

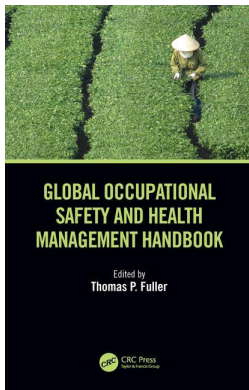
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## **Global Occupational Safety and Health Management Handbook**

Thomas P. Fuller

### **Introduction to Global Occupational Safety and Health**

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# 1 Introduction to Global Occupational Safety and Health

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## 1.1 INTRODUCTION

Global Occupational Safety and Health (OSH) is the study of worldwide worker injury, illness, and fatality. It is the study of the factors that influence the well-being of workers internationally. It is also the study of the differences in occupational morbidity and mortality rates between countries, why those differences exist, and what can be done to improve working conditions in all nations and geographic regions. Global OSH is the analysis of complex intersections and interactions between economics, politics, culture, and science. It is more than the typical measurement and reporting of workplace exposures to risks, but an in-depth analysis of why and how

the risks and hazards exist, and what social, political, economic, and cultural factors lead to those risks.

The term “globalization” represents the expanded breadth, intensity, and speed at which the world is connected. It has been represented by the following basic characteristics:

- Social, political, and economic activities commonly span across national, regional, and continental boundaries.
- The flow of trade, investment, wealth, people, and culture increases substantially.
- Global interactions of business, politics, and information are more rapid.
- Events that occur in one nation (e.g., policy changes, political instability, economic collapse, natural disasters) are felt more deeply and significantly in distant lands (Held, 1999).

In a globalized world, the actions and policies taken in one nation can have profound impacts on other nations. OSH impacts are not excluded from this premise. Globalization of business, politics, economics, and finance greatly influences OSH activities and approaches taken in individual countries around the world.

Globalization also includes the transfer of products, services, and technology. Each of these may come with their own inherent risks, including risks to workers using, manufacturing, handling, or disposing of the products. Globalization can mean the increased transfer of toxic chemicals, dangerous equipment and operations, and hazardous waste, each with their own significant and very real OSH concerns in the receiving countries. It can also bring the transfer of knowledge and education. This is particularly important for OSH, as it relates to the transfer of risks mentioned earlier.

A major catalyst for increased globalization occurs because of economic and financial benefits. And OSH has often been closely related to business and economics. Part of the original rationale for the creation of the U.S. Occupational Health and Safety Administration was to level the playing field between states that allowed different levels of safety within their operations that provided some with economic advantages. In international trade, the same incentives for businesses exist today globally, to find the country with the weakest environmental or safety regulations and set up operations there to take advantage of reduced operational or labor costs. Countries with governments that do not either understand or care about the risks to the environment or workers accept the hazardous activities, processes, and chemicals, for the purely economic benefit. Businesses then tend to seek those countries out to expand operations, and a viscous circle ensues. Countries compete for the business growth and reduce their national regulations further, which has resulted in a phenomenon coined “race to the bottom.”

As economics play a special role in the national levels and norms of OSH, it is important to present some related concepts and terminology that will be used throughout this book. There is no clear international consensus on terminology to describe the economic or social status of nations, yet there is a need to have common reference words to describe conditions and make basic comparisons.

Some economists consider a developed economy to be one in which the average gross domestic product (GDP) per capita is US\$12,000. Others may set this figure higher (Investopedia, 2018). However, many other factors can be considered in the definition including such parameters as access to safe drinking water, levels of sanitation and hygiene, food security, levels of air pollution, and climate vulnerability. The United Nations Human Development Index is a summary of social achievements of countries including such measures as economic growth, life expectancy, living standards, and expected years of schooling (UN, 2018). This index rates countries as very highly developed, highly developed, medium development, and low development (economically developing). Countries such as Norway, France, Spain, Japan, Canada, and Argentina are considered very highly developed, whereas countries such as Swaziland, Haiti, Yemen, and Afghanistan are considered in a state of low development.

The terminology is useful when discussing how social and economic activities impact OSH internationally. It is understandable that in the least developed nations, resources may be limited to fully implement desired OSH programs and protections. The ability to maintain adequate levels of OSH may also be related to the capacity to educate the workforce, or even supply adequate numbers of OSH professionals. Nutrition, sanitation, and availability of medical services, which are the important factors impacting the health and safety of the workforce, must all be considered when looking at OSH in a global context.

OSH and economics also overlap in terms of the discussion about supply and demand for products and services as they relate to the transfer of wealth. The costs and values of OSH are transferred and traded just as other services or “products.” These are related to the status of nations or businesses. These factors also relate most basically to the differences that cultures or societies may place on the value of a life, value of longevity, or overall lifetime health. Just as there are economic disparities between nations, these closely relate through OSH to disparities in occupational injury, illness, and fatality rates, and ultimately average life span in a nation.

Many OSH professionals today feel an ethical responsibility to work to improve OSH globally, particularly in disadvantaged countries with little OSH capacity or infrastructure. Numerous volunteer opportunities exist to OSH professionals who want to share their expertise and services. There are opportunities to support OSH research to better understand the issues and controls needed to reduce worker risks globally. There are also opportunities to teach and work abroad in less developed countries. And there are roles for OSH professionals to play within their own organizations to improve the health and safety of workers in foreign countries, such as ensuring corporate supply chains follow international standards for worker safety, and the avoidance of slave and child labor in supply chains.

This edition of this book represents the first step in a broader discussion of the individual chapter topics in one resource. Many other important topics have not made it to this edition but can be included in the next revisions. For the most part, the issues and topics selected for this edition represent some of the more challenging and controversial subjects. They were selected partly as a means to begin to advance our conversations. Other chapters provide basic information on international agencies

and organizations, in one location, that may be of use to OSH professionals working in international corporations or those that may be traveling abroad for work.

## 1.2 GROWTH AND GLOBALIZATION

Although international trade was known to occur between countries as early as 1900 BC, the need for locally grown food and limitations in transportation curtailed significant portions of societies' benefits from coming from distant lands. Mass migration occurred from time to time, but mostly by foot. Exotic materials such as spices or rare metals traveled long distances, but these represented limited parts of any given societies' trade (Stearns, 2001).

It was not until the latter half of the 19th century that industrialization and improvements in transportation brought large movements in people and products to more remote parts of the globe. Communications systems allowed for greater information exchange, societies became more urban rather than agrarian, and monetary systems based on the gold standard became more stable. By 1914, international trade had increased to 38% of the global GDP (Gun, 2017).

In the period after World War I, there was a sharp decline in trade as many countries instituted protectionist and isolationist strategies to protect their currencies and economies. The Great Depression brought further declines, and by the end of World War II, only 7% of the world's GDP was based on international trade.

During the massive reconstructions that took place after World War II, global trade grew rapidly. In 1944, the Bretton Woods accord led to numerous international agreements meant to stabilize and standardize international trade and the world economy. The International Monetary Fund was created that allowed member countries to regulate capital flows and make their currencies convertible for trade-related transactions. These monetary policies, the expansion of commercial aviation, and the development of container shipping over the next two decades led to the growth of global trade to 30% of the world GDP by 1980.

In 1995, the World Trade Organization (WTO) was created to provide a forum to negotiate international trade agreements on an agreed upon level playing field as a means to expand and promote global trade (WTO, 2017). With 164 member states, including China, the WTO has contributed to unprecedented international trade growth. Combined with the fall of the Soviet Union, government deregulation of banking systems, and significant advances in information technology, international trade has risen to 47% of global GDP (Gun, 2017).

As markets become more globally oriented, economically developing countries (EDCs) tend to increase their proportion of the world GDP, whereas those countries that are more developed lose percentage share of global GDP. Perhaps this explains the recent rise in protectionism in the G7 countries citing Brexit and the election of Donald Trump as indicators for popular nationalist and protectionist policies. And although discriminatory protectionist tariffs and barriers to free trade are on the rise and popular with some public and politicians, evidence indicates that overall, protectionist policies lead to lower total GDP growth for both developing and developed economies alike.

### 1.3 OSH AND GLOBALIZATION

With the expanded globalization of business and global value chains of products and workers, OSH activities must “Go Global” and reach across borders. Companies and other organizations with diverse interests and operations overseas need to expand OSH to provide adequate services to all facilities. Ex-patriot employees in foreign countries need safe working conditions, the same as in the home country. New employees hired in foreign countries have the right to safe and healthful working conditions. And various nations have differences in health and safety regulation development and enforcement. Upper managements of organizations need to consider OSH delivery and operations when expanding business abroad for mostly the same reasons that good OSH programs and implementation are required at home. In addition, organizations and countries can learn from their international counterparts or competitors about the latest trends in OSH and the values that they add to businesses and governments. That is to say, what is good for Denmark could very well also be good for Botswana with regard to worker safety. Countries can learn from one another. Companies in Botswana will need to have comparable OSH programs in place to compete in global markets in the long term.

Transfer of technology to developing countries due to the global expansion of trade has also led to transfer of hazards (ILO, 1988). Less developed countries are sometimes not in the position to handle additional hazards safely, due to the lack of adequate education, infrastructure, regulations, and availability of OSH professionals. There may be language barriers in the handling of complicated technical equipment for which operating manuals are only provided in English, or a few major languages. In Bolivia, for example, one study showed that farmers were overexposed to organophosphate pesticides because they were not aware of the hazards of exposure or benefit of protective measures (Jors, 2006).

In the absence of a concerted effort, technologies may be transferred without adequate consideration of such basic conditions as climate, sunlight, or power availability. Personal protective equipment (PPE) may not be available in adequate numbers, or workers may not know how to use it effectively. Machinery designed for healthy developed country workers may not be ergonomically correct for EDC country workers, or children and women. Nutritional deficiencies of developing country workers may exacerbate health effects from exposures to hazardous chemicals, biological, and physical agents, as well as extreme temperatures. In some developing nations, there is little awareness of the value of OSH, and therefore, little attention is paid to OSH training or research (Puplampu, 2012).

Enterprises transferring technology should consider the climate and location where the systems or equipment are to be used. Locations of plants in relation to geographic population centers should be considered. Other factors such as emergency response capabilities and environmental factors including rainfall or likelihood of flooding should also be considered. Potential effects of ongoing climate change should also be analyzed. Hazard analyses should be conducted to the same levels of awareness as would be done in developed countries, regardless of a lack of regulations or a legal impetus to do them. Hazardous chemical control, fire safety, and waste management all need to be considered prior to transferring technologies

abroad. Companies and countries that are transferring technology need to maintain a constant level of adherence to international standards for OSH. The lack of regulations in a host country does not absolve organizations from a moral and ethical duty to provide the same level of care to the environment and workers as in a developed, home country.

The ethical standards for all companies and countries transferring technology to developing countries are all laid out in the International Labor Organization (ILO) 1988 document, “Safety, health and working conditions in the transfer of technology to developing countries—An ILO Code of Practice” (ILO, 1988). This document provides the criterion necessary to ensure operations within expected and accepted standards of practice. As large multinational companies continue to expand globally, they create larger numbers of global small to midsized enterprises (SMEs). These SMEs in EDCs are less likely to have the technical capacity and resources to fully address OSH issues (ILO, 2003).

#### 1.4 NUMBERS OF INJURIES AND ILLNESSES

According to the ILO, 6,300 people die as the result of occupational accidents and illnesses each day (ILO, 2017), which supports a global total of 2.3 million occupational fatalities annually. But the numbers are not spread proportionately to populations; EDC injury and fatality rates exceed global averages and are more than double that of the most advanced nations. Occupational fatality rates for the African continent are 18.6 per 100,000 annually, compared with 6.9 for Europe and 13.7 for the United States (Hämäläinen, 2009). In addition, as a comparison, not only they are directly codependent, but the life expectancy rates for countries also vary significantly. The life expectancy is 65.7 in Botswana, 54.5 in Nigeria, and just under 50 in Swaziland. These are drastically lower than that in the United States (79.3) and Norway (81.8) (WHO, 2015).

Major causes of work-related deaths globally include cancer, communicable diseases, and circulatory diseases followed by accidents as shown in Table 1.1.

In the study by Nelson, 37% of occupational deaths were caused by chronic obstructive pulmonary disease (Nelson, 2005). Occupational diseases and injuries

**TABLE 1.1**  
**Major Causes of Death Worldwide**

Major Causes of Occupational Fatality Globally (%)		
	Hämäläinen	Takala
Cancer	25	32
Circulatory diseases	21	23
Communicable diseases	28	17
Accidents	—	18

*Source:* Created from Takala (2014) and Hämäläinen (2009).

accounted for 24 million years of healthy life lost and 1.5% of all-cause mortality. The leading cause of years of healthy life lost was unintentional injuries (44%) followed by occupational hearing loss (18%). In developing countries, communicable diseases are a significant source of work-related disease, particularly in agriculture, food production, and health care (Hämäläinen, 2011). In more developed countries, such as the European Union (EU), the most common work-related injuries were musculoskeletal disorders at 60%, followed by depression, stress, and anxiety at 14% (EC Eurostat, 2009).

Although there are many good studies of injury and illness rates, there are still significant shortcomings in our true understanding of actual levels of OSH in many countries. Many countries do not require accident or injury reporting. In Pakistan, for example, which is the tenth most populated country in the world, there is no national system for recording occupational injuries or work-related casualties (Abbas, 2015). Those that do require record-keeping have large differences in systems and methods, which make it hard to compare results across borders (Takala, 2014). In the United States, for example, hundreds of thousands of government workers are not included in statistical databases and analyses.

Even when reporting structures are the same, there remain gross differences in various study assumptions and quantitative/qualitative measures of exposure. Synergistic health effects from exposures to multiple hazardous agents at the same time are also not accounted for in most reporting methods. In EDCs, employment in the informal sector reaches 70%, with the contribution to the GDP ranging from 10% to 60% (Rosenstock, 2006). Workers in the informal sector seldom have any means of recording and reporting injuries and illnesses. As a result of many of these shortcomings, the global burden of disease from occupational injury and exposure is greatly underestimated (Driscoll, 2005).

As EDCs become more industrialized, there is evidence that occupational exposures to toxic chemicals will increase, and with the increase, the risk of cancer and other illnesses (Purdue, 2015). Although these illnesses will increase, many of them will be unreported (Hämäläinen, 2009).

When developed countries move operations to less developed countries to take advantage of low labor rates and lax environmental/occupational safety laws, EDCs become more competitive and create the resulting “race to the bottom” where the least regulated country gets the larger share of business. In general, workers in the EDCs are expected to be less educated or experienced with toxic chemicals and hazardous operations, and have lower risk awareness and greater risk acceptance. Advanced countries sell/use obsolete equipment, processes, and chemicals to less developed nations (Stellman, 1998). These factors lead to potentially more unsafe and unhealthy working conditions and dangerous environmental consequences.

## 1.5 ECONOMIC AND SOCIAL COSTS

It is estimated that the annual economic burden of occupational injuries and disease is 4% of the global GDP (ILO, 2017). In the United States, the direct costs of disabling injuries to workers amounted to over US\$53 billion. This was 71% of the total



compensation cost burden in 2008 (LMRI, 2010). In the United States, the direct and indirect costs of work-related injuries and illnesses are near US\$250 billion (Leigh, 2011). Work-related accidents and injuries cost the EU 478 billion Euros each year. On average, worldwide work-related injuries and illnesses result in the loss of 2.9% of the world GDP. This amounts to a total global cost of 2,680 billion Euros (EU, 2017).

The social costs to families when an income earner is injured are not included in typical economic analyses. Individuals who are injured suffer significant financial consequences. The loss of income, in addition to medical expenses from the injuries, can lead to bankruptcy and forces many families into poverty as the result of a workplace injury or fatality. Many workers continue to work while injured, for both the income and fear of losing their job. This has a negative effect on the productivity of the enterprise (Boden, 2005).

## 1.6 LACK OF AWARENESS OF OSH PROGRAM BENEFITS

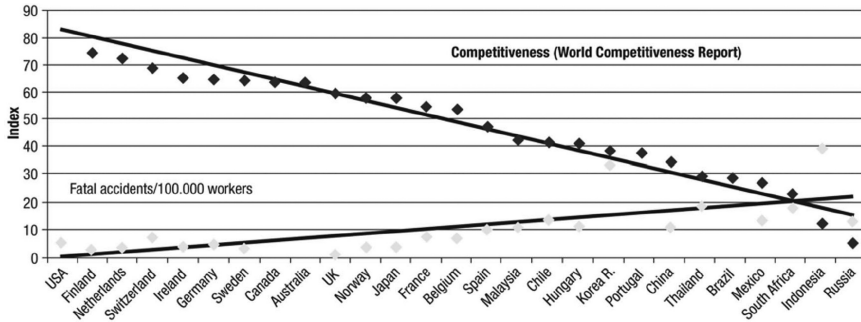
Many studies have shown a financial benefit from occupational health and safety programs, policies, and systems (Harms-Ringdahl, 1990; Lahiri, 2005; Amador-Rodeno, 2005; Argiles-Bosch, 2014; Oxenburgh, 2005). When OSH professionals within organizations understand and can communicate the business value of OSH programs and systems, they contribute to better decision-making by management. Various methods for economic evaluation have been developed to assist managers and OSH professionals (Biddle, 2005; AIHA, 2011; Bergstrom, 2005; Tompa, 2010).

The business value of safety can be quantified in terms of return on investment (ROI) just as any other business endeavors, where the ROI is the reduction in financial losses due to injuries or illnesses, which is divided by the cost of the safety intervention or program. These direct costs typically include labor costs, turnover costs, productivity losses, costs of accident response, and higher insurance premiums (Lyon, 1997). There is often a payback period associated with the intervention that is compared to the initial financial outlays.

In addition to the direct financial benefits of OSH programs and control interventions, there are numerous indirect benefits to organizations that use OSH to reduce injury and illness rates. These include improvements to product quality, employee morale, reduced absenteeism, better corporate image, and fewer penalties for non-compliance with laws and regulations.

Studies have shown that top-level corporate financial decision-makers have favorable perceptions of OSH programs and interventions. The most beneficial safety modification as perceived by managers was worker OSH training (Huang, 2007, 2011). Yet many businesses, particularly small and midsized ones, have not fully recognized the business value of comprehensive OSH programs (DeArmond, 2010; Cagno, 2013).

What is good at the enterprise level has also been shown to be good at the national level. Good OSH programs and working conditions lead to improved productivity and greater competitiveness. In a study by the World Economic Forum and ILO, the relationships between economic competitiveness and the number of fatal accidents per 100,000 workers are shown clearly in Figure 1.1.



**FIGURE 1.1** Competitiveness and safety. (Source: ILO, 2003.)

The most financially competitive and efficient business units tend to have the lowest fatality rates.

National governments are even less likely than businesses to thoroughly consider the financial benefits of OSH regulation. In addition, there has been a shortage of academic studies on the topic (Viscusi, 2006). Developing countries in the vacuum of clear data are reluctant to implement stringent OSH regulation (injury and illness reduction) for fear of stifling growth (Pouliakas, 2013). In one recent study in Ghana, it was shown that the implementation of a robust OSH management program could significantly improve the overall socioeconomic development of the country (Amponsah-Tawiah, 2013).

In addition to looking at OSH with an eye towards productivity and efficiency, several other international management principles are commonly used. The International Standards Organization (ISO) has published “ISO 45001 Occupational Health and Safety Management Systems,” which provides the foundation for an OSH program, a system to monitor that all parts of the program are accomplished, and a format for continuous improvement. Other similar systems include the OHSAS 18001 Occupational Health and Safety Management Systems, ANSI/AIHA/ASSE Z10-2012 Occupational Health and Safety Management Systems, ILO-OSH Guidelines on OSH Management Systems, and the Australian/New Zealand document AS/NZS 4801:2001 Occupational Health and Safety Management Systems—specification with guidance for use.

## 1.7 MANAGEMENT AND BENCHMARKING

Despite the availability of numerous standardized and recognized OSH management systems, there remains a vacuum in the realm of OSH business strategy and research. Advances in corporate social responsibility reporting have begun to include OSH topics and performance indicators, but the practice is not pervasive. Advanced businesses and institutions may practice elaborate reporting and benchmarking between facilities, even those in foreign countries. But industry benchmarking in terms of OSH, particularly internationally, has several shortcomings in development, implementation, and reporting.

Reporting of injuries and illnesses, even if not required by the government, is the first step in understanding OSH issues and impacts in the workplace. Other “leading indicators” of performance are being developed and implemented to provide a better understanding of impacts and where program improvements would be most useful. Expanded benchmarking activities such as program reviews, audits, inspections, and the structured reporting of results would improve overall OSH. Benchmarks that allow comparisons between countries and continents would also be useful towards creating systems of continuous improvement.

## 1.8 CULTURAL, ECONOMIC, AND EDUCATIONAL DIFFERENCES

Global occupational hygiene cannot be fully understood or discussed without including the consideration of cultural differences between countries and peoples. Culture plays a large role in the judgment and acceptance of risk in general. Although there is a shortage of literature on the topic, it might be assumed that cultural awareness and responses to risk and hazards would flood over into the workplace.

In a country with a lower life expectancy, the people and workers themselves might be expected to be more complacent about workplace hazards and resulting injuries or fatalities. That is, if a long life is valued less in general, then it might be expected that there would be less concern over being killed at work. This is particularly true if the job is a necessity for survival. The economics of a person’s condition can play a large role in his or her acceptance of risk in performing any hazardous job, in any culture.

In developing nations, women and children comprise a significantly higher percentage of the workforce. And women and children make up more of the workforce in informal economies, where workplace hazards are less well evaluated or controlled than in established economies. Children, in particular, are more susceptible to the harmful effects of hazardous workplaces. Physiological characteristics of children such as higher breathing and metabolic rates tend to increase their exposures and resulting doses to potentially toxic or carcinogenic chemicals. And their young age makes the exposure period or time for toxic actions to be well before the normal life expectancy. Children are typically less able to recognize, understand, or be aware of how or why to control occupational risks than adults from the same culture. Women are also less likely to be concerned about risks as they are often more dependent upon the job for survival of their families. And women have anatomic and physiological differences that may make them more susceptible than men to some hazards. For women, normal workplace protective controls, including PPE, may not be adequate since they are typically designed for men.

Workers in EDCs are more likely to be malnourished, dehydrated, and overworked, and are therefore inherently more “at risk” from exposure to hazardous agents or working conditions. Routine workplace protective controls and even PPE may not fit properly or be adequately protective. These workers may be more likely to be involved in an accident and may be more affected by working conditions such as intense thermal work environments.

## 1.9 EDUCATION, TRAINING, AND CREDENTIALING

### 1.9.1 FORMAL EDUCATION IN OSH

Educational systems created to meet the demand for OSH professionals vary greatly between countries. Differences partly reflect the various modes of OSH practice in the country and also are a result of different levels of emphasis put on the value of OSH by governments and potential employers. In countries where the true preventive value of OSH practice has been realized, the educational system is typically more developed and streamlined to provide sufficient numbers of OSH graduates at the university, master's, and doctoral levels.

In a comprehensive study of OSH education in Canada, it was determined that the existing system of OSH education contained several gaps in program content and shortcomings in the ability to meet the need for OSH professionals at different levels, and that the OSH educational system needed significant development and enhancement to increase course offerings in certain sectors to ensure minimum levels of competencies on OSH issues (Curran, 2013). In the United States, the demand for qualified OSH professionals has historically outpaced the supply, and that continues to be the case today (Erickson, 1991). In Europe, OSH education systems vary greatly between countries, with most of the OSH courses offered within master's programs in engineering, applied sciences, or management (Arezes, 2012).

Globally, the demand for OSH professionals can also be expected to outpace the supply. As developing countries become more industrialized, the numbers and variety of occupational exposures to hazardous substances and working conditions lead to the need for more professionals capable to evaluate and control them. Policies and funding for OSH professional capacity building are needed in numerous countries to meet current and future demands (Harrison, 2016). Educational programs should, in addition, allow for education at the master's and doctoral levels to fully support the field of occupational hygiene and its development in the future (Vincent, 2005).

### 1.9.2 GLOBAL OSH TRAINING

The shortage of formal educational development in OSH is mirrored by the need of OSH training by the workers. That is, the lack of competent qualified professionals to teach OSH courses in the workplace leaves workers in hazardous conditions where they are unaware of the risks or the appropriate controls needed to minimize the risks. OSH training is offered in many formats including online courses and seminars. Workers can obtain safety and health information for general awareness, or they can earn certificates in recognized accreditation programs. The Occupational Health Training Association (OHTA) is a nonprofit organization that has materials for several training courses available online for free. These course materials can be used by qualified OHTA trainers to allow students to sit for OHTA certificates in various OSH subject areas such as hazard control, ergonomics, and toxicology (OHTA, 2018).

Although Internet and web access training have the potential for reaching millions of workers, the true potential has yet to be achieved. The Multilingual Health

and Safety Resource Guide to Worker Training Materials on the Web prepared by the State of California is an excellent source of contact information for OSH training (CA, 2014).

### 1.9.3 MAINSTREAMING OSH EDUCATION

A new approach for bringing OSH into the forefront of public awareness is the concept of mainstreaming. This is the introduction of basic safety concepts and principles into childhood and adolescent education programs with the belief that they will carry OSH concepts and principles into their working careers and daily lives as adults. It is a strategic community oriented approach being strongly promoted by the European Agency for Safety and Health at Work. Several EU countries have already developed elementary educational programs and training materials (EASHW, 2018).

The European Network Education and Training in Occupational Safety and Health (ENETOSH) is supported by the European Commission with the aim to maintain OSH education and training. The primary approach to training is through the mainstreaming of OSH into all facets and levels of education in society. ENETOSH has more than 80 partners from 33 countries that work together to collaborate on projects to achieve objectives (ENETOSH, 2018). The ENETOSH's belief is that the best way to ensure safe workplaces in the future for all workers is to ensure everyone is trained and receives an appropriate education of OSH topics throughout their education and ongoing careers.

### 1.9.4 LICENSING AND CREDENTIALING

Government regulation for occupational licensure is required for many professions. Licenses may require a minimum number of hours of related training, age requirements, internships or apprenticeships, and/or passing an examination. Licensure has historically been associated with professions that impacted the public health in some way, such as nurses or physicians. In 2009, it was estimated that approximately 38% of workers required some sort of government certification or licensing (Kleiner, 2009). Licensure may also be associated with ensuring minimum levels of quality and protections for consumers, such as required training and licensing for hairdressers (Bryson, 2010). Unfortunately, in many other areas, professional licensure exists solely as a means of revenue for governments and/or a means to bar entry into a field, and raise wages to those already practicing. In one recent study, it was shown that the number of training hours required for emergency medical technicians (33 days) was significantly less than the number of training hours required for other professions much less related to public safety, such as cosmetologists (372 days) (Carpenter, 2015).

Although most would agree that occupational hygiene is closely related to public health and safety, few governments require licensure to practice as an occupational hygienist. When licensure is not required, the next best means available to document levels of expertise in a profession is through an organized and stepped system of credentialing. Different professional credentials or designations require various combinations of levels of education, experience, and examination (SIA, 2016). In lieu of

licensure, certification can be a means for employers and the public to have a level of awareness about the stated capabilities of a person practicing occupational hygiene. Numerous OSH professional credentials have surfaced in several countries as a result of the need. In addition, international professional organizations such as the International Occupational Hygiene Association have begun to rate various national professional credentialing systems as a means to make comparisons between systems (IOHA, 2018).

In 2010, a new group of professional associations of safety professionals created the European Network of Safety and Health Professional Organizations. The goals of the group are to influence legislation, exchange information, and develop good standards of practice. In addition, they have created standardized certifications for two different levels of practice based on experience and education (ENSHPO, 2017).

## **1.10 INTERNATIONAL ORGANIZATIONS AND REGULATIONS**

Several intergovernmental organizations (IGOs) exist to promote OSH in a variety of capacities. Some organizations such as the ILO are tripartite in nature, comprising representatives from government, workers, and employers. They create conventions and treaties that members can choose to ratify into national laws of standards if they so choose. Others have been created as subsets of larger IGOs, such as the World Health Organization. The basic information on these groups is provided solely as a simple introduction to their organizations and activities, and as a start point for more related information.

International nongovernmental organizations are presented, and their fundamental activities and objectives are provided. Many of these organizations have tens of member professional organizations from around the world. Individual national organizations have not been presented in this book, even though they may individually have large international memberships, in addition to international projects. For the most part, these organizations are represented by the international organizations to which they belong.

Chapter 11, on national profiles, represents only a sample of information on a small group of countries or regions. Future editions of the book will expand and balance the information provided on a larger number of countries and regions. The decision to include or exclude countries in this edition was based solely on the factors that impacted the ready availability of information on the given countries and regions.

## **1.11 SPECIAL TYPES OF WORKERS—CHILDREN AND INFORMAL WORKERS**

### **1.11.1 CHILD LABOR**

The ILO estimates that globally, there are approximately 250 million children between the ages of 5 and 14 who work. And nearly half of them are working full-time (ILO, 2003). Many of these children work in hazardous or exploitive jobs, and despite being illegal in all countries, child labor continues and is supported financially by global supply chains. It is important for occupational hygienists to

understand the issues surrounding the unethical and immoral use of the worst forms of child labor and to play a role in corporate social responsibility programs for informing organizations and governments.

### 1.11.2 INFORMAL WORKERS

In many parts of the world such as Pakistan, Mali, Nepal, and Africa, more than 70% of the workforce does not work in formal workplace settings or industries (ILO, 2003). They do not have typical relationships with employers and are found in such jobs as waste collection, agriculture, fishing, transportation, and service industries. These workers often work from home and in cramped and unsafe workspaces. These workers lack legal protections from hazards, social services from governments, and medical support for injuries or illnesses incurred on the job. Informal workers face significant occupational risks and are often ill-prepared to protect themselves from them.

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