist/hands (40.9%), and shoulders (39.4%);
- the lower back (15.2%) was the highest ranked body part for preventing normal work in the last 12 months.

Woods et al. surveyed 775 cleaners (89% of them were women) in the **United Kingdom** [20] with regards to the pains they might have suffered in the last 12 months and in the past 7 days. Nearly 3 in 4 cleaners (74%) had experienced muscular aches, pains and discomfort during the last 12 months (Table 23). When looking at the last 7 days, 53% reported muscular discomfort resulting in 52% of them having consulted medical services for this. Although the number of cases of pains experienced during the last 7 days is lower than in the last 12 months, the results point out that musculoskeletal pains occur quite persistently [20]. These results were consistent with a **study by HSE in the UK** [96]: during the 12 months previous to the study, 74 % of the cleaners studied had experienced muscular aches, pains and discomfort, 53 % sought medical advice, and 23 % had been absent from work because of these disorders.

Table 23: Percentage of survey respondents who experienced pain by body area [20]

Body area	Over the 12 previous months (%)	Over the 7 previous days (%)
Lower back	46	24
Neck	33	19
Knees	24	16
Right shoulder	23	14
Right wrist / hand	22	15
Left shoulder	19	10
Hips / thighs	17	11
Ankles / feet	18	13
Left wrist / hand	17	10
Upper back	14	8
Right elbow	13	9
Left elbow	9	5

(n = 775)

Woods et al. [50] investigated the occurrence of tingling, numbness and white fingers as indicators of the **hand-arm vibration syndrome** in 800 UK cleaners. 34% of the tested cleaners reported tingling sensation, 32% numbness, and 16% white fingers. The combination of all three symptoms in the same individual occurred in 12 % of the sample. However, due to the absence of clinical diagnosis these results have to be taken with caution.

Regarding the **low back region**, 46% of 1,216 cleaners **in the UK** reported aches/pains [50] in this region over the last 12 months and 24% reported pain and discomfort during the 7 days preceding the completion of the questionnaire. The low back region was symptomatic in 67.5% of cleaners (n=114) in the above mentioned **Portuguese study** [11] with an average discomfort score of 4.6 on a scale ranging from 1 to 6.

With regards to the **wrist region**, a **Danish study** reported that 46% (n=1,166) of cleaners referred some type of wrist problem [117]. Carpal tunnel syndrome was diagnosed in 48.3% (n=145) of female floor cleaners operating at hospitals [118]. A **Swedish study** found that in the previous 7 days 11% (n=62) of cleaners claimed to have trouble with the wrist [119]. Another study carried out in the **United Kingdom** [50] stated that 22% (n=1,216) of cleaners reported pain/discomfort in the previous week in the right wrist/hand.

Another **Swedish study** found that approximately 43% cleaners had pain and discomfort in the **hands** [52]. A **Portuguese study** [11] of 114 cleaners revealed that 35.1% of cleaners reported persistent symptoms in the right hand 28.9%, namely tingling or numbness in the hand and fingers.

In a study of **cleaning workers in hotels in Las Vegas** [120] (n_{total} = 941, n_{female} = 931, n_{male} = 10), 75% experienced work-related pain during the past 12 months. Of those cases:

- 94% of the cleaners said the pain began during their current job;
- 61% visited the doctor for this pain; and
- 57% went on sick-leave or took some holiday because of these pains.

5.3.2.2. Needlestick injuries (NSI)

Between 30 October 2003 and 21 October 2008, 24 German hospitals notified needle stick injuries and cuts and contact with blood or body fluids to the EPINet (**Exposure Prevention Information Network**) [121]. In these hospitals, a total of 2,452 NSI and cuts were registered for the entire staff, of which 71 in the hospital cleaning staff (2.95 % of all cases). Furthermore, in two cases the cleaning staff had had contact with blood or body fluids (1.12 % of all 179 cases of contact with blood/body fluids). **Disposal of medical waste carries a clear risk of injury with needle and sharps for cleaners.**

5.3.2.3. Skin diseases

Skin diseases are among the most frequent work-related diseases in cleaners [98].

Darsow et al. analysed data for 439 cleaners, of which 417 female, from the Informationsverbund Dermatologischer Kliniken (IVDK – information network of dermatology clinics) in Germany between 1990 and 1994. **The main diagnoses were allergic contact eczema (178 cases, 40.5%) and irritant contact eczema (92 cases, 21.0%). In 231 cases (52.6%) the hands were mainly affected.** The duration of work did not correlate with the number of work-related skin alterations [122].

Further studies confirm the **high prevalence of work-related dermatitis in cleaners [30] – higher than in other jobs** [96]. Work-related contact dermatitis in cleaners may be caused by [96]:

- dermal exposure to the chemicals present in cleaning products [26];
- wet work and frequent contact with water (particularly when more than two hours a day);
- dermal contact with biological agents (e.g. plants, bacteria and fungi);
- mechanical abrasion (e.g. when using abrasive substances); and
- physical agents (e.g. vibration).

In addition, the use of personal protective equipment such as gloves that do not permit the skin to “breathe” may cause skin alteration and skin diseases [122] [123].

A review by K. Messing confirms that **cleaners have a high prevalence of skin problems, particularly dermatitis and eczema**, and that **cleaners who spend more time with wet hands have more skin problems** [40].

5.3.2.4. Respiratory diseases and asthma

According to the review carried out by Bello et al. for their own study [23], the incidence of asthma and asthma-like symptoms has increased among cleaning workers in the last decade, and the hypothesis that the development or aggravation of respiratory disorders, including asthma, seems to be confirmed by epidemiological studies.

Measurement of the levels of exposure to nitrogen trichloride (NCl_3) and aldehydes for 175 cleaning and disinfecting workers in the ambient air of food industry plants during cleaning and disinfecting operations showed that cleaning and disinfecting workers in the food industry are at risk of developing nose and throat irritations – as well as irritations of the eyes. Exposure to NCl_3 does not seem to carry a risk of developing permanent bronchial hyper-responsiveness but the possibility of transient bronchial hyper-responsiveness cannot be ruled out entirely. [124]

According to a Danish study, cleaners have an increased risk of death from airway diseases compared to the average population [104].

According to the European Community Respiratory Health Survey (ECRHS) [125], **cleaning is the fourth occupation with the highest risk of asthma**, defined as bronchial hyper-responsiveness and reported asthma symptoms or medication (odds ratio 1.97 [95% CI 1.33-2.92]) - after farmers (odds ratio 2.62 [95% CI 1.29-5.35]), painters (2.34 [1.04-5.28]) and plastic workers (2.20 [0.59-8.29]), and before spray painters (1.96 [0.72-5.34]) and agricultural workers (1.79 [1.02-3.16]). This was consistent across different countries [126]. According to recent research from Kogevinas et al. [127], the exposure to certain cleaning chemicals, bioaerosols, mites, agricultural products, and latex in the workplace raise the risk of developing asthma. The study found that the risk of developing asthma for cleaners due to conditions in the workplace was 1.7 times higher than for other occupations. A Finnish study ($n_{\text{cleaners cohort}} = 53,708$, $n_{\text{administrative workers cohort}} = 202,751$) showed that female cleaners had a significantly elevated relative risk (RR = 1.5) for adult-onset asthma in comparison to female administrative workers [128]. Similar results regarding the increased prevalence of asthma were obtained in the Spanish part of the ECRHS [129]. However, it should be noted that because of different definitions of asthma in the different countries, the direct comparison of results is difficult. In addition, the job history, for example job changes, before asthma diagnosis may bias the analyses [128].

The Spanish ECRHS showed that asthma risk among Spanish indoor cleaners is related to the cleaning of private homes. Among different cleaning professions, cleaners of private homes had a higher asthma risk (prevalence between 3.3 and 5.0, depending on the asthma definition) than cleaners in schools, shops, hospitals and offices for whom the prevalence was similar to the one of the reference group [129]. The risk of asthma differed with the tasks and locations where the cleaning work is performed and is higher for kitchen cleaning, furniture polishing, vacuuming and sweeping, cleaning furniture and cleaning of sanitary facilities [129], [130]. This finding may be explained by the use of sprays and other products for kitchen cleaning and furniture polishing, but this should be confirmed in additional studies in different countries [129]. Cleaning products such as chlorine, ammonia, quaternary ammonium compounds and (ethanol) amines have been suggested to cause work-related asthma [23] [129].

A further study [131] showed that female domestic cleaners, including currently working cleaners as well as former cleaners, had a significantly increased risk of asthma and other respiratory symptoms compared to women who never worked in cleaning (cross sectional study, $n_{\text{total}} = 4,521$). Moreover, current domestic cleaners had a lower asthma risk than former cleaners. According to the study, a possible explanation is the healthy worker effect. It can be hypothesised that relevant exposures in cleaners have decreased during the last decades.

5.3.2.5. *Mental health*

In a Norwegian study of 374 female cleaning workers, 17.5% reported mental health problems [92]. Workers in housekeeping, laundry, cleaning and services were 4.1 times more likely to develop schizophrenia (even after controlling for alcohol and drug use). Cleaning women aged 50-59 were found to be at higher risk of mental health problems than other age groups.

The risk of mental health problems was also found higher for non-ethnic Norwegians than for ethnic Norwegians [92]. In a study of Munar Suard [5], the researchers mentioned that workers of a foreign origin do not often use the notion of stress. Nevertheless if the workers are asked to describe the problems they have at work and the effects on their health and well-being, this description is clearly linked to the notion of “stress” as described in scientific literature. The study also found that being immigrant was an important risk factor contributing to the development of mental health problems among female cleaning workers. [5]

Poor satisfaction with the management’s leadership, as well as unsatisfactory cooperation with peers was associated with mental health problems [92]. The quality of communication, more than the amount of communication, was found to play a role. Indeed, high-quality cooperation between the cleaning staff and their supervisors appeared to be more important than the quantity of meetings. In this study, no association was found between mental health problems and working time or work organisation.

5.3.2.6. *Cancers*

A recent study published in 2009 found elevated odd ratios (OR: 2.04, 95% CI: 1.00, 4.14) of chronic **lymphocytic leukaemia** in cleaners [106]. An increased risk of **leukaemia** in cleaners was also found in a population-based case-control study conducted in Iowa and Minnesota (USA) [110]. In Denmark, an earlier register linkage study (published in 1996) investigating cancer incidence in health care personnel found concluded on a significantly elevated risk of leukaemia in female cleaners [113].

A case-control study in New-Zealand published in 2008 found a statistically significant elevated risk of **non-Hodgkin's lymphoma** in cleaners and mentioned that this result was one of the most robust findings of the study [108]. According to a population-based, case-control study in Italy aimed at investigating associations between different hematolymphopoietic malignancies and exposure to solvents and pesticides in men, cleaners’ occupations were associated with elevated risk of one or more malignancies among men for non-Hodgkin's lymphoma [112].

Evidence of significantly elevated risk of **bladder cancer** in domestic helpers, cleaners, and launderers was found in a Belgian population-based case-control study [107].

In the USA, according to a study investigating the causes of death from esophageal squamous cell carcinoma by occupation and industry between 1991 and 1996 [109], mortality was found to be high in cleaners. The study concluded that **esophageal squamous cell carcinoma** was potentially associated with exposure to chemical solvents or detergents - as well as exposure to silica.

A study published in 2002 [105] on the relation between **gastric cancer** and occupations among people employed in 1970 in Sweden for the period 1971-1989 found evidence of an excess risk of **gastric cancers** in cleaners.

A population-based case-control study of **brain glioma** in the state of Iowa (USA) [111] found that, among men, the industries and/or occupations that had a significantly increased risk for employment of more than ten years included cleaning and building service occupations, as well as janitors and cleaners.

Data collected from a multicenter case-control study of invasive cervical cancer and carcinoma in situ of the cervix were analysed with regard to occupation [114]. Cleaners were among the occupations showing elevated risks of **invasive cervical cancer**. The analysis of risk from carcinoma in situ was limited because of the small number of cases.

A review of 12 less recent peer-reviewed scientific articles published between 1984 and 1994 [9] concluded on associations, with reservation, between cleaning occupations and cancer of the pancreas, liver, bladder and lungs as well as with non-Hodgkin's lymphoma. However, according to the review, three limitations have to be taken into consideration:

- data on the work area, and the intensity and the duration of exposure are often missing in the cancer register or death certificates on which some of the studies rely, and it is very difficult to obtain a job-exposure matrix from questionnaire-based studies;
- the biological model for exposure is often unknown, i.e. how the exposure causes cancer; and
- other factors, such as socioeconomical ones, may also play a role.

An additional point to take into account is that the legislation on chemical substances has changed since the time when some of the studies mentioned above were carried out. Some substances which were present in detergents at the time of the studies and might have been the - or one - causal factor of cancer might now be classified as carcinogen or mutagen category 1 or 2 according to Directive 2004/37/EC³¹, for which substitution is mandatory, and should therefore not be present in cleaning products nowadays.

Almost all the studies mentioned above concluded that the association of cancer risks with cleaning workers deserve further assessment and more focused research.

5.3.2.7. Reproductive health disorders

The review by Krüger and al. conducted in 1997 [9] found six studies looking at the reproductive health of cleaners in the scientific literature. The authors concluded from their review on an increased risk of spontaneous abortion, preterm delivery, low-weight babies and high blood pressure during pregnancy in cleaners. The risk factors suggested were prolonged standing, carrying heavy loads and high abdominal pressure from bending and stooping. One of the studies reviewed also found an association between low fecundity and heavy cleaning work in combination with unfavourable working hours.

5.3.3. Physical fitness

The physical characteristics of female cleaners have been studied in small studies from Denmark, Finland, Sweden and Germany. Some studies found that there is a **high proportion of women with poor health** in cleaning activities [40] [102] and that their **physical capacity is lower than average** [9]. A general tendency among cleaners in the Finnish studies as well as in some Danish studies indicated that the body mass index is above average compared to the general population, which is a risk for developing MSDs, metabolic disorders, diabetes and cardio-vascular diseases [10]. In some cases, the work-related stress and strains were found to be so high that cleaners can not recover sufficiently after work, which in the long run may cause permanent fatigue. It was found in this respect that less physical discomfort is experienced with increased physical capacity and that poor physical fitness is a predictor for early retirement of cleaners [132]. However, the workplace can also be a context which is particularly conducive to risk prevention measures and health promotion activities in cleaners. In fact, **promotion of health at work is one of the priorities of the Community Strategy 2007-2012 on health and safety at work** [133] and aims at a “situation at work which enhances a person’s health and wellbeing and improves the general health of the population”. According to the Luxembourg Declaration on Workplace Health Promotion (WHP) [134], “WHP is a modern corporate strategy which aims at preventing ill-health at work (including work-related diseases, accidents, injuries, occupational diseases and stress) and enhancing health promoting potentials and well-being in the workforce”. It describes the combined efforts of employers, employees, and society to improve the health and well-being of people at work. It includes the improving of the organisation and the work environment, promotes active participation of the employees in the process and encourages personal development. Some information on WHP³², including a collection of cases of Good Practice, is available at the Agency’s website European Agency for Safety and Health at Work .

³¹ Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work, OJ L 158, 30.4.2004, p. 50–76.

³² <http://osha.europa.eu/en/topics/whp>

6. Conclusions, challenges and perspectives

This report aims to provide an overview of the current occupational safety and health status of cleaning workers, to highlight the main trends and issues related to their working conditions, to characterise their exposure to OSH risk factors and the subsequent health outcomes, and to identify the knowledge and information gaps and formulate recommendations for future work and actions.

The cleaning sector represents one of the most dynamic corporate services in the world. The number of cleaning companies continues to grow especially in newer EU Member States. Cleaning is a basic service occupation carried out in all industry groups and workplaces, outdoors and indoors, including private companies and public areas. Nowadays, cleaning jobs develop towards more global service packages, which go beyond simple cleaning to include activities such as facility management and support services.

The occupational safety and health conditions depend on the environment and workplaces where the cleaners work but are poor in general. This is partly due to the specific contractual situation of many cleaning jobs. Indeed, most of the cleaning work is performed as contract cleaning where the cleaners are employed by a cleaning company but work within the premises of one or more “host companies”. The employer, i.e. cleaning company, is responsible for the health and safety of their cleaning workers but is not in control of the environment in which they work in the host company. Because cleaning work comprises a wide variety of tasks, cleaners are potentially exposed to a wide variety of chemical, biological, physical and psychosocial risks.

The dangerous substances to which cleaning workers can be exposed go beyond the chemical compounds contained in the cleaning products and include chemicals and biological agents contained for example in dirt, dust, soot particles and aerosols. The biological risks encountered in cleaning activities are exposure to micro-organisms (bacteria, viruses and moulds), fungal secretion products and bacterial endotoxins from dust and aerosols generated during the cleaning process or vacuuming. Contact with contaminated blood and other body fluids, with pets, rodents or birds and their droppings, and insects can also be a threat to health.

Physical hazards in cleaning work include any hazards linked to the poor ergonomics of work equipment (e.g. too short handles of vacuum cleaners) and work environment (e.g. work in confined workplaces leading to awkward working postures, furniture in hotel rooms difficult to lift), handling loads, falls from ladders and elevated platforms, wet and slippery floors, falling objects, moving or rotating machinery parts, sharp objects including broken glass, electrical hazards, etc.. Musculoskeletal disorders are among the most common negative health outcomes in the sector, mainly due to awkward postures. However, in the new types of cleaning services which are emerging such as “integrated services” and “facility management”, workers are generally provided with sophisticated equipment and are offered specific training.

Cleaning is often performed outside the usual working hours, early morning and in the evening or at night, and combines different kinds of interrupted rosters to attain a full time employment. It is generally very labour-intensive, mostly lone work. Cleaners often face a high workload, mostly due to intensification of work, and a high pace of work deriving from the demands for an increasing flexibility and productivity from employer and customers. They are often employed in precarious employment contracts or are even not declared; their incomes are generally low and they have a low socio-economic status. The feeling of job insecurity, linked to the labour market, their contractual situation and their on average low level of education, is an additional stressor. As a consequence, cleaning companies sometimes face difficulties in recruiting.

National data on health outcomes are rather scarce and a breakdown into the different cleaning sub-sectors (e.g. offices, industrial premises, schools, hospitals, etc.) even more so. Because quantitative data are lacking, the current practice is often to extrapolate the data available for one sub-sector to others and to use it to describe the cleaning sector as a whole, which might lead to serious biases in the conclusions. Several reasons may explain the scarcity of quantitative data. First, a significant number of cleaners employed in the “informal sector” are not included in health surveillance and OSH monitoring systems. The fact that cleaning is a job found in many different sectors also complicates the issue of data collection. Such data would be necessary in order to provide a reliable picture of cleaners’ working conditions and OSH at national as well as European levels. Although the figures collected for the present report cannot be extrapolated to an European level, they are a useful indication of the main accidents and diseases in the cleaning sector.

As to the research information available, it clearly suggests that the prevalence of health problems in the cleaning workforce is high. However, many studies give only a fragmented view of the cleaning occupation, focussing on specific hazards or outcomes separately rather than taking a holistic approach, considering the cleaning job as a whole and taking into account the working environment and working conditions. Seeing that cleaning is a generic, universal activity, the amount of scientific literature available is, in proportion, relatively poor. One explanation could be that research might have overlooked cleaning activities in the past – maybe because of a possible negative image of the cleaning work, which is associated with dirt and waste, because it was not seen as a job requiring specific skills, or simply because cleaning was taken for granted and not given further thought?

At the national as well as at the European levels, further research is needed to understand better the OSH challenges of the sector and improve the situation. In particular, the following issues have not been sufficiently investigated and deserve further attention:

- mapping and quantification of the exposure to the chemicals present in the cleaning products or produced from their reaction with the working environment, as well as their effects on worker's health, in particular with a view to the development of cancers and reproductive health disorders;
- mapping and quantification of the risks from biological agents, in particular with an emphasis on bacteria and viruses other than blood-borne viruses, but also including those, and the development OSH monitoring systems targeted at cleaning workers in order to better identify the cases of infections and prevent them;
- the risks from the exposure to less studied physical agents such as noise and electromagnetic fields;
- and the health effects of combined exposures to several risk factors, which is in many cases the reality of cleaning jobs, where cleaners are exposed simultaneously - or successively - to several types of chemicals and micro-organisms while sometimes working in poor ergonomic conditions and in precarious employment situations, taking into account broader aspects impacting on OSH such as their average more vulnerable health, their possible status of migrant workers with difficult access to social services, etc..

In particular, there is a lack of studies on domestic cleaners. Because they are mostly self-employed and often undeclared workers, little information is available on the status of their occupational health and safety, the tasks they perform, their working and employment conditions, etc. Migrant workers are often not aware of their rights, do not or hardly speak the language of the country where they work and are often in a precarious health and living situation, which forces them to accept any job, very often precarious work [135]. The fact that they are undeclared workers increases the risk of being exploited and having absolutely no control over their working conditions. One of the challenges is to inform these workers on their rights through other channels than the official ones. Systems such as the service cheques introduced in Belgium, Germany and France proved helpful to move undeclared workers from the informal to the formal economy, and beneficial in terms of workers' social protection at the same time.

Another challenge is that, although social partners increasingly collaborate at the European level in terms of producing and disseminating health and safety information for the sector, the situation in the companies often remains poor in terms of OSH awareness of the employers and host companies, and of OSH information available to them and to the cleaning workers. Cleaning workers often do not get the career and training opportunities provided to other workers, which often leads to an increased precariousness of their situation. Life-long learning programmes developed and financed by the sector (e.g. sectoral social funds) and supported by policy makers could increase workers' possibility to participate in training courses and increase their employability.

In conclusion, developing sound knowledge of the risk factors and health and safety outcomes is the first step to address the challenges of the sector and be able to develop preventive measures adapted to the specificities of the cleaning sector. Furthermore, OSH should be included in the procurement of cleaning services as well as of cleaning equipment. Cleaning worker should be systematically consulted on the work organisation and choice of equipment. In addition, improving the communication and coordination of responsibilities between the cleaning companies and the clients is essential to improve the working conditions of cleaning workers. Last but not least, more efforts should be made in raising awareness for OSH, training workers and disseminating the available information material on OSH risks and their prevention down to employers, "host companies",

supervisors, cleaners and even to further actors who equally have an impact on cleaners' working conditions such as architects, and designers and manufacturers of furniture or cleaning equipment.

In addition to this report, an Agency's report called "Preventing harm to cleaning workers" provides an overview of the EU legislation, policies and standards relevant to the occupational safety and health of cleaning workers, as well as examples of good practice to reduce the risks to cleaning workers. The Agency will organise a workshop on 2-3 December 2009 in Brussels in order to discuss with stakeholders the challenges associated with cleaning tasks and to seek solutions, with a particular focus on procurement issues, risk assessment, workers' training, and cleaners' exposure to dangerous substances, in particular in relation to skin diseases and respiratory disorders.

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