

Occupational Health Crossing Borders

Part 2: Comparison of 18 Occupational Health Systems Across the Globe

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Background Occupational health and safety (OHS) is considered one of the most important factors for a sustainable development; however, it is often considered a luxury by decision-makers. This article compares OHS systems of 18 countries at different stages of development.

Methods In an international summer school, structure of the national OHS system, definition of occupational accidents and diseases, procedures for compensation claims, outcome (expressed as incidence of occupational accidents) and training opportunities were presented.

Results National OHS systems ranged from non-existent to systems implemented almost 200 years ago. Priorities, incidence of occupational accidents and training opportunities varied. Common problems included the lack of OHS service for small enterprises and in rural areas.

Conclusions International training programs like this summer school might enhance the exchange about OHS opportunities around the globe and contribute to improved workers health. *Am. J. Ind. Med.* 53:55–63, 2010. © 2009 Wiley-Liss, Inc.

KEY WORDS: occupational health; occupational accidents; developing countries; developed countries; teaching; international educational exchange

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Contract grant sponsor: German Academic Exchange Service, Physician Programme.

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Accepted 7 September 2009

DOI 10.1002/ajim.20771. Published online in Wiley InterScience (www.interscience.wiley.com)

INTRODUCTION

Eight occupational accidents occur per second in the world [International Labour Organization, 1999; LaDou, 2003]. The burden of occupational health (OH), however, is more than workplace accidents: Four percent of all disease and disability can be attributed to conditions encountered in the workplace [International Labour Organization, 2002; World Health Organization, 2009]. In order to prevent and recognize occupational diseases, healthcare professionals should learn about the causal associations between occupation-related exposures and diseases as well as the basic legal aspects of occupational medicine (OM).

Due to globalization, many developing countries enjoy rapid economic growth. Major growth factors are exports of raw materials and manufactured products. However, the transfer of unsafe technologies and high risk workplaces from industrialized to developing countries may lead to an increased health risk at the workplace in countries where occupational health and safety (OHS) standards remain low [Mikton, 1994; Ahasan and Partanen, 2001; Knave, 2002; Lehtinen, 2003]. Indeed, only about 5–10% of the workers in developing countries have access to OH care [World Health Organization, 1994]. Notably, a minimum workers' compensation insurance system is still not a requirement for nation wishing to join the World Trade Organization [LaDou, 2005].

International workers' compensation standards are seldom discussed and rarely compared [LaDou, 2005]. Little has been published about the different OHS standards in countries at different levels of industrialization. Most previous publications, dating from the late 1990s, focused on industrialized countries and countries in transition [Langard and Wannag, 1995; Harrington and Aw, 1996; Bedrikow et al., 1997; Cikrt et al., 1997; Contreras and Dummer, 1997; de la Hoz et al., 1997; Ribak et al., 1997; Wolf et al., 1997; He, 1998; Koh and Jeyaratnam, 1998; Lehnert and Wrbitzky, 1998; Libert and Yamada, 1998; Overgaard-Hansen, 1998; Phoon, 1998; Gestal-Otero et al., 1999; Guo et al., 1999; Joshi, 1999; Saric, 1999; Ahlberg, 2000; Werner, 2000; Hämäläinen et al., 2001].

Hämäläinen et al. [2006] recently estimated the incidence of occupational accidents across the world. Correlating such estimates against the gross national income of the country showed that—where such data exist—the lower the country income, the higher the occupational fatality rate [Wilson et al., 2007]. Using ratified ILO conventions as a proxy of the OHS conditions in a country, countries that ratified ILO conventions had lower work-related fatality rates than countries that had failed to ratify such conventions [Wilson et al., 2007]. However, in general, direct comparisons of different OHS practices have been confined principally to high income countries or specific occupations or exposures [e.g., Shouksmith and Taylor,

1997; Maeda et al., 1999; Brueggmann et al., 2001; Fischer, 2001; Staal et al., 2003; Choi, 2005].

In order to understand more about OHS in countries at different stages of development, a 2-week summer school for physicians, nurses, and other healthcare professionals currently working or currently being in training in OH was initiated in Munich, Germany. The overall objective of the program was to contribute to a better level of understanding of different OHS and the impact of globalization on OH. The overall concept and teaching methods as well as the lessons learned for this year's summer school are described elsewhere [Radon et al., 2009]. The aim of this report is to compare the different OHS in 18 countries at different stages of development.

METHODS

Each lecturer ($n = 15$ from 8 different, mainly industrialized countries—Europe: Finland, France, Germany, the Netherlands, UK, Russia; America: Colombia, USA) and each participant ($n = 23$ from 12 different countries: Europe: Germany; America: Brazil, Chile, Colombia, Guatemala; Africa: Egypt, Madagascar, Nigeria, Tanzania; Asia: Bangladesh, China, India) was asked to present the current OH practices of his/her country of origin. The information summarized herein was provided by the presenters and participants during the course. Wherever possible, the information was supplemented by information from recent literature and reviewed by an expert [Rasmussen et al., 1991; Szantho Pongracz and Morales Freire, 1994; Harrington and Aw, 1996; Isah et al., 1996; Bedrikow et al., 1997; Contreras and Dummer, 1997; Joyce, 1997; He, 1998; Lehnert and Wrbitzky, 1998; Libert and Yamada, 1998; Joshi, 1999; Laskar et al., 1999; Macdonald et al., 2000; Vallebuona Stagno, 2001; Ofili et al., 2003; Ejilemele and Ojule, 2004; Danishevski et al., 2006; De Valk et al., 2006; Kamuzora, 2006; Kauppinen et al., 2006; Womack, 2008; Center for Disease Control, 2009; Finnish Institute of Occupational Health, 2009; Occupational Safety Health Agency, 2009; United States Department of Labor, 2009].

The following indicators were used to compare OH systems:

- Who pays for OH services and who is covered by the OH system?
- How is the OH system organized?
- Where is the OH care provided?
- What is covered by the OH system?
- Where OH services are provided?
- How are occupational accidents and diseases defined?
- How does the compensation system for occupational accidents and occupational diseases work?
- What is the outcome in terms of the incidence of occupational accidents?

Box 1. Case Study 1: An Occupational Accident in the Construction Industry (www.networm-online.eu)

Somebody working in construction (employed) falls from the scaffold during work and suffers from a vertebral body fracture with paraplegia. How do you proceed in your country?

- To which hospital (public, private, hospital owned by the workers compensation board) is the patient transferred?
- Who covers which part of the treatment?
- Is rehabilitation done and if yes, where? Who covers rehabilitation? Who pays the salary for how long?
- After rehabilitation re-education is needed. Who covers this? What about the salary? What about workers compensation (lifelong pension, one-time pension)?

In order to have comparable outcome estimates, the estimates of the rate of fatal occupational accidents provided by Hämäläinen et al. [2006] were used. In addition, training opportunities in OHS in each country were presented.

Finally, each lecturer and participant received a case series of four cases to address in his or her presentation (see Box 1 for the 1st case). Presenters were asked to explain how the general procedure with such cases would be in the context of their national OH system. The different approaches to these cases can be found at www.networm-online.eu.

RESULTS

Structure of OH Care in the Participating Countries

In most participating countries, except for Egypt, Nigeria, and Tanzania, there exists some kind of occupational (statutory) accident insurance. However, the differences, especially with respect to prevention and compensation, between the different systems are large (Table I).

Who Pays?

In the majority of countries presented, the premiums for OH care are paid by the employer only, and the premiums depend on the risk and size of the enterprise. By contrast, in Guatemala, Madagascar, China, Bangladesh, and India, the employee has to cover the cost of part of the premium. In the latter countries, the premiums do not depend on the risk of occupational accidents or injuries in the enterprise or sector.

Who Is Covered?

In countries with accident insurance systems, all employees working under a contract should be protected by

such insurance. Some countries (like Germany) even ensure protection for informal workers, students, children in kindergarten, and those working without contract. In other countries (like Chile and Colombia), only those with a long-term contract (e.g., >6 months) are protected. In practice, in many of the participating countries only a small portion of workers is protected.

How Are the Accident Insurances Organized?

In the Netherlands, UK, USA, Russia, Colombia, Bangladesh, and India accident insurances are for profit organizations, while in the other countries they are non-profit or state institutions.

What Is Covered?

The type of coverage differs largely across countries. In all countries with accident insurance systems, workers compensation (and mostly rehabilitation) in case of an occupational accident or occupational disease is covered by the accident insurance. In the UK, US, Russia, and Guatemala, the accident insurance does not cover prevention and/or surveillance.

In many countries with less developed public healthcare systems like Guatemala, Madagascar, and India, accident insurance also cover general health expenses. In Finland, France, and Bangladesh, no clear distinction between general and OH systems exists, or OH care is integrated into primary healthcare. In the UK, the occupational accident insurance only covers compensation while treatment and rehabilitation as well as pensions are provided by the National Health System (NHS) paid by taxes. The US system differs largely by state; however, workers compensation provides income (mostly) and medical benefits for the victim.

Where Is Service Provided?

In Chile, the OH system is a distinct system within the general healthcare system with own hospitals, outpatient clinics, ambulances, etc. In Colombia, the costs for treatment of occupational accidents and diseases can only be covered in hospitals that are contracted by the workers' accident insurance.

In most developing countries like Nigeria, Tanzania, Nigeria, Colombia, and Brazil, large (international) enterprises have their own healthcare services, mostly taking care of occupational and non-occupational diseases. In these companies, special services are offered, and OH care is often better than in small and medium enterprises (Table II).

TABLE I. Comparison of the Basic Characteristics of the Accident Insurance and the OHS System in the Participating Countries

	Accident insurance										Integrated in primary healthcare/tax which	
	Paid by employer only	Premiums depend on risk	No-profit/ state organization	For profit organization	Covers prevention	Covers surveillance	Covers compensation	Covers rehabilitation	Covers general healthcare	Covers treatment	Covers compensation	Comments
Europe and USA												
Finland	X	X		X	X	X	X	X	X	OH is integrated in general care for workers		
France	X	X	X	X	X	X	X	X	No clear distinction between general + OH care			
Germany	X	X	X	X	X	X	X	X				
The Netherlands	X	X		X	X	X ^a	X	X				
UK	X	X (not SMEs)		X	X	X	X	X				
Russia	X	X	X	Optional for individual entrepreneurs	X	X	X	X				The system is under development
USA	X	X		X	X	X	X	X				Differences by state
South and Central America												
Brazil			X		X		X	X				Differences by state
Chile	X	X	X	X	X	X	X	X				
Colombia	X	X		X	X	X	X	X				
Guatemala	Employer + employee		X		X	X	X	X	Combination of primary healthcare with specific program for OH			Only formal workers
Africa												
Egypt												If not insured employer might pay for treatment
Madagascar	X	X	X	X	X	X	X	X				Costs covered by patient or employer
Nigeria												If not insured employer might pay
Tanzania												
Asia												
Bangladesh	Lumpsum			X	X	X	X	X	No clear distinction			No OHS strategy exists. Government works on a strategy for it.
China	X	X	X	X	X	X	X	X			Partly	If not insured employer might pay
India	Employer + employee		X	X	X	X	X	X			X	Enterprises with >10/20 employees need to pay for state insurance

OH, Occupational Health and Safety; OM, Occupational Medicine.

^aIn the Netherlands a court decides whether one gets compensated for occupational diseases. An exception is asbestos-related mesothelioma which might be directly settled by a governmental institute.

TABLE II. Comparison of the Claim for Compensation Procedures, the OHS Coverage, and the Training in OM/OH in the Participating Countries

	Claim for compensation		Special OHS in larger companies	Medical training in OM		Postgraduate training in	
	Who?	Where?		Undergraduate	Postgraduate	OH nursing	OH
Europe and USA							
Finland	Patient	Accident insurance		X	X	X	
France	Patient/legal dependents	Social security service		X	X	X	
Germany	Physician/employer	State accident insurance		X	X		X (public health)
The Netherlands	Patient	Court		X	X		
UK	(a) Physician, (b) patient	(a) National health system, (b) court		X (some)	X	X	X
Russia	Patient/legal dependents	The Social Insurance Fund		Some	X		Some
US	Patient	Workers compensation/court		X (60%)	X	X	X
South and Central America							
Brazil	Patient/legal dependents	Court	X	X	X (few)	X	X
Chile	Physician	Accident insurance	X	X ^a		Some with combined training on OH	
Colombia	Patient	Accident insurance	X	X ^b	X	X (64 different programs)	
Guatemala	Physician patient	Institute for Social Security	X				Some
Africa							
Egypt	Physician	State	X		Professionals mainly trained abroad		
Madagascar	Physician/legal dependent?	CNAPs	X				
Nigeria	Patient	Employer	X			X	X
Tanzania	Physician?	National Health Insurance Fund/ Employer	X				
Asia							
Bangladesh	Patient	Accident insurance	X		X (and NIPSOM)		NIPSOM
China	Patient/employer	Social security section	X	X (few)		X	X
India	Patient	State Insurance (if insured)/Employer through district labor courts	X	X	3 months	X	X

CNAP, National office of reserve funds; NIPSOM, National Institute of Preventive and Social Medicine Bangladesh; OH, Occupational Health; OHS, Occupational Health and Safety; OM, Occupational Medicine.

^aAt the Universidad de Chile in Santiago only.

^bAt two universities.

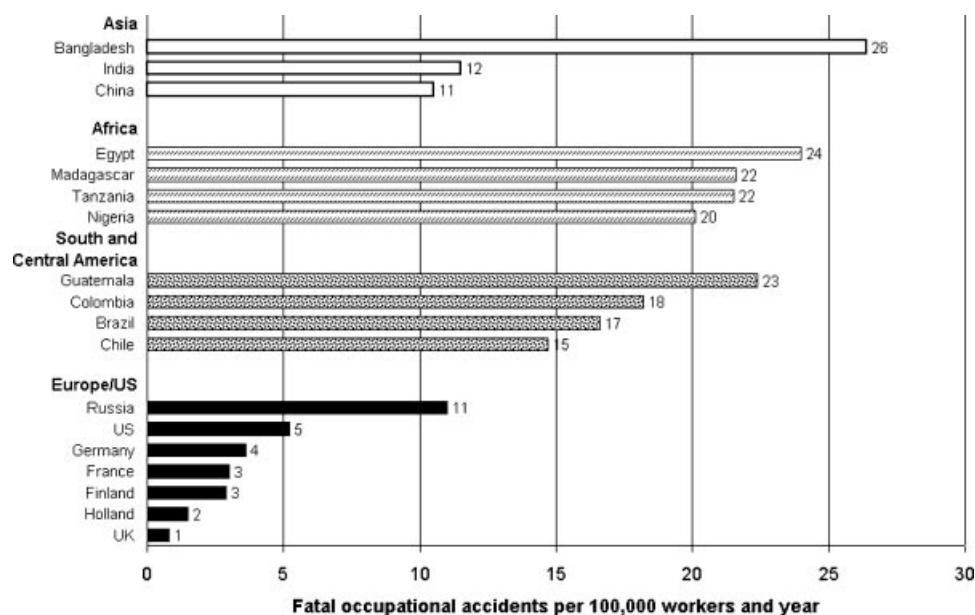


FIGURE 1. Estimated incidence of fatal occupational accidents by participating country sorted by region. Data taken from Hämäläinen et al. [2006].

Definition of Occupational Accidents, Occupational Diseases, and Compensation Claim Procedures in the Participating Countries

Definition of occupational accidents and diseases

Occupational accidents may be compensated by the employer, a non-profit or for-profit accident insurance, or the state. In some countries (e.g., Germany, Chile) commuting accidents are considered occupational accidents, while in others, it is not.

There are important disparities in the definition of occupational diseases. In some countries, occupational diseases that might be compensated are specifically listed. In others, each case is judged individually. The content of this list also differs. For example, dysphonia is the most frequent recognized occupational disease in Chile, but it is not on the list of occupational diseases in Germany or France.

Claim for compensation of an occupational accident or disease

A claim for workers compensation may either be filed by the physician in charge or by the patient or his legal dependent (Table II). The claim is sent either to the (statutory) accident insurance or, mainly in countries where the employer is sued (e.g., UK, the Netherlands), to the responsible court.

Another issue is the time interval within which someone may claim for compensation after diagnosis of the disease or

end of exposure or change of job. In some countries, strict rules apply (e.g., USA, Chile, Brazil), while it varies with the disease in others (e.g., Germany, UK).

Outcome

Figure 1 summarizes the fatality rate of work-related accidents in the participating countries according to the estimates provided by Hämäläinen et al. [2006]. The fatality rates in the African regions are high but do not differ substantially among countries. In contrast, the rate of fatal occupational accidents is almost three times higher in Bangladesh than in India or China and was estimated to be highest in the participating countries. The largest variety in fatalities can be seen among the South American countries: while Chile has a rate of occupational accidents that is similar to the one in Germany and below that of the US, the rate in Guatemala is similar to those found in African countries.

Training in OH Provided in the Participating Countries

Medical training in OM at the undergraduate level, i.e., in medical schools is common in most European countries. It is also provided at some of the universities in Russia, US, Chile, Brazil, China, and India (Table II).

Postgraduate specialization in OM exists in Europe, Russia, Brazil, Bangladesh, and India. About one-half of the countries provide specialized postgraduate training for OH nurses. General studies in OH at the postgraduate level exist in most countries; they are frequently part of the studies in public health. In the African countries training in OHS is scant.

DISCUSSION

Knowledge about OHS practices in low income nations compared with nations with higher income levels remains sparse. The comparison of 18 national OH systems presented here indicated a huge diversity in the structure, coverage, care provided, and training opportunities across countries. These differences have to be discussed in the political, regulatory and judicial context, the economic factors, the social-cultural background, the technology and type of industry in the country as well as the demographic factors. In addition, the historical development in each country has to be considered. For example, in Germany, OH started in the late 19th century with the introduction of a first occupational accident insurance initiated by Otto von Bismarck under the pressure of industrial revolution. Therefore, the system has been developed since over 100 years and has adapted to the needs of a changing employment structure with—as in many industrialized countries—services as the predominant employment sector [International Labour Organization, 2007]. In contrast, in Tanzania, Madagascar, India, and Bangladesh, most workers are still employed in the agricultural sector [International Labour Organization, 2007]. While occupational accidents are a problem especially in agricultural and industrial societies, psychosocial factors and repetitive strain injuries might be more important in the countries with dominant service sectors. Needs, risks, and prevention strategies differ considerably across the countries presented here.

Due to the differences in the level of general healthcare as well as in the OHS systems the incidence of occupational accidents differs largely between the participating countries. Differences in the estimated fatality rates due to occupational accidents are huge not only between industrialized countries, countries in transition, and developing countries but also within regions. In interpreting the data, one has to take into account that, e.g., the low fatality rate in the UK may partly be due to the high prevalence of people working in the service sector. However, the rate of occupational accidents in the US is five times higher than in the UK, which might partly be attributable to the substantial differences in the OHS system [Hämäläinen et al., 2006]. The fatality rates in the African regions are high but do not differ substantially between countries. In contrast, the rate of fatal occupational accidents is almost three times higher in Bangladesh—where little OHS exists—than in India or China. This indicates that the implementation of OHS is associated with a decrease in the burden of occupational fatalities and, most likely, occupational diseases.

Whenever workers suffer from an occupational accident or develop occupational diseases, secondary prevention and compensation is needed. Compensation for occupational diseases might reach most of the working population in some

countries, while it is below 20% in other countries (e.g., India, Guatemala).

In a few of the countries presented herein, no OH structures exist at all. Bangladesh is an example, though the government is reportedly working on the introduction of OHS in the country. Furthermore, in many of the poorest countries, treatment costs have to be covered by the workers themselves, but is often unaffordable. The consequences may be loss of quality of life, permanent disability with loss of income, and death. The health of workers, however, is an essential prerequisite for productivity and economic development in all regions. This recognition resulted in the global plan of action on workers' health of the WHO (2008–2017) [Executive Board, 2007].

Some common challenges for OHS were identified by the summer school participants. One of these problems is the provision of adequate OHS in medium and small enterprises. This was an issue in all countries represented during the summer school. In addition, the informal sector, which in some countries constitutes more than half of the working population but is also at the rise in European countries, is a challenge, since OHS in this sector is mostly non-existent. Furthermore, in many countries a large disparity exists between rural and urban areas with higher prevalence of informal work in rural areas [International Labour Organization, 2007]. New ways for OHS in these enterprises have to be found [World Health Organization, 1997; Mikheev, 1998]. An example of such a method is control banding, an easy to understand qualitative risk assessment, and risk management tool. It aims at small enterprises in order to enable them to focus resources on exposure controls [Zalk and Nelson, 2008].

Another issue frequently cited and difficult to overcome is the lack of enforcement, which might be due to lack of interest, knowledge, and personnel. Corruption might also be considered as a problem. These issues result in the under-reporting of occupational diseases and occupational accidents. In this context, many of the countries lack adequate training possibilities.

To overcome a number of problems, Rantanen [2005] has proposed a training program for Basic Occupational Health Services (BOHS). The idea of BOHS is to provide services for all workers around the globe regardless of economic sector, company size, geographic area, or type of employment. Training for BOHS might be done via brochures, video conferences, and online modules in combination with onsite training like local or international summer schools or camps. Currently, such a program is developed under the umbrella of the WHO collaborating centers in OH and the International Commission on Occupational Health (ICOH) Scientific Committee on Education and Training in OH.

Some limitations of the information provided here have to be considered. Primarily, the countries presented are a

convenience sample rather than a random sample of representative countries. However, countries at all levels of income participated and thus OHS systems in a wide range of nations across the globe could be described. Secondly, the information summarized in this article is those provided by the presenters and participants during the course. Wherever possible, the information was supplemented by data from recent literature and reviewed by at least one regional expert.

Comparing OHS, discussing their advantages and disadvantages in the national context as well as on the international level may help to slowly contribute to a long-term improvement in workers health. Programs like international summer schools may raise awareness and help to reduce the disparity in OH care and attention globally.

ACKNOWLEDGMENTS

The Occupational Health Crossing Borders Summer School Team are (in addition to the authors of this article): Institute and Outpatient Clinic for Occupational, Social and Environmental Medicine, Clinical Centre of the Ludwig-Maximilian-University Munich, Germany: PD Dr. Peter Angerer, Dr. Stefanie Kolb, Elena Riu, Laura Wengenroth, Hammersmith Hospital, London, UK: Dr. John Harrison, Federal Institute for Occupational Health and Safety, Berlin, Germany: Dr. Peter Kujath, NIOSH, Washington, USA: Dr. Marilyn Fingerhut, University of Glasgow, UK: Dr. Ewan Macdonald, Institute for Occupational and Social Hygiene, Karlsruhe, Germany: Prof. Dr. Dirk Rose, Munich-Re, Munich, Germany and Bogotá, Colombia: Dr. Héctor Upegui, Statutory Accident Insurance for the Construction Industry, Munich, Germany: Dr. Reinhold Weis, Universidad Andrés Bello, Santiago, Chile: Raúl Adriasol Gallardo, Maria Angélica Barrientos Arriagada, Isabel Lilayu Gutierrez, Pamela Antonia López Grondona, Daniel Segura Rojas, Ilse Urzua Finke, Jimena Zamorano Wittwer, Universidad de Chile, Santiago, Chile: Paola Godoy Pena, Universidad el Bosque, Bogotá, Colombia: Manuel Ernesto Rubio Campos, Ana Maria Sánchez Rojas, Ambassade d'Allemagne à Antananarivo, Madagascar: Dr. Marcelle Herilala, Tanzania: Dr. Yassin Lumbe Hassan, Chevron Nigeria: Fadeyi Olatubosun Tunde. We thank the tutors for their active contribution to the summer school. In this context, Stella Maria Huber, Leandro Llopis, and Bettina Prüller are especially acknowledged. We thank the team of the Institute and Outpatient Clinic for Occupational, Social and Environmental Medicine, the occupational physicians at different enterprises, the staff of the House of the Bavarian Farmers Organization, and Vice President Professor Dr. Reinhard Putz for their support. Frau Winter and Frau Jansen of the German Academic Exchange Service are kindly acknowledged for their continuous support. The Summer School "Occupational Health Crossing Borders" is part of the

Munich International Summer University of the Ludwig-Maximilian-University Munich (www.lmu-misu.de).

REFERENCES

- Ahasan MR, Partanen T. 2001. Occupational health and safety in the least developed countries—A simple case of neglect. *J Epidemiol* 11:74–80.
- Ahlborg G Jr. 2000. Occupational and environmental medicine in Sweden. *Int Arch Occup Environ Health* 73:1–6.
- Bedrikow B, Algranti E, Buschinelli JT, Morrone LC. 1997. Occupational health in Brazil. *Int Arch Occup Environ Health* 70:215–221.
- Bueggemann M, Roetting M, Luczak H. 2001. International comparison of occupational safety and health research—A review based on published articles. *Int J Occup Saf Ergon* 7:387–401.
- Center for Disease Control. 2009. www.cdc.gov/niosh.
- Choi BC. 2005. An international comparison of women's occupational health issues in the Philippines, Thailand, Malaysia, Canada, Hong Kong and Singapore: The CIDA-SEAGEP study. *Occup Med (Lond)* 55:515–522.
- Cikrt M, Pelcova D, Markvart K, Lukas E, Kriz J. 1997. Occupational and environmental medicine in Czech Republic. *Int Arch Occup Environ Health* 69:79–82.
- Contreras GR, Dummer W. 1997. Occupational medicine in Chile. *Int Arch Occup Environ Health* 69:301–305.
- Danishevski K, Balabanova D, McKee M, Atkinson S. 2006. The fragmentary federation: Experiences with the decentralized health system in Russia. *Health Policy Plan* 21:183–194.
- de la Hoz RE, London M, Friedman-Jimenez G, Rom WN. 1997. Occupational and environmental medicine in New York State. *Int Arch Occup Environ Health* 70:1–8.
- De Valk MM, Oostrom C, Schrijvers AJ. 2006. An assessment of occupational health care in the Netherlands (1996–2005). *Occup Med (Lond)* 56:475–479.
- Ejilemele AA, Ojule AC. 2004. Health and safety in clinical laboratories in developing countries: Safety considerations. *Niger J Med* 13:182–188.
- Executive Board. 2007. Workers' health: Draft global plan of action. Geneva: World Health Organization.
- Finnish Institute of Occupational Health. 2009. www.ttl.fi/NR/rdonlyres/80205D62-8369-477A-ADD1-D2D4171C67CD/0/9DoOH-servicesreallyexistinColombia.pdf.
- Fischer FM. 2001. Shiftworkers in developing countries: Health and well-being and supporting measures. *J Hum Ergol (Tokyo)* 30:155–160.
- Gestal-Otero JJ, Dominguez de la Calle M, Takkouche B. 1999. Occupational health in Spain. *Int Arch Occup Environ Health* 72:345–350.
- Guo YL, Wu TN, Liou SH, Wang JD. 1999. Occupational medicine in Taiwan. *Int Arch Occup Environ Health* 72:419–428.
- Hämäläinen P, Husman K, Räsänen K, Westerholm P, Rantanen J. 2001. Survey of the quality and effectiveness of occupational health services in the European Union and Norway and Switzerland. People at work. Helsinki, Finland: Finnish Institute of Occupational Health.
- Hämäläinen P, Takala J, Saarela KL. 2006. Global estimates of occupational accidents. *Saf Sci* 44:137–156.
- Harrington JM, Aw TC. 1996. Occupational and environmental medicine in the United Kingdom. *Int Arch Occup Environ Health* 68:69–74.

- He F. 1998. Occupational medicine in China. *Int Arch Occup Environ Health* 71:79–84.
- International Labour Organization. 1999. <http://www.ilo.org/public/english/bureau/inf/pr/1999/9.htm>.
- International Labour Organization. 2002. http://www.ilo.org/public/english/protection/safework/accidis/globest_2002/dis_world.htm.
- International Labour Organization. 2007. The key indicators of the labour market programme. 5th edition. Geneva: ILO.
- Isah EC, Asuzu MC, Okojie OH. 1996. Occupational health services in manufacturing industries in Nigeria. *Occup Med (Lond)* 46:333–336.
- Joshi TK. 1999. Occupational health and unemployment in India. *Int Arch Occup Environ Health* 72(Suppl):S8.
- Joyce S. 1997. Growing pains in South America. *Environ Health Perspect* 105:794–799.
- Kamuzora P. 2006. Non-decision making in occupational health policies in developing countries. *Int J Occup Environ Health* 12:65–71.
- Kauppinen T, Hanhela R, Heikkilä P, Kasvio A, Lehtinen S, Lindström K, Toikkanen J, Tossavainen A. 2006. <http://www.ttl.fi/Internet/English/Information/Electronic+publications/>.
- Knave B. 2002. *Mankind Working Life and Occupational Health Toowoomba*: University of Southern Queensland Printery.
- Koh D, Jeyaratnam J. 1998. Occupational health in Singapore. *Int Arch Occup Environ Health* 71:295–301.
- LaDou J. 2003. International occupational health. *Int J Hyg Environ Health* 206:1–11.
- LaDou J. 2005. World Trade Organization, ILO conventions, and workers' compensation. *Int J Occup Environ Health* 11:210–211.
- Langard S, Wannag A. 1995. Occupational and environmental medicine in Norway. *Int Arch Occup Environ Health* 67:219–224.
- Laskar MS, Harada N, Rashid HA. 1999. The present state and future prospects of occupational health in Bangladesh. *Ind Health* 37:116–121.
- Lehnert G, Wrbitzky R. 1998. Occupational health in Germany and other countries of the European Union. *Int J Occup Med Environ Health* 11:9–18.
- Lehtinen S. 2003. Summary Report: Sixth Network Meeting of the WHO Collaborating Centres in Occupational Health. Brazil: ICOH Conference Iguazu.
- Libert B, Yamada Y. 1998. Occupational medicine in France: A perspective at the Fiftieth Anniversary of *Medecine du Travail*. *J Occup Health* 40:91–95.
- Macdonald EB, Ritchie KA, Murray KJ, Gilmour WH. 2000. Requirements for occupational medicine training in Europe: A Delphi study. *Occup Environ Med* 57:98–105.
- Maeda M, Inoue M, Washio M. 1999. International comparison of occupational health related laws and occupational health systems on ethics. *Sangyo Eiseigaku Zasshi* 41:45–53.
- Mikheev MI. 1998. Occupational health and safety in small enterprises. *Int Arch Occup Environ Health* 71(Suppl):S10–S12.
- Mikton P. 1994. Declaration on Occupational Health for All. Second Meeting of the WHO Collaborating Centres in Occupational Health Beijing. China: World Health Organization.
- Occupational Safety Health Agency. 2009. <http://www.osha.gov/comp-links.html>.
- Ofili AN, Ugwu EN, Ziregbe A, Richards R, Salami S. 2003. Knowledge of disease notification among doctors in government hospitals in Benin city. Vol. 117. Edo State, Nigeria: *Public Health*, p. 214–217.
- Overgaard-Hansen K. 1998. Occupational health services in the countries of transition. *Int Arch Occup Environ Health* 71(Suppl): S13–S15.
- Phoon WO. 1998. Occupational health in Australia. *Int Arch Occup Environ Health* 71:363–371.
- Radon K, Ehrenstein V, Bigaignon-Cantineau J, Dev Vellore A, Fingerhut M, Nowak D. 2009. Occupational health crossing borders—Part 1: Concept, teaching methods, and user evaluation of the first international summer school in Munich, Germany. *Am J Ind Med* 52:774–781.
- Rantanen J. 2005. Basic occupational health services. Helsinki, Finland: ILO/WHO Committee on Occupational Health priority area for ILO/WHO/ICOH collaboration.
- Rasmussen K, Lunde-Jensen P, Svane O. 1991. Biological monitoring and medical screening at the workplace in the EC countries. *Int Arch Occup Environ Health* 63:347–352.
- Ribak J, Lerman Y, Froom P. 1997. Occupational health in Israel. *Int Arch Occup Environ Health* 70:73–76.
- Saric M. 1999. Occupational health services in Croatia. *Int Arch Occup Environ Health* 72:491–495.
- Shouksmith G, Taylor JE. 1997. The interaction of culture with general job stressors in air traffic controllers. *Int J Aviat Psychol* 7:343–352.
- Staal JB, Hlobil H, van Tulder MW, Waddell G, Burton AK, Koes BW, van Mechelen W. 2003. Occupational health guidelines for the management of low back pain: An international comparison. *Occup Environ Med* 60:618–626.
- Szantho Pongracz G, Morales Freire A. 1994. Salud ocupacional en Chile. *Boletin Esc. de Medicina* 23:62–64.
- United States Department of Labor. 2009. <http://www.dol.gov/dol/topic/workcomp/>.
- Vallebuona Stagno C. 2001. Sistema automatizado de informacion en salud ocupacional (saismo), Chile 1997-2000.
- Werner AF. 2000. Occupational health in Argentina. *Int Arch Occup Environ Health* 73:285–289.
- Wilson DJ, Takahashi K, Sakuragi S, Yoshino M, Hoshuyama T, Imai T, Takala J. 2007. The ratification status of ILO conventions related to occupational safety and health and its relationship with reported occupational fatality rates. *J Occup Health* 49:72–79.
- Wolf C, Winker N, Baumgartner E, Jahn O, Rudiger HW. 1997. Occupational medicine in Austria. *Int Arch Occup Environ Health* 69:151–156.
- Womack H. 2008. Russia's next president needs to tackle health reforms. *Lancet* 371:711–714.
- World Health Organization. 1994. Recommendation of the second meeting of the WHO Collaborating Centres in Occupational Health. In: World Health Organization editor Global strategy on occupational health for all: The way to health at work Beijing. China: World Health Organization.
- World Health Organization. 1997. Implementation of the WHO Global Strategy for Occupational Health for All. Plan of action: Covering the specific period 1996–2001. Part I. *Int J Occup Med Environ Health* 10:113–139.
- World Health Organization. 2009. http://www.who.int/occupational_health/publications/occupationalhealthbrochure.pdf.
- Zalk DM, Nelson DI. 2008. History and evolution of control banding: A review. *J Occup Environ Hyg* 5:330–346.