

OCCUPATIONAL HEALTH AND SAFETY - AN OVERVIEW

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Summary

Occupational health and occupational safety represent the two main elements in the study of work and its hazards. Occupational health is the study of the relationship between work and disease, illness and wellness. Occupational safety is the study of safety at work. Clearly the two concepts are interrelated and much of the methodology of analysis and of preventive strategies, is the same. This chapter is an overview of the subject including a look at the future whereas, *Occupational Diseases and Injuries*, deals more specifically with occupational disease and injuries.

1. Occupational Health and Safety

1.1. Work

Work is usually conceived of as an activity related to earning a livelihood. It often takes place in the context of employment where there is a relationship between an employer and an employee – often described in legal terms as a “master and servant relationship” but many people also work in a self-employed fashion. Others perform activities unrelated to making their living – charitable work for example or housework. Still others perform work activities in conditions of virtual slavery. Work is a pretty universal activity: there are no societies where nobody works but plenty where there is unemployment or underemployment, causing a variety of usually adverse social effects. Work as an activity is central to people’s well-being. In the words of the International Labour Organisation (ILO) “work can pave the way for broader social and economic advancement, strengthening individuals, their families and communities as well as providing income. Such progress, however, hinges on work that is decent. Decent Work sums up the aspirations of people in their working lives.”

1.2. International Labour Organisation

The ILO is the international organisation responsible for drawing up and overseeing international labour standards. It is the only “tripartite” United Nations agency that brings together representatives of governments, employers and workers to jointly shape policies and programs promoting Decent Work for all. The organisation was founded in 1919 to pursue a vision based on the premise that universal, lasting peace can be established only if it is based on social justice. Subsequently, the ILO became the first specialised agency of the UN, in 1946. Its primary goal today is to promote opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity.

The ILO has four strategic objectives:-

1. To promote and realise standards and fundamental principles and rights at work.

2. To create greater opportunities for women and men for decent employment and income.
3. To enhance the coverage and effectiveness of social protection for all.
4. To strengthen tripartism and social dialogue.

In support of its goals, the ILO offers unmatched expertise and knowledge about the world of work, acquired over more than 90 years of responding to the needs of people everywhere for decent work, livelihoods and dignity. It serves its tripartite constituents (governments, employers and workers) – and society as a whole – in a variety of ways, including:

1. Formulation of international policies and programs to promote basic human rights, improve working and living conditions, and enhance employment opportunities.
2. Creation of international labour standards backed by a unique system to supervise their application.
3. An extensive programme of international technical cooperation formulated and implemented in an active partnership with constituents, to help countries put these policies into practice in an effective manner.
4. Training, education and research activities to help advance all of these efforts.

The ILO's concept of Decent Work implies certain kinds of work are far from decent and can be damaging. Suitable work is generally considered to be good for health at the individual level and a healthy working population is essential to a country's economic and social development. Unsuitable work – dirty, dangerous, and degrading- is undoubtedly bad for people's health and constitutes a major part of the subject matter covered by occupational health and safety. Occupational health involves the study of the effect of work on people's health and, conversely, the effect of people's health on their work: fitness for work in other words.

1.3. Work and Workplaces

Occupational health and safety can be seen as a subspecialty of public health, analogous to environmental health. Workplaces are specialised environments, more capable of being controlled than the general environment. Not everyone works in a workplace which can be geographically defined and not everyone works as an employer or employee but, generally speaking, it is the lack of control imposed by employers that is the cause of the greatest burden of ill health due to exposure to hazardous materials and agents at work, and of injury caused by workplace accidents.

A working population consists of people, mainly between 15 and 70 years (although more and more people are working into old age now and many children work, some of them full-time). The range of types of work and of working conditions is enormous. For example, consider those kinds of workplaces for which the Health and Safety Executive in Britain is responsible: factories, farms, building sites, nuclear installations, mines, schools and colleges, fairgrounds, gas, electricity and water systems, hospitals and nursing homes, central and local government premises and offshore installations. In addition, local authorities are responsible for offices, shops, hotels, restaurants, leisure premises, nurseries and playgroups, pubs and clubs, museums, places of worship and

sheltered accommodation and care homes. Notwithstanding the variety of workplaces, principally due to globalisation, some convergence is happening and, all over the world, the pattern of work is changing fast. Where there was once full employment, even in economically developed countries, job insecurity and low pay remain as significant threats to health. Manufacturing industry is mainly concentrated in developing countries now which is where traditional occupational diseases such as pesticide poisoning and asbestosis still occur and occupational accidents are particularly prevalent especially in places where industrialisation is occurring rapidly as was once the case during the industrial revolution in 19th century Britain.

Hunter- gatherer and agrarian communities continue to exist in the modern world but there is an inexorable move in the direction of collectivisation and industrialisation. There has been a shift in many countries from agricultural and extractive industries (mines and quarries) via heavy factory industry to technology – intensive manufacturing and to services and cleaner energy generation. These activities are inherently safer, but such changes in working practices in the industrialised world are giving rise to work that is more demanding in a psychosocial sense, and less in hard physical activity – a change which does not necessarily suit the demography of all countries. Whatever kind of work a person does, however interesting or however tedious, work defines an important aspect of people's lives. Most people who do not or cannot work actually wish to do so – obviously work improves people's standard of living (although not necessarily their quality-of-life) but has other profound effects – on social networks and interpersonal behaviour as well as on demographics.

In many areas of the world working conditions have become cleaner, safer, and often better than before. Work has changed in both the economically developed and undeveloped world alike where there has been a shift from unskilled work to more highly skilled or multiskilled work in largely sedentary occupations. There is greater self-employment and a shift towards employment in small and medium-sized enterprises. More and more people work non-standard hours (with consequences to their health). The percentage of women in employment has been growing for decades. Traditional occupational diseases such as pneumoconiosis and noise induced deafness can be adequately controlled by the same strategies of hazard control used to limit accidental injury. However, the long latent period between exposure and the appearance of occupational diseases makes attribution and control more problematic than is the case with accidents

1.4. Historical Aspects

Apart from animal husbandry and a wide range of agricultural practices – both of which activities remain widespread in all kinds of countries, arguably the first work activities were mining and metal working. Both of these activities had profound and very direct influences on human health – mining is inherently physically unsafe, and caused exposure to toxic dusts while the production and working of metals caused many varieties of poisoning. Many traditional crafts such as weaving and dyeing, and the manufacture of pottery and glass involved the use of chemicals. A new kind of physical hazard appeared in the 17th century with the discovery of gunpowder, used initially as a blasting explosive in underground mines.

One of the first descriptions of the hazards of work – in this case, mining – was that of Agricola, a 16th century physician who published his treatise *De Re Metallica* in 1556. The 12 volumes cover every aspect of mining, including the smelting and refining of gold and silver. There is specific reference, for the first time, to the diseases associated with the various processes, the accidents suffered by the miners and the means by which their health and safety might be preserved. Lung diseases and musculoskeletal disorders were recognised as occupationally induced conditions; lung cancer and pulmonary tuberculosis were no doubt rife. Agricola noted the importance of mine ventilation in relation to some of these conditions.

Another famous European physician, Paracelsus, also described some of the diseases of miners and smelter workers but the first coherent account of the diseases specific to workers was published 100 years later in 1700 by Bernadino Ramazzini, a physician working in Padua. He observed an enormous range of occupations and described in detail the effects of workers' jobs on their health. He was the first to suggest that when a doctor takes the medical history of a patient, a crucial question should be "what is your job?" He recognised that there were dangerous trades and that the people working in them- more often than not- came from the underprivileged classes.

Early craft industry, such as weaving, was an essentially domestic activity practised by hand until machines were introduced. This was known as cottage industry and was dispersed throughout the land. The Industrial Revolution, especially marked in Britain, began as the use of power in the form of water and then charcoal burning, transformed and centralised production. Woollen and flour mills were for centuries driven by water power, but increasingly the use of fossil fuels characterised the Industrial Revolution, which, in Britain, lasted between 1760 and 1830.

The construction of canals, roads and railways and the invention of steam power allowed industrial machinery to burgeon and prompted large sections of the rural population to move into overcrowded and insanitary cities to work in factories. This transmigration in search of work has been a constant feature of modern life to the present day. Conditions of life in the towns and in the factories were terrible, child employment was rife and for the first time people were brought together *en masse* in workplaces where the deleterious effects on their health became very apparent. Epidemics of infectious disease were common. Not only were working conditions bad, machines were themselves dangerous and workers were unused to them. Many new chemicals had been introduced, the toxic nature of which were unappreciated or ignored. Social reformers stimulated the passing of a number of Factory Acts which, among many attempts to improve working conditions, regulated hours of work and child labour. Conditions in the factories of those days are still replicated in some of the rapidly industrialising developing countries of today.

The Factory Acts were the response of social reformers, not doctors, and were opposed by many big employers. However, Charles Turner Thackrah - a Yorkshire physician - revived the spirit of Ramazzini in 1831 when he published his book entitled *The Effects of the Principal Arts, Trades and Professions, and of Civic States and Habits of Living, on Health and Longevity, with Suggestions for the Removal of many of the Agents, which produce Disease and shorten the Duration of Life*. He was a clinician and an

activist who drew attention to the foul conditions experienced by most factory workers and the effects on their health caused by their labour – not just the pulmonary disease caused by exposure to flax and cotton dust and metal and stone grinding but the effects on the musculoskeletal system – especially in children – of poor posture and long working hours. He saw that these conditions were also bad for mental health. Although he only lived to the age of 37, his influence was profound and led to the establishment of the first Factory Inspectorate whose job it was to administer the various Factory Acts passed around that time. The early factory inspectors and certifying factory surgeons had a right to enter factories and other workplaces and the ability to force dangerous machinery to be guarded, to limit the working hours of children and insist on measures to reduce exposure to toxic substances. These Acts and the establishment of the Factory Inspectorate laid the foundations for the establishment of a body of health and safety legislation and the science of occupational hygiene, which deals with the measurement and control of dangerous substances and processes (see *Hazards Management, Monitoring of the Work Environment and the Implementation of Standards*).

Subsequent Acts followed progressively covering mine workers, textile workers, sweatshops, chimney sweeps etc. The 20th century saw an explosion in the discovery and development of chemicals and chemical engineering, the widespread use of steel and the realisation that certain processes such as coal mining and the use of lead were inherently hazardous to health. Another British doctor – Sir Thomas Legge became the first medical Inspector of factories in 1898 and an expert on lead poisoning, which was rife in those engaged in smelting the metal for use in paint and the glazing of pottery.

National insurance with the provision of sickness benefits for workers was pioneered in Germany and in the ensuing years compensation for workers who suffered accidents or industrial diseases developed in Britain and somewhat later in the United States. A National Insurance Act was passed in Britain in 1946, which provided for comprehensive industrial injuries and diseases compensation. Other European and Scandinavian countries developed inspection and compensation regimes and similar approaches followed in the United States. Dr Alice Hamilton was an American pioneer of industrial toxicology and occupational (industrial) hygiene who published her book *Exploring the Dangerous Trades* in 1943.

1.5. The Changing Nature of Occupational Health and Safety

Since that time there have been huge advances in the subject and there are now few toxic substances whose health effects have not been extensively researched and methods devised to protect workers from being exposed to them. Thus, over the middle decades of the 20th century, serious occupational diseases such as lead poisoning and asbestosis reduced in most economically developed countries. Occupational accidents also reduced, though these remain a problem in countries undergoing rapid industrial development – usually with poor controls.

This is not to say that occupational disease and injury is disappearing: just as the health of the public changes according to development, climate, demography, education and wealth, effects on health of modern work and working practices (take commuting as an example) change. Emerging economies often display a mixture of “ancient and modern”

work-related health and safety problems. Factory workers in some parts of the Far East, for example, may simultaneously experience the deleterious effects of exposure to toxic substances, the effects on the musculoskeletal system of repetitive work and work-related stress due to a combination of work pressures and social problems.

Modern work has been associated with a huge rise in musculoskeletal problems such as back pain and upper limb disorders and mental health problems such as stress, anxiety and depression and these have replaced some of the “traditional” occupational disease of the past. Unlike such diseases of the past which were associated with particular exposures at work, these more modern afflictions already occur at various levels of prevalence in the general population, independent of work.

The demography of the workforce has also changed: it has become increasingly feminised. With rising age expectation there are more older workers and in some countries people with disabilities are appearing more frequently in the workplace. As a result, workplaces themselves are changing with better design and ergonomics. At the same time more people are working from home (an activity not without its problems – mainly psychosocial), thus avoiding the hazards of commuting.

In addition to well defined occupational diseases, both ancient and modern, new illnesses – better described as symptom complexes – have appeared representing interactive states between people’s attitudes and feelings towards their work, their domestic environment, and the way in which their illness behaviour is expressed. Examples might be Gulf War syndromes, repetitive strain injuries, sensitivity towards electromagnetic radiation, sick building syndromes and chronic (as opposed to acute) symptoms experienced by pesticide workers. These conditions have much in common with chronic fatigue syndrome and other disorders of uncertain aetiology.

1.6. The Global Burden of Ill Health due to Work Related Accidents and Disease

According to recent International Labour Organisation calculations, every day, 6300 people die as a result of occupational accidents or work related diseases – more than 2.3 million deaths per year (including 12,000 children) – and 337 million people suffer workplace injuries, causing disability and time off work. Two million workplace-associated deaths per year outnumber those people killed in road accidents, war, violence, and through AIDS, and consume 4% of the world’s gross domestic product in terms of absence from work, treatment, compensation, disability and survivor benefits – not to mention the human cost.

This burden is particularly heavy in those countries where workers are concentrated in the most heavy and dangerous industries – construction, mining, fishing, logging and agriculture. In the United States alone some 60,300 deaths from occupational disease, 862,200 illnesses and 13.2 million non-fatal injuries with 6500 accident-related deaths occur each year.

The UK Health and Safety Executive publishes annual health and safety statistics. Most countries publish similar material. In 2010-11, 171 workers were killed at work and 315,000 significant injuries were reported. 1.2 million working people were reckoned to

be suffering from a work related illness and 26.4 million working days were lost due to work-related illness and work place injury. Work-related illnesses actually cost, in terms of disability (which also predicts financial cost), much more than occupational accidents. As is the case in many countries workplace injuries and diseases have become less prevalent over the course of the last few decades but it must be noted that the UK has an exceptionally good record in this respect. Nevertheless workplace injuries and ill health (excluding cancer) cost society in Britain an estimated £14 billion in 2009-10 and approximately 8000 cancer deaths were considered to be due to occupational exposure to carcinogens (albeit half of those were asbestos-related as a result of past exposure – sometimes decades previously.) Most countries have a much worse record than this with proportionately higher costs to society. Occupational Health and Safety is no trivial matter.

1.7. Legislation and Standards

1.7.1. ILO Labour Standards

Since 1919, the International Labour Organisation has maintained and developed a system of international labour standards in recognition of the inequitable working conditions which globalisation has helped to create and maintain. Such a situation is, to say the least, regrettable since globalisation has created opportunities and benefits for many. In 1960 the income gap between the wealthiest and the poorest fifth of the world's population was 30 to 1. By 1999, it had increased to 74 to 1. In 1995 average GDP per capita in the richest 20 countries was 37 times the average in the poorest 20 – a gap that doubled in 40 years.

The ILO standards have grown over the years into a comprehensive system of instruments on work and social policy, backed by a supervisory system designed to address all sorts of problems in their application at the national level. They are the legal component in the ILO's strategy for governing globalisation, promoting sustainable development, eradicating poverty, and ensuring that people can work in dignity and safety – the Decent Work Agenda in other words.

International labour standards are legal instruments drawn up by the ILO's constituents (governments, employers and workers) setting out basic principles and rights at work. They are either expressed as *conventions* which are legally binding international treaties that may be ratified by member states, or *recommendations*, which serve as non-binding guidelines. Once a standard is adopted, member states are required under the ILO Constitution to submit them to their competent authority (normally Parliament) for consideration. Ratifying countries commit themselves to applying the convention in national law and practice and reporting on its application at regular intervals.

Eight conventions are regarded as “fundamental” and do not directly relate to occupational health and safety. They cover matters such as trade union rights, forced labour and minimum working age. Other conventions are known as “priority” instruments and they cover matters such as labour inspection and employment policies. Many of the standards have implications for occupational health and safety but, in 2003, a specific global strategy on occupational safety and health was instituted by ILO. This

initiative argued for a high level of political commitment for effective implementation of national occupational safety and health systems. The fundamental pillars of such a strategy include the building and maintenance of a national preventative safety and health culture and the introduction of a systems approach to occupational safety and health management.

International labour standards are primarily tools for governments who can ratify them and incorporate them into their own legislative processes. In many countries ratified international treaties apply automatically at the national level. Where no such system exists at least the standards can be cited and be used for example by trades unions or interested non-governmental organisations to hold governments or employers to account. The list of standards includes many directly related to occupational health and safety, whether they be general, e.g. relating to protection of workers health or recommending a list of occupational diseases, or more specific e.g. conventions and recommendations on aspects of safety, such as the prevention of major industrial accidents. Other instruments cover hazardous substances such as radiation, asbestos, lead and benzene. Specific diseases are also targeted e.g., occupational cancers and HIV/AIDS and so are potentially hazardous industries such as construction, agriculture, and specific working groups such as migrant workers, seafarers, indigenous and tribal peoples and children.

There is, additionally, a Maritime Labour Convention launched by the ILO in 2006. The Convention sets out seafarers' rights to decent conditions of work and a wide range of subjects, and aims to be globally applicable.

The International Standards, if ratified by a particular country, put obligations on that country to report regularly on measures to implement the standard. These reports are examined by an ILO Committee of Experts, which can make observations on compliance with the standards or ask the country in question to provide more information or evidence.

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He has worked as an occupational physician for 40 years in the UK and abroad, with particular interests in the health of construction workers, expatriates and those working in the health care sector. He trained in medicine at Edinburgh University, in occupational medicine at the London School of Hygiene and Tropical Medicine and in medical law at the University of Wales.

He chaired the Health and Safety Executive's Research Ethics Committee until recently, was external examiner for the Master's course in occupational medicine at the University of Cardiff and is still a member of the Independent Medical Expert Group advising the Ministry of Defence on the Armed Forces Compensation Scheme and co-editor of the textbook "*ABC of Occupational and Environmental Medicine*", now in its 3rd edition.