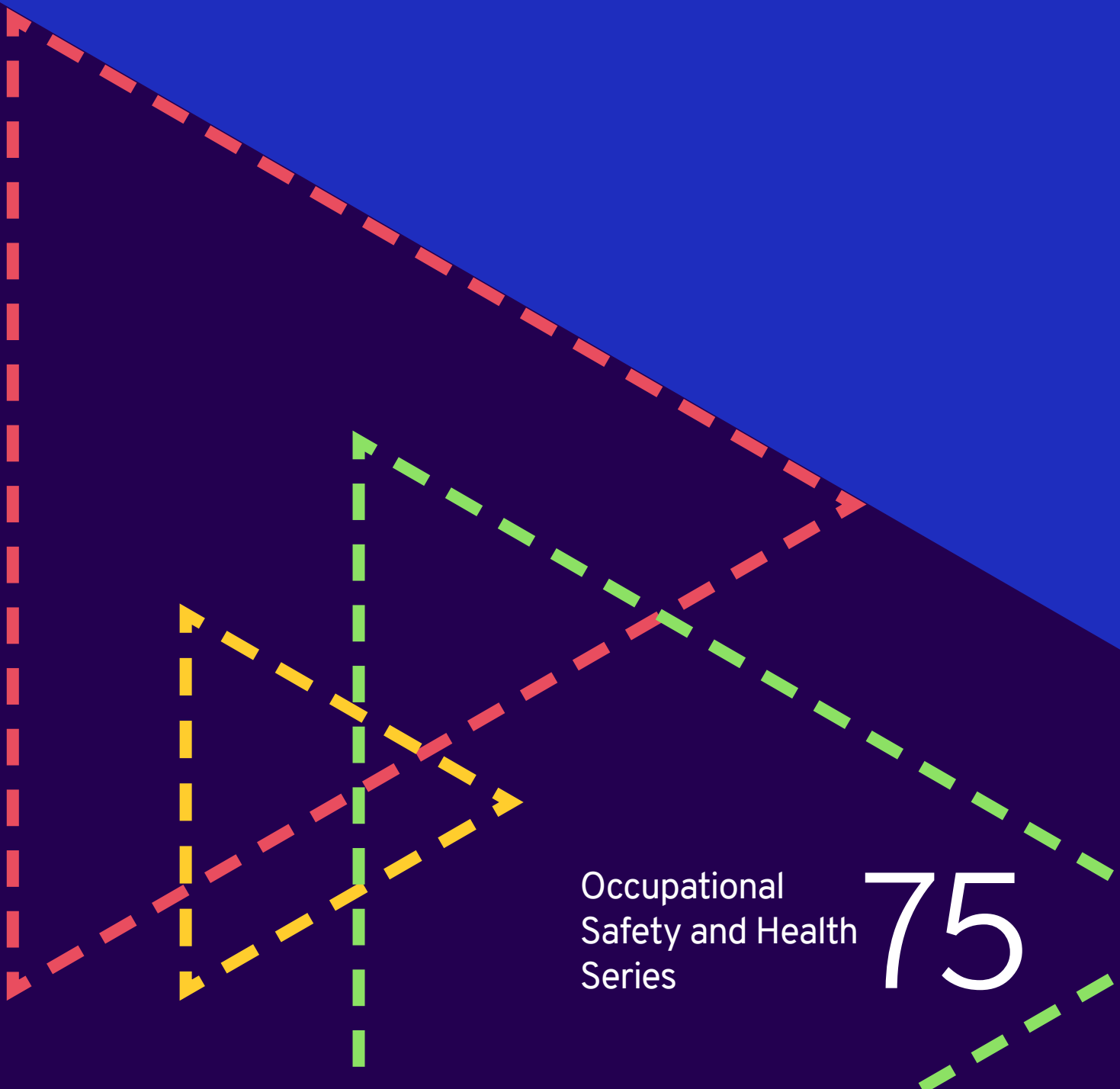
International Labour Organization

IEA International Ergonomics and Human Factors Association

Review report on laws and practice related to human factors/ergonomics and manual handling at the workplace



Occupational Safety and Health Series 75

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Review report on laws and practice related to human factors/ergonomics and manual handling at the workplace

Jointly prepared by
the International Labour Organization and the International Ergonomics Association

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Occupational Safety and Health Series 75 - Review report on laws and practice related to human factors/ ergonomics and manual handling at the workplace

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Foreword

A safe and healthy working environment has been established as a fundamental right and principle at work. Adverse human factors and ergonomic working conditions can cause visual, muscular, and psychological disturbances such as eye strain, headaches, fatigue, musculoskeletal disorders (MSDs) including chronic back, neck and shoulder pain, cumulative trauma disorders (CTDs), repetitive strain injuries (RSIs) and repetitive motion injuries (RMIs), psychological tension, anxiety, and depression. MSDs account for around a third of all work-related injuries and illnesses, a higher-than-average absenteeism rate and significant healthcare costs, and production losses. Psychosocial factors that result from the organization of work are considered to have impacts on the development of MSDs. Psychological job demands, decision latitude, and social support are three key psychosocial factors at the workplace affecting workers' health.

The human factors/ergonomics (HFE) systems approach is key to addressing all aspects of work and work systems. An iterative HFE systems approach acknowledges the importance of a holistic perspective, context, and interactions among humans and their working environment. Regulation of HFE in the workplace requires a consideration of the interrelatedness of human, technical, task, and environmental components and the potential effects of design changes on all parts of the system. This broad approach provides a solid framework for effective implementation of occupational safety and health legislation and standards.

In response to the ILO Governing Body decisions for the Office to initiate preparations for possible standard-setting items on HFE and manual handling, the Office supported by the International Ergonomics Association (IEA) prepared this report. The purpose is to review HFE-related legislation, standards, and guidance documents in selected countries and regions across the globe. This work will provide useful technical background for the preparation of ILO's normative work on workplace HFE and manual handling of weight, which will likely take place at the International Labour Conferences in 2028-29.

The contents of this document are based on the feedback from a questionnaire on the national /state or regional laws and practice relevant to HFE from the IEA member associations and the contributions from individual international experts identified by the IEA. The document was peer reviewed by a diversity of stakeholders. The contributions of all the experts and reviewers to the drafting and finalization of this document are much appreciated. Special thanks are given to Dr Shengli Niu, Senior Specialist on Occupational Health of the ILO and Dr Kathleen L. Mosier, the former President of the IEA, who initiated this joint project, oversaw the development of the technical contents, and edited this publication.

Joaquim Pintado Nunes
Chief

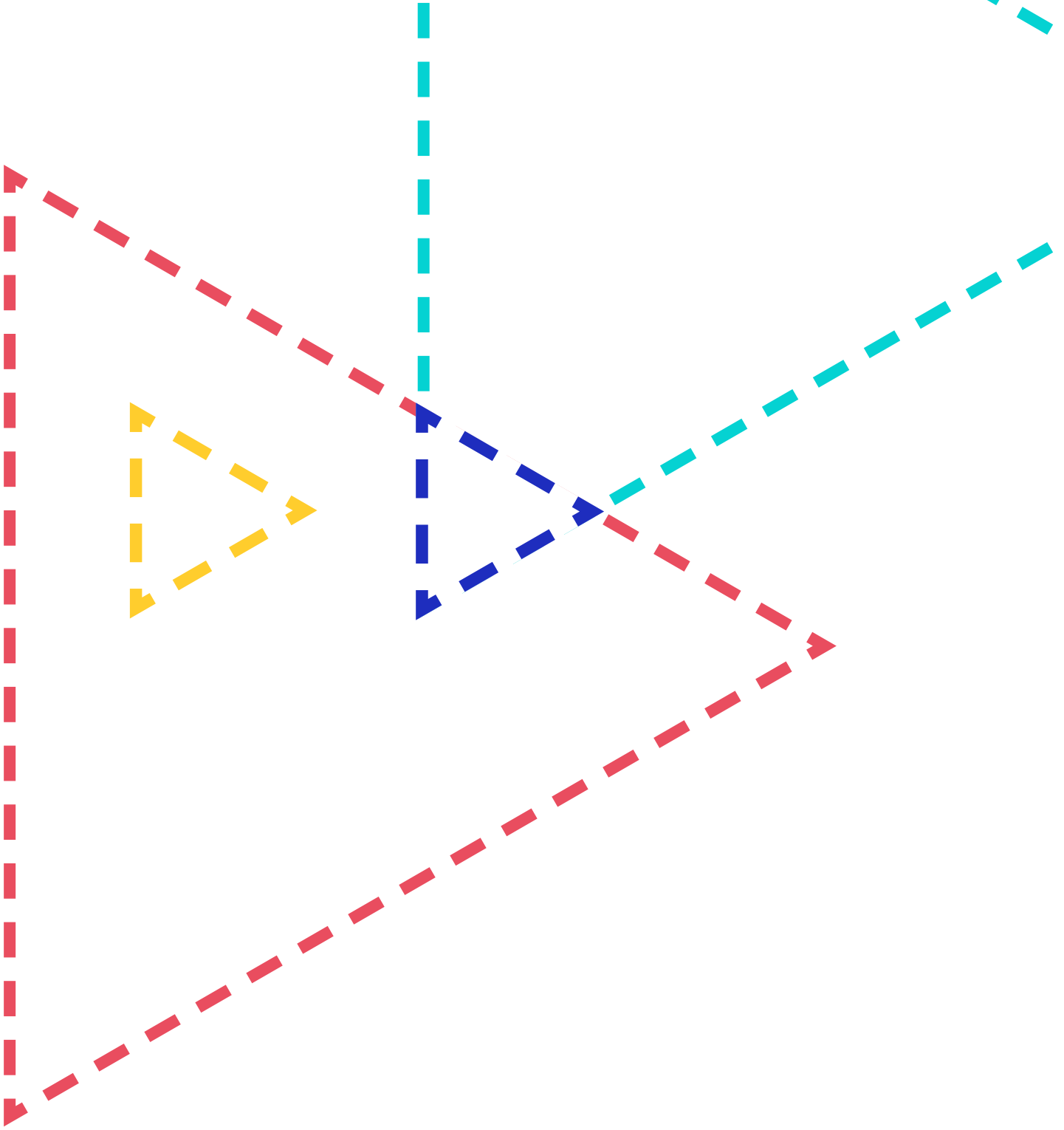
Labour Administration, Labour Inspection
and Occupational Safety and Health Branch

Executive summary

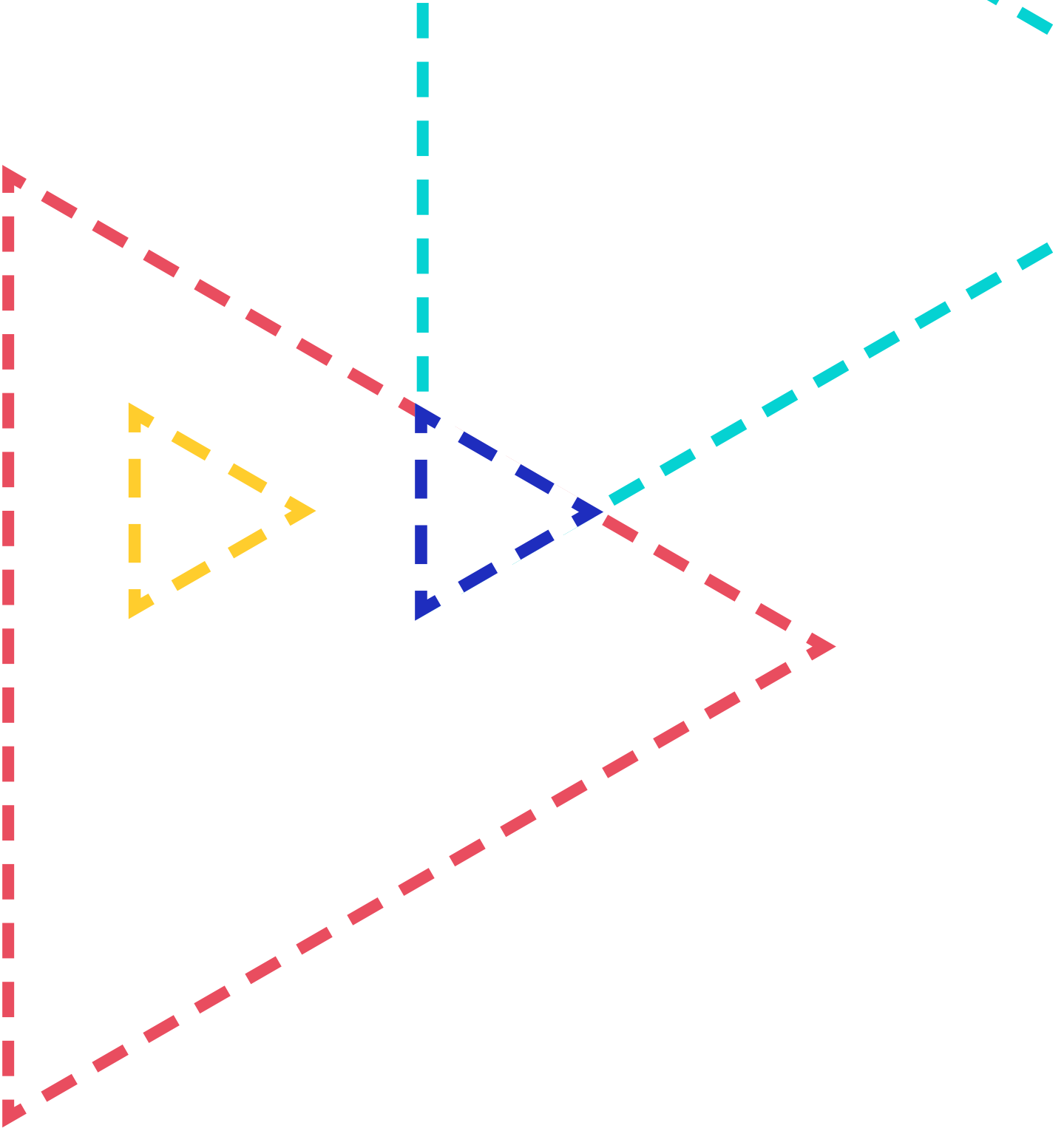
The International Labour Organization (ILO) and the International Ergonomics Association (IEA) share the goal of Decent Work for all: first, because it focuses on achievement of high-quality, motivating jobs, work, and output; second, because it is widely applied to improve occupational safety and health; and third, because its practitioners recognize the need for participation of all stakeholder groups (i.e., participatory HFE). The ILO recognizes the broad nature of HFE and the need to take account of not only manual handling issues but all relevant aspects of the HFE discipline. This wider perspective promotes a user-centred systems approach to the design and evaluation of work tasks and tools, jobs, environments, and the overall work system; however, it is not always reflected in country and regional regulations and guidelines for safety and health at work and the working conditions and environment.

This document is intended to: catalog and characterize HFE-related legislation, standards, and guidance documents from countries and regions around the globe, as well as ILO Conventions, Recommendations, codes of practice, and guidelines relevant to HFE and manual handling in the workplace; to identify gaps in these documents with respect to coverage of HFE-related issues and concerns; and to provide guidance on addressing these gaps for the complex variation of work and workers that exists today.

A primary goal of the document is to serve as a resource for HFE elements to be considered for inclusion in laws, regulations, standards, and/or guidelines on HFE and manual handling in the workplace. An effective HFE systems approach is indispensable to support our life and work in the 21st century; without sufficient attention to HFE, system design will not support the sustainability of work, organizations, or societies.



Contents



Chapter 1. Background and scope of the report

1.1 Background

Ergonomics or human factors (HFE) concerns the understanding of interactions among humans and other elements of a system and is a profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance. HFE encompasses but is not confined to physical, cognitive, psychosocial, organizational, and external factors. Physical HFE is concerned with human anatomical, anthropometric, physiological, and biomechanical characteristics as they relate to physical activity. Relevant topics include working postures, materials handling, repetitive movements, work-related musculoskeletal disorders, workplace layout, and physical safety and health.

Physical HFE hazards include manual materials handling causing overexertion; inappropriate lighting or selection and use of tools; continuous standing or sitting while working; slips, trips or falls; thermal discomfort; and fixed postures contributing to musculoskeletal disorders (MSDs). The wide variety of MSDs renders an accurate estimate of direct and indirect costs particularly difficult but available evidence suggests that MSDs account for around a third of all work-related injuries and illnesses, a higher-than-average absenteeism rate and significant healthcare costs, informal care costs, and production losses. Attention to prevention of HFE risks and efforts to improve comfort and well-being at work become more urgent as workforces age and workers are expected to work longer. Workers in all sectors are at risk; high-risk industries include agriculture, construction, transport and communication, manufacturing, hotels and restaurants, health care and social work, and mining.

Cognitive HFE is concerned with mental processes, such as perception, memory, reasoning, decision making, and sensorimotor response, as they affect interactions among humans and other elements of a system. Relevant topics include mental workload, skilled performance, human-computer interaction, human reliability, work stress, and training as these may relate to human-system design. Organizational HFE is concerned with the optimization of sociotechnical systems, including their organizational structures, policies, and processes. Relevant topics include communication, crew resource management, work design, design of working times, teamwork, participatory design, community ergonomics, cooperative work, new work paradigms, virtual organizations, telework, quality management and, importantly in the present context, prevention of work-related musculoskeletal disorders.

The ILO recognizes the broad nature of HFE and the need to take account of not only manual handling issues but all relevant aspects of the HFE discipline. This wider, IEA/ILO perspective promotes a user-centred systems approach to the design and evaluation of work tasks and tools, jobs, environments, and the overall work system. In the present context, the ‘users’ at the centre of the system are people performing their work (see Figure 1).

Many occupational safety and health (OSH) jurisdictions and their associated laws and regulations focus mainly on physical health and safety issues, including the prevention of work-related musculoskeletal injuries and disorders (WMSDs), through prescriptive laws intended to control risk from the physical hazards of work such as manual handling or highly repetitive or physically demanding work tasks. Control of WMSD risk from these physical hazards is important and is arguably the most salient and well-recognized role of HFE practitioners in the OSH domain. But these are not the only elements of work systems considered by HFE practitioners. A diverse range of work-related and work environment hazards can have a substantial impact on health outcomes including WMSD risk. More broadly, a wide variety of physical, perceptual-cognitive, and psychosocial factors influence risks arising from task and job design, from work organization, and from both the physical and socio-technical work environment, with consequences for workers' safety and health. Accordingly, a great many different factors may be taken into account by HFE professionals when assessing and controlling risks to OSH outcomes, in accordance with the HFE systems approach illustrated in Figure 1.

▶ **Figure 1. Multiple factors within the sociotechnical work system can influence OSH outcomes. An iterative HFE systems approach is required to address them.**

The HFE systems approach is appropriate and key to addressing all aspects of work and work systems and offers insights into global regulatory needs for nations and regions. An iterative HFE systems approach acknowledges the importance of a holistic perspective, context, interactions among humans and their working environment, and purpose in understanding the nature of the system and emergent characteristics. As illustrated in Figure 1, the individual in the workplace is directly impacted by work conditions and demands involving the required tasks or work processes, the tools and technology required, the internal work environment, and characteristics of the employing organization. Regulation of HFE in the workplace requires a consideration of the interrelatedness of human, technical, task, and environmental components and the potential effects of system design changes on all parts of the system. This broad approach provides a solid framework for effective implementation of OSH legislation and standards. Regulation that does not consider these components within a systems approach will not be effective to secure safety, health, and wellbeing in the workplace. The need for a systems approach to HFE in the workplace should be recognized and incorporated into OSH policies and standards.

The ILO has a mandate to protect workers against sickness, diseases, and injuries due to workplace hazards and risks including ergonomic, work organization, and other psychosocial risk factors. In response to the increased concern with workplace HFE problems and work-related MSDs in both developed and developing countries, the ILO has initiated technical preparations for possible standard-setting on HFE and manual handling. This report is a part of the ILO's work to prepare a technical basis for the standard-setting on human factors/ergonomics and manual handling. In a collaborative effort with the International Ergonomics Association (IEA), searches were conducted for legislation, standards, and guidelines pertaining to the physical hazards that can arise from manual handling work tasks, for those pertaining to other relevant factors such as perceptual and cognitive sources of risk from display screens used to view and process information, and for other work system and environment factors of particular relevance to HFE and OSH, as depicted in Figure 1. Information was collected from the 54 IEA Federated Societies across the globe, drawing from relevant legislative documents to identify HFE-related factors that appear in existing legal regulations, standards, and guidelines in a representative sample of countries and regions. Notably, we found that virtually every country or region that has an OSH regulatory body addresses the physical risks of manual handling and WMSD prevention in some way (legislation, standards, guidance documents). Other HFE factors are not universally addressed, and sometimes appear only in the context of specific industries or types of work. Many gaps and limitations in legislative coverage of HFE factors are documented in the report.

▶ 1.2 Scope

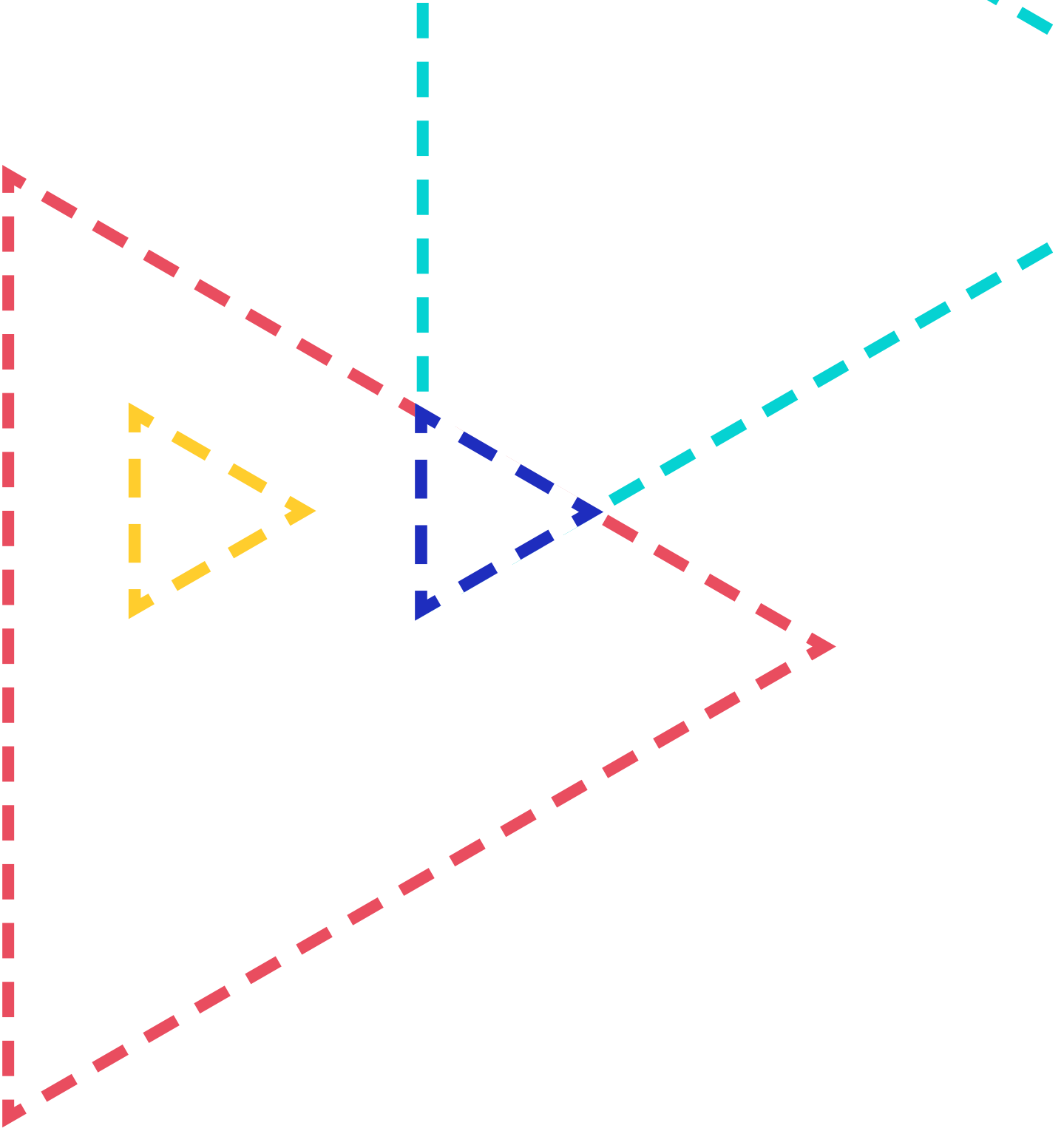
The scope of this report includes HFE-related legislation, standards, and guidance documents from the countries and regions represented by the 54 IEA Federated Societies and several additional countries, as well as the ILO Conventions, Recommendations, codes of practice, and guidelines relevant to HFE and manual handling in the workplace. The nature of HFE legislation and regulations varies among countries and regions, as do the specific aspects of HFE and manual handling that are addressed in national and regional laws and standards. One primary purpose of this report is to:

- Identify, document, and summarize content of existing legislation, regulations, standards, codes of practice, and guidelines that is of high relevance to HFE and manual handling.

Additional purposes are to:

- Identify key HFE factors, issues, and principles that an occupational safety and health standard on HFE and manual handling at the workplace should consider, and
- Provide a list of references and existing sources of national and regional HFE and manual handling documents.

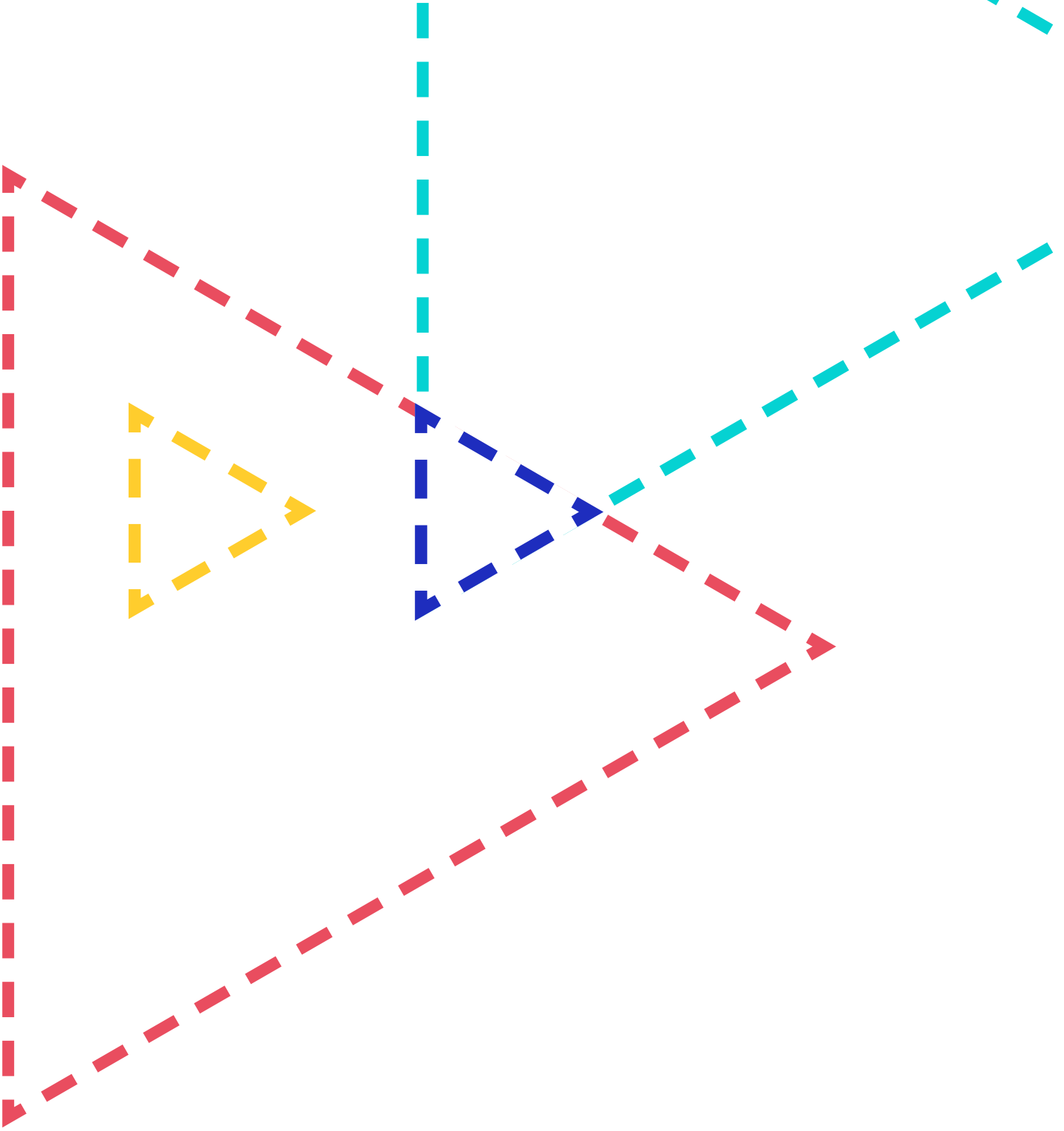
This report draws from and complements the IEA/ILO joint publication *Principles and guidelines for human factors/ergonomics (HFE) design and management of work systems*. Together the two documents will provide a technical basis for potential standard setting by the ILO on HFE and manual handling at the workplace.



Chapter 2.
Terms and definitions

In this report, the following terms and definitions apply:

Hazard	A hazard is anything that has the potential to cause harm. Hazards can affect people, property, processes; they can cause accidents and ill-heath, loss of output, damage to machinery, etc. https://osha.europa.eu/en/themes/musculoskeletal-disorders/glossary
Biomechanical and physical hazards that affect MSD risk	May include: • Handling loads, especially when bending and twisting • Repetitive or forceful movements • Awkward or static postures • Vibration, poor lighting or cold working environments • Fast-paced work • Prolonged sitting or standing in the same position https://osha.europa.eu/en/themes/musculoskeletal-disorders
Organisational and psychosocial hazards	May include: • High work demands and low autonomy • Lack of breaks or opportunities to change working postures • Working at high speed • Working long hours or on shifts • Bullying, harassment and discrimination in the workplace • Low job satisfaction. More generally: any work-related factors that may lead to excessive stress, fatigue, anxiety or other such negative outcomes. https://osha.europa.eu/en/themes/musculoskeletal-disorders
Human factors and ergonomics (HFE)	The scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design to optimize human well-being and overall system performance (International Ergonomics Association, 2001); https://iea.cc/about/what-is-ergonomics.
Manual handling	Any activity requiring the use of human force to handle, lift, lower, carry, push, pull, or otherwise move or restrain an object, person, or animal. This includes static exertions such as grips and pinches, wrist and forearm torques, insertions, or over-shoulder work.
Musculoskeletal disorders	Musculoskeletal disorders (MSD) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs. Work-related musculoskeletal disorders (WMSD) are conditions in which: the work environment and performance of work contribute significantly to the condition; and/or the condition is made worse or persists longer due to work conditions.
Participatory HFE	An approach to the implementation of change or new technology in organizational systems that requires end users to be highly involved in developing and implementing the intervention. Active involvement of people in the planning and controlling of a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes to achieve desirable goals, reduces risks to safety and health and improves productivity.
Systems approach	Systematic, analytical procedure that examines and takes into account interactions among persons, tasks, tools and technologies, physical environment, and organizational conditions rather than concentrating on an individual part of the system.
Work environment	Conditions at the workplace including **functional factors** such as job design, staffing, and communication; **physical factors** such as workstations and tools, technology, heat, noise; temporal factors such as working time, breaks, incentives, access to resources; and **interpersonal factors** such as safety culture and climate, supervisor support, teamwork, and job security.
Workplace	Area where workers need to be, or to go, on the instruction of an employer to carry out their work. A workplace need not be a fixed location.



Chapter 3.
Overview of HFE and manual handling

3.1 Description of HFE – integrative science and discipline

The word *ergonomics*, "the science of work," is derived from the Greek ergon (work) and nomos (laws). The terms *ergonomics and human factors* are often used interchangeably or as a unit (e.g., human factors/ergonomics – HFE or EHF), a practice that is adopted by the IEA and is used in this report. HFE is characterized by an emphasis on design, systems, and joint optimization of human well-being and system effectiveness. Within the OSH domain, HFE addresses issues such as workplace safety, health, and performance, which are typically influenced by a diverse range of potentially interacting factors that together constitute a system. HFE therefore views the design and evaluation of tasks, jobs, products, and environments within a holistic, human-centred systems framework.

The philosophical foundation of HFE is congruent with the ILO's goal of Decent Work for all: first, because it focuses on achievement of high-quality, motivating jobs, work, and output; second, because it is widely applied to improve occupational safety and health; and third, because its practitioners recognize the need for participation of all stakeholder groups (i.e., participatory HFE). HFE participatory design principles and methodologies apply across the design of tasks, jobs, products, environments, industries, and types of work that comprise the socio-technical workplace system. HFE principles are reflected in essential core values:

- humans as assets,
- technology as a tool to assist humans,
- promotion of quality of life,
- respect for individual differences, and
- responsibility to all stakeholders.

To practice effectively, HFE professionals who are specialists in a given domain (such as OSH) or discipline (such as psychology, human anatomy or physiology, engineering) must give sufficient consideration to all system components relevant to each situation or 'case.' This assumes a broad understanding of all HFE-related disciplines, and deeper analysis and effective problem solving often require HFE professionals to work collaboratively in multidisciplinary teams that may include specialists in other fields of particular relevance to each case.

▶ 3.2 Global trends and development in HFE and the HFE systems approach

The nature of work is changing and the context within which work is done is becoming increasingly complex. Disruptive drivers such as artificial intelligence, additive manufacturing (3-D printing), automation, and robots are shaping the future of work. New technologies make it possible to work at any time from virtually any place (e.g., remote/platform/crowd/gig work). These drivers introduce some new HFE priorities for safety, health, and wellbeing such as managing the increasing impact of automation on the nature of work and workplaces, securing reasonable working hours and conditions for people working remotely from their employer, and managing physical and psychosocial effects of work intensification and greater time pressures. In parallel with technology-transformed working conditions, risk continues to arise from traditional work tasks, jobs, and workplaces that, because of poor HFE design, may increase the risk of injuries, accidents, or WMSDs and other physical and mental disorders from physical and other work environment hazards. Physical hazards arising from manual handling (lifting, loading, pushing/pulling), repetitive movements, awkward or static postures, and vibrating tools or work surfaces are well recognized, along with physical environment factors such as poorly designed workspaces, excessive noise, or poor lighting. Less well recognized sources of risk are poor work organization, poor job design, and the diverse range of work environment hazards that can generate high stress levels and subsequent negative outcomes.

This expanded variety of work situations is accompanied by an industry movement – Industry 5.0 – toward human-centric, resilient, and sustainable production processes – goals consistent with the core values of HFE. According to the European Commission, a human-centric approach promotes human talents, diversity, and empowerment. In industry it puts core human needs and interests at the heart of the production process. We focus on what technology can do for us. We use technology to adapt the production process to the needs of workers, e.g. to guide and train them. We make sure that the use of new technologies does not impinge on workers' fundamental rights, such as the right to privacy, autonomy, and human dignity. The well-being of the human is a top priority of the process.

Addressing the complex range of work realities that exists today requires a dynamic HFE systems approach that encompasses not only physical safety and health but also cognitive, psychosocial, and other work environment factors. Regardless of the nature of work being performed, work systems function through dynamic interactions among various human, technical, environmental, task, and organizational characteristics.

▶ 3.3 The role of HFE in the workplace, manual handling, and safety and health

3.3.1 Overall safety and health

Regulations and interventions for HFE at the workplace have traditionally focused on the physical demands of performing work such as manual handling on the muscles, joints, and cardio-respiratory system of the human body, with an emphasis on identifying, assessing, and controlling the resultant risks of discomfort, pain, and injury resulting from those demands and associated outcomes including work-related musculoskeletal disorders (WMSDs), injuries, or accidents. The introduction of new technologies into work systems, the increase in remote work or telework, and the proliferation of platform work/crowd work/gig work have made clear the need to establish HFE regulations and guidance not only for physical aspects of work but also for interconnected cognitive and psychosocial aspects. An expanded perspective of HFE issues and requirements, such as the framework shown in Figure 2, is essential to promote physical and psychological health and avoid adverse incidents, injuries, and harm to workers. Effective HFE is indispensable to support our life and work in the 21st century; without attention to HFE, system design will not support the sustainability of work, organizations, or societies.

The successful application of HFE risk assessment methods and knowledge of engineering solutions for control of risks requires a certain level of expertise. In many countries, enforcement agencies and companies require that the people who perform these assessments or design solutions have advanced training in HFE and are certified by some non-governmental body. In the UK, such a person is identified as a Chartered Ergonomist as determined by the Chartered Institute of Ergonomics and Human Factors (CIEHF). The Centre for Registration of European Ergonomists (CREE) is generally recognized as the appropriate certifying body in other European countries. In the US, the Board of Certification in Professional Ergonomics (BCPE) oversees certification. The Brazilian Ergonomist Certification System (SisCEB) provides standards and procedures to certify individuals or enterprises offering ergonomics services. The Ergonomics Society of South Africa Professional Affairs Board (ESSA-PAB) sets minimum qualifications for competency in ergonomics. In Japan, professional ergonomists are certified by the Japan Ergonomics Society (JES). The Human Factors and Ergonomics Society of Australia provides oversight for becoming a Certified Professional Ergonomist. Typically, certification requires at least a relevant Master's degree including one year of HFE courses plus three years of relevant experience.

3.3.2 Manual handling

Manual handling is one of the major causes of musculoskeletal injuries and disorders in the workplace. Tasks of this type must be carefully designed for the range of persons who will perform the tasks as well as the work conditions (duration of the task, frequency, etc.). HFE plays a major role in assessing and designing manual handling tasks, drawing on epidemiological, biomechanical, physiological, and psychophysical data and criteria to develop quantitative assessment methods for measuring maximum acceptable loads to ensure musculoskeletal integrity and avoid pain, injury, and prolonged fatigue. HFE is also key in the creation of risk assessments and proactive programs to avoid injuries, accidents, and MSDs associated with manual handling work tasks. Proactive measures include early consideration of HFE in work design and organization, manual handling practices, and process improvement, as well as identifying and addressing early symptoms of injury or harm to workers.

▶ **Figure 2. Links between work tasks and environmental factors, individual factors, and worker and workplace outcomes (adapted from Faucett, 2005)**

Chapter 4.
Legislative provisions on workplace HFE and manual handling

4.1 Definitions of HFE and manual handling under national laws and coverage/scope of the legislation

Legislative provisions on workplace HFE and manual handling fall under several broad categories:

- **Governmental regulatory requirements** must be followed under penalty of fines or imprisonment.
- **Government standards** are created by government agencies to define specific limits or the expected duty of care. These may be industry-specific and may be periodically revised without legislative change.
- **Guidelines** are created or provided by governments or agencies as guidance and reference.
- **Voluntary consensus standards** are created by standards organizations. Examples include ISO standards, SEMI-S8, or standards of the European Standards Organization (see Chapter 5). These are adopted and used by some countries.

4.1.1 The general duty clause

Most HFE and manual handling provisions are found within occupational safety and health (OSH) regulations. Industrialized countries have legislated at minimum a basic safety requirement within which HFE-related hazards are addressed – but not always specifically identified as such – in a 'general duty clause.' These clauses focus on keeping employees free from hazards or harm. The European Union Occupational Safety and Health Framework Directives (89/391/EEC), for example, contain a general duty rule that "Employers are required to provide a place of employment free from hazards that are likely to cause death or serious harm." The United States Occupational Safety and Health Administration [OSHA - OSH Act5(a)(1) General Duty Clause] charges employers to "furnish...employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to ...employees.' Countries with at least a general duty clause include those in Table 1 below.

In addition to a general duty clause, some countries have specific HFE regulations. The European Union legislated three directives within the Occupational Safety and Health Framework Directives (89/391/EEC) to address HFE hazards in the workplace and the workplace environment and follow the general HFE principle of "adapting the work to the individual." They address working with display screen equipment (Directive 90/270/EEC), manual handling of loads to prevent back injuries (Directive 90/269/EEC), and the machine directive (Directive 2006/42/EC). Each EU member country must develop its own national laws

and rules in compliance with these Directives; many EU member countries rely on EU Directives rather than creating their own regulations.

4.1.2 Prescriptive HFE regulations

4.1.2.1 Prescriptive HFE regulations on manual handling

Prescriptive HFE rules are typically written to protect workers in particular high-risk jobs or industries from musculoskeletal disorders, injuries, or accidents and require specific risk assessment methods and work practices. Examples are protection from hand injuries due to vibrating tools (e.g., Germany), use of computers (e.g., Brazil), manual material handling (e.g., Chile, Brazil), and patient handling (California, USA).

Countries may have prescriptive regulations that specify required assessment methods, interventions, and other actions. This is often the case with manual handling and other work tasks with physical hazards. An example of a prescriptive HFE rule would be "No manual handling of loads >50 kg, women and children under 18, >20 kg. Manual loading and unloading operations for pregnant women are prohibited." Other examples are:

Chile – Manual Material Handling. The Chilean Labor Code (Article 211 H&J) was modified in 2016 to limit the carrying, lifting, or pushing of loads to no more than 25 kg.

State of California, USA – Safe Patient Handling. The California Labor Code added a new law in 2012 on Safe Patient Handling, "Health Care Worker Back and Musculoskeletal Injury Prevention" (5120). The law has details on scope, definitions, requirements of the injury prevention plan, training, and record keeping. The injury prevention plan includes the requirement for the identification of patients, on admission to the hospital, who require manual handling to be moved or lifted. Those patients must be moved with equipment and equipment must be readily available and maintained.

Brazil – Material Handling. The Brazil NR17 (HFE) regulations address manual handling, workstation design, display screen equipment, environmental factors (temperature, noise, air velocity, humidity), lighting, and work organization. Recently, Brazil adopted three ISO ergonomics standards (11228-1, -2, -3) as law. The standards address: (1) lifting and carrying; (2) pushing and pulling; and (3) handling of low loads at high frequency. The standards specify approaches to hazard identification, risk estimation with simple or detailed risk assessment tools, and risk reduction.

4.1.2.2 Other examples of prescriptive ergonomics regulations

Germany – Vibration Exposure. The 2007 (updated 2015) German Ordinance on noise and vibration mandates risk assessment for hand or whole-body vibration exposure based on field measurements of vibration or manufacturer provided data and is used to estimate a daily exposure over eight hours that can be compared to action limits and limit values. Limit values cannot be exceeded. If the action limit is exceeded then preventive measures must be taken including medical monitoring.

UK – Work with Display Screen Equipment. The 1993 (modified in 2013) UK display screen equipment regulations define the users to which they apply, list the principal health risks (e.g., musculoskeletal problems, visual fatigue, and mental stress), require risk assessment of users, list equipment, workstation, and task requirements, require breaks or changes of activity, discuss requirements for visual demands, and list training requirements.

4.1.3 Performance-based HFE regulations

Performance-based HFE rules typically list all required HFE program elements (Switzerland, South Africa, Canada, some jurisdictions of Australia). They are designed to prevent musculoskeletal disorders associated with jobs involving manual material handling tasks or repetitive hand intensive tasks, do not target specific tasks, jobs or industries, and do not specify risk assessment methods or work practices. The usual components of performance-based standards are risk identification, risk assessment, risk

reduction (hierarchy of control: engineering, administrative, personal protective equipment or PPE), training, responsibilities, record keeping, and ongoing evaluation.

4.1.3.1 Examples of performance based HFE regulations

Switzerland. The Swiss Labor Law Ordinance 3 regulates the rights and obligations of employers and employees with regard to health protection and includes general provisions, special health protection requirements, workplaces, loads, supervision of workers, personal protective equipment and work clothing, as well as the design, use, and maintenance of the workrooms. Article 25 addresses manual handling and specifies appropriate organizational measures and provision of appropriate work equipment, in particular mechanical equipment. If manual handling of loads cannot be avoided, suitable equipment for lifting, carrying, and moving heavy or bulky loads must be provided and used to ensure safe and health-friendly handling. Employers must provide information on the weight and weight distribution of loads, the dangers involved in handling heavy and bulky loads, and instruction on how to lift, carry and move such loads correctly.

Australia. The Australian 2016 Code of Practice includes requirements to identify hazards, eliminate risk so far as is reasonably practicable, minimize risk using hierarchy of control, maintain controls, review and revise risk control measures, review workplace design, and consult with workers or their representatives.

Hong Kong, China. Labour legislation documents include Cap.509 Occupational Safety and Health Ordinance to ensure the safety and health of persons when they are at work, to provide for related matters, and to amend the Factories and Industrial Undertakings Ordinance and the Administrative Appeals Board Ordinance. [23 May 1997] L.N. 281 of 1997 (Format changes—E.R. 2 of 2018). Subsection Cap. 509A includes HFE considerations of accident prevention, workplace environments, hygiene at workplaces, and manual handling operations, and Cap509B regulates workstations in workplaces.

▶ 4.2 Definitions of HFE and manual handling in ILO and other international organizations' instruments and technical documents

4.2.1 HFE

ILO provides wide-ranging resources for definitions and laws concerning HFE and manual handling in the NATLEX database as well as the e-LabadminOSH and the Encyclopaedia of Occupational Health and Safety. An important point made in the ILO e-LabadminOSH and the Encyclopaedia of Occupational Safety and Health concerns the definitions of human factors and ergonomics across the globe. These terms have different definitions and connotations depending on the country or region, although the general goals remain the same – maximizing human performance and wellbeing. In some countries, ergonomics refers primarily to physical aspects and outcomes of work and product design, and human factors to cognitive and psycho-social aspects and outcomes. In other countries and in most instruments and technical documents, the term human factors is not used at all, and the common emphasis of OSH-related instruments is on physical aspects and outcomes of health. The variety of definitions and perspectives must be taken into account when designing global programs, guidelines, or regulations. The use of HFE in this report is intended to encompass all human factors/ergonomics definitions.

The articles of the ILO Occupational Safety and Health Convention, 1981 (No. 155), require reporting on occupational accidents and diseases, including many HFE-related diseases. The ILO List of Occupational Diseases Recommendation, 2002 (No.194), includes sections on diseases caused by physical agents and on musculoskeletal disorders. Although the paragraphs do not use the terms ergonomics or human factors, many HFE-related diseases are on this list, for example, hearing impairment caused by noise, diseases caused by vibration, and occupational MSDs caused by hazardous manual handling activities such as lifting and lowering, rapid or repetitive motion, forceful exertion, excessive mechanical force concentration, awkward or non-neutral postures, or vibration.

Many industry and task specific, voluntary guidelines on HFE have been developed by unions, trade associations, and governmental and non-governmental organizations. For example, guidelines have been written for apparel and footwear manufacturing, baggage handling, construction, warehouse work, hotel work, meat processing, patient handling, lifting and lowering, pushing and pulling, computer work, and other industries. The guidelines may include checklists for initial screening of job risks. Detailed risk assessment tools have been developed by ISO (International Standards Organization), ACGIH (American Conference of Governmental Industrial Hygienists), and other organizations.

4.2.2 Manual handling

ILO uses the term manual handling to cover a wide variety of activities including lifting, lowering, pushing, pulling, and carrying. ILO documents recognize that manual handling injuries can have serious implications for the employer and the person who has been injured. They can occur almost anywhere in the workplace and heavy manual labour, awkward postures, repetitive movements of arms, legs and back or previous/existing injury can increase the risk. Other international organizations such as ISO use similar definitions of manual handling, and typically include variants of the same three components of lifting and carrying, pushing and pulling, and handling of low loads at high frequency.

▶ 4.3 Status of HFE in national safety and health laws including laws on manual handling

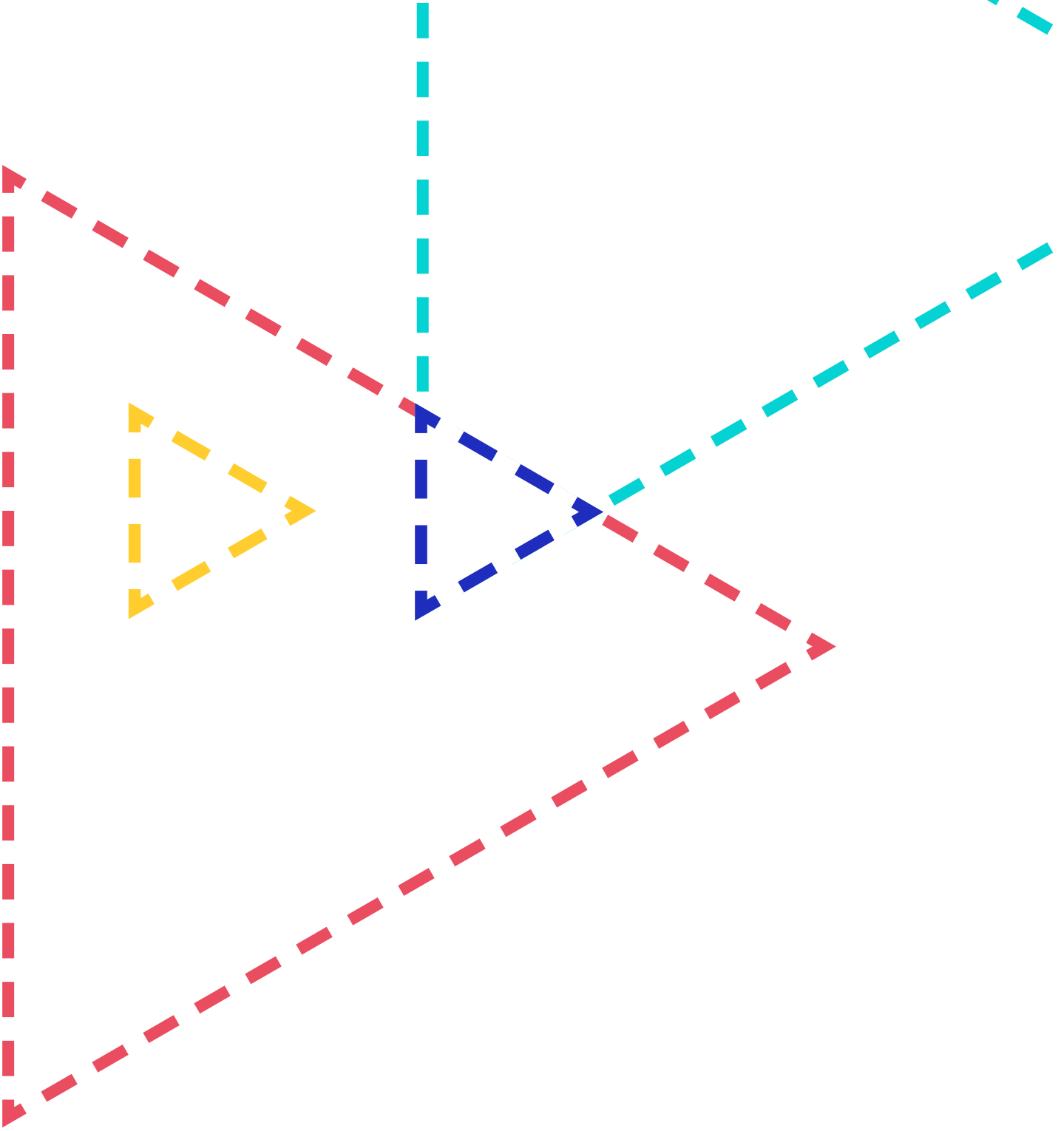
Table 1 contains national and regional HFE legislations around the globe collected for this report. Legislation requires compliance and enforcement. The countries and regions in Table 1 have at least an occupational safety requirement with a general duty clause that covers HFE concerns. In addition, countries or regions may have laws, regulations, standards, or decrees related to specific aspects of HFE or requirements for a prescriptive program addressing HFE issues. For example, countries in the European Union maintain compliance with EU Directives concerning display screen equipment, work equipment, vibration, and personal protective equipment; however, other HFE requirements vary by country. Regions or states within countries - for example in Australia, Canada, and the US - may also have different types of HFE requirements. Other aspects of HFE are presented in guidance materials, such as guidelines and manuals. Information on these can be found in Chapter 5.

▶ Table 1. HFE legislation (laws, regulations) by country and region

	HFE risk assessment / Monitoring / Eval	Prescriptive / Preventive HFE program and monitoring	Participatory HFE (mgmt., unions, workers)	MSD prevention	Manual handling / Lifting / Loads	Patient handling / Health care	Repetitive work / Movements	Sitting / Standing / Posture	Display screen equipment	Work tools & equipment	Workspace / Workstation design	Work environment / Conditions (shifts, hours, cleanliness, temp)	Vibration	Cognitive & psychosocial aspects/risks	Age, gender, pregnancy
Argentina		✓		✓	✓		✓								
Australia												✓			
Australia: New South Wales, Queensland, South Australia, Tasmania, Victoria, Western Australia	✓				✓										
Australia: New South Wales	✓		✓		✓										
Australia: Queensland			✓	✓	✓			✓				✓		✓	
Australia: Victoria	✓	✓	✓	✓	✓					✓	✓	✓	✓		
Austria (EU Directives)					✓				✓	✓			✓		
Belgium (EU Directives)			✓	✓	✓				✓	✓		✓	✓	✓	
Brazil					✓			✓	✓	✓	✓	✓		✓	
Canada				✓	✓			✓							
Canada: Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Quebec, Saskatchewan		✓		✓	✓										✓
Canada: Newfoundland and Labrador, Quebec, Saskatchewan		✓		✓	✓			✓	✓	✓		✓			
Chile	✓			✓	✓							✓			
China: Hong Kong					✓				✓			✓			
China: Taiwan				✓	✓		✓	✓				✓		✓	
Cuba										✓		✓			
Czech Republic					✓	✓						✓		✓	
Denmark (EU Directives)					✓				✓	✓			✓		

	HFE risk assessment / Monitoring / Eval	Prescriptive / Preventive HFE program and monitoring	Participatory HFE (mgmt., unions, workers)	MSD prevention	Manual handling / Lifting / Loads	Patient handling / Health care	Repetitive work / Movements	Sitting / Standing / Posture	Display screen equipment	Work tools & equipment	Workspace / Workstation design	Work environment / Conditions (shifts, hours, cleanliness, temp)	Vibration	Cognitive & psychosocial aspects/risks	Age, gender, pregnancy
Ecuador	✓														
Finland (EU Directives)	✓		✓	✓	✓				✓	✓	✓	✓	✓	✓	✓
France (EU Directives)					✓				✓	✓		✓	✓		
Germany (EU Directives)	✓				✓				✓	✓			✓	✓	✓
Greece (EU Directives)					✓				✓	✓			✓		
Hungary (EU Directives)					✓		✓		✓	✓		✓	✓	✓	
Iceland (EU Directives)					✓				✓	✓			✓		✓
India					✓					✓					
Indonesia	✓	✓	✓		✓	✓		✓		✓	✓	✓		✓	
Ireland: (EU Directives)					✓				✓	✓			✓		
Italy (EU Directives; regional laws)		✓			✓				✓	✓			✓	✓	
Japan	✓				✓										
Korea, Republic of					✓										
Malaysia					✓			✓			✓				
Malta			✓							✓					
Mexico					✓									✓	✓
Netherlands (EU Directives)					✓				✓	✓			✓		
Nicaragua					✓		✓	✓		✓	✓	✓			
Norway		✓													
Peru		✓			✓					✓	✓	✓	✓	✓	✓
Philippines				✓	✓										
Poland					✓				✓	✓			✓		
Portugal (EU Directives)					✓				✓	✓			✓		✓

	HFE risk assessment / Monitoring / Eval	Prescriptive / Preventive HFE program and monitoring	Participatory HFE (mgmt., unions, workers)	MSD prevention	Manual handling / Lifting / Loads	Patient handling / Health care	Repetitive work / Movements	Sitting / Standing / Posture	Display screen equipment	Work tools & equipment	Workspace / Workstation design	Work environment / Conditions (shifts, hours, cleanliness, temp)	Vibration	Cognitive & psychosocial aspects/risks	Age, gender, pregnancy
Serbia		✓				✓									
Singapore	✓			✓											
South Africa, Republic of	✓	✓		✓				✓				✓			
Spain (EU Directives)	✓	✓			✓				✓	✓		✓	✓	✓	✓
Sweden (EU Directives)					✓				✓	✓			✓	✓	
Switzerland			✓		✓					✓	✓	✓			
Thailand					✓										
Türkiye	✓									✓					
United Kingdom					✓				✓	✓			✓		
United States	✓	✓													
United States: California, Hawaii, Illinois, Maryland, Minnesota, Missouri, New Jersey, New York, Ohio, Rhode Island, Texas, Washington						✓									
United States: California		✓		✓		✓	✓	✓				✓			
United States: Maine								✓	✓						
United States: New Hampshire	✓														
United States: Washington						✓									
Venezuela					✓										



Chapter 5.
Safety and health standards and guidelines relevant to workplace HFE and manual handling

Many countries have subordinate standards or guidelines on HFE and material handling that accompany or are in place of national legislation. These are typically not regulatory or legally binding, but rather are guidance documents. They tend to focus on specific industries, such as meat packing, or specific kinds of material handling, such as lifting and lowering. International NGOs, such as ISO, ANSI and ACGIH, have developed such standards. Many countries have developed guidelines that apply to specific industries or specific work activities. Some country military departments have developed standards that apply to the design of military equipment and tasks. In addition, some large industrial sectors, such as oil and gas, have developed their own HFE/material handling guidelines as have some international unions. Representative examples of these standards are listed below.

5.1 International NGO developed standards

5.1.1 ISO (International Standards Organization)

ISO develops international voluntary standards on many technical issues. Members are from standards organizations from countries and the developed standards are based on consensus. Some countries adopt ISO standards as legislative, e.g., enforceable, national standards. Relevant ISO Standards for HFE and manual handling in the workplace include:

- ISO 11228-1: 2021 Ergonomics — Manual handling — Part 1: Lifting, lowering and carrying
- ISO 11228-2: 2007 Ergonomics — Manual handling — Part 2: Pushing and pulling
- ISO 11228-3: 2007 Ergonomics — Manual handling — Part 3: Handling of low loads at high frequency
- ISO 9241-210:2019 Ergonomics of human-system interaction, Human-centred design for interactive systems
- ISO 9355:1999 Ergonomic requirements for the design of displays and control actuators. Parts 1 and 2: Human interactions with displays and control actuators

- ISO NP TR 12295 Ergonomics - Application document for ISO standards on manual handling
- ISO TR 12296:2012 Ergonomics - Manual handling of people in the healthcare sector
- ISO 15534:2000 Ergonomic design for the safety of machinery — Part 1–3
- ISO 45001:2018 Occupational Health & Safety Management systems – Requirements with guidance for use.

5.1.2 ACGIH (American Conference of Governmental Industrial Hygienists)

ACGIH is a professional scientific organization, not a government agency, that develops voluntary guidelines for workplace exposures to chemicals and physical agents. The Threshold Limit Values, or TLVs, and Action Limits, or ALs, that are developed are based on published data, not consensus. TLVs relevant to material handling at the workplace are listed below.

- Hand-arm vibration TLV
- Whole body vibration TLV
- Hand activity TLV
- Lifting TLV
- Upper limb localized fatigue TLV.

5.1.3 ANSI (American National Standards Institute)

- ANSI 100 – Visual display terminals
- ANSI B11 TR1-1993 Ergonomic guidelines for the design, installation and use of machine tools
- ANSI A10.40 – Construction ergonomics.

5.1.4 Industry and union developed standards

Some industrial consortiums and international unions have developed voluntary HFE guidelines and some of those guidelines are listed below. These tend to be task and industry specific.

- Oil and gas: American Petroleum Institute (API)
- Pharmaceutical industry
- Utilities: Electric Power Research Institute (EPRI)
- Laborers' international unions
- Bricklayers international unions
- Glaziers international unions.

▶ 5.2 Government developed voluntary standards or guidelines

Table 2 is a list of HFE-related voluntary standards or guidelines by country. Industry or task specific voluntary standards or guidelines are generally not included in the table. The exception is patient handling in hospitals and clinics, which is included because it is a common form of manual handling with a high degree of risk.

▶ **Table 2. HFE related voluntary standards or guidelines by country and region**

	HFE risk assessment / Monitoring / Eval	Prescriptive / Preventive HFE program and monitoring	Participatory HFE (mgmt., unions, workers)	MSD prevention / Safety	Manual handling / Lifitng / Pushing	Hospitals / Care / Medical / Safe patient Handling	Repetitive work / Movements	Sitting / Standing / Posture	Display screen equipment	Work equipment / Machine safety	Workspace/ Workstation design	Work environment / Conditions (shifts, hours, cleanliness, temp)	Vibration	Psychosocial aspects / Risks
Australia: New South Wales, Queensland, South Australia, Tasmania, Victoria, Western Australia	X		X								X	X	X	X
Canada		X									X			
Canada: Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Quebec, Saskatchewan					X	X			X		X			
Chile	X	X	X					X	X		X			
China: Hong Kong				X	X		X							
China: Taiwan				X					X		X			
Colombia			X	X	X		X		X	X	X	X	X	X
Ecuador														
Finland (EU Directives)					X		X		X		X			
Germany (EU Directives)					X	X		X	X	X			X	
India	X			X	X			X	X	X	X	X		
Indonesia						X								
Ireland: (EU Directives)				X										

	HFE risk assessment / Monitoring / Eval	Prescriptive / Preventive HFE program and monitoring	Participatory HFE (mgmt., unions, workers)	MSD prevention / Safety	Manual handling / Lifitng / Pushing	Hospitals / Care / Medical / Safe patient Handling	Repetitive work / Movements	Sitting / Standing / Posture	Display screen equipment	Work equipment / Machine safety	Workspace/ Workstation design	Work environment / Conditions (shifts, hours, cleanliness, temp)	Vibration	Psychosocial aspects / Risks
Italy (EU Directives)	X				X		X						X	X
Japan		X		X					X		X	X		X
Malaysia	X				X			X	X				X	
Mexico					X				X		X	X	X	X
Netherlands (EU Directives)						X								
New Zealand	X				X				X		X			
Peru				X	X	X	X							
Serbia				X	X									
Spain (EU Directives)						X								
Sweden (EU Directives)				X		X								X
United Kingdom	X			X	X				X		X			
United States	X	X		X	X	X	X		X		X			
United States: California		X				X								
United States: Ohio					X				X		X			
United States: Washington State	X	X				X	X							
Vietnam									X					

▶ 5.3. Industry-specific government developed voluntary standards or guidelines

Some countries have voluntary standards and guidelines for specific industries or tasks. Standards and guidelines related to patient handling are listed in section 5.2. Other examples of industry or task specific guidelines are:

- Poultry processing (USA)
- Meatpacking (USA)
- Shipyards (USA)
- Grocery stores (USA)
- Forest machines (Sweden)
- Conveyer belt workstations (UK)
- Pharmaceutical industry (UK)
- Microscope work (Finland).

▶ 5.4. Voluntary guidelines, best practices, risk assessment tools

There are many industry and task specific, voluntary guidelines on human factors/ergonomics developed by unions, trade associations, and governmental and non-governmental organizations. For example, guidelines have been written for apparel and footwear manufacturing, baggage handling, construction, warehouse work, hotel work, meat processing, patient handling, lifting and lowering, pushing and pulling, and computer work, to name a few. The guidelines may include checklists for initial screening of job risks. Detailed risk assessment tools have been developed by ISO, ACGIH and other organizations. Table 3 lists representative examples of guidelines and risk assessment methods.

▶ Table 3. Examples of human factors/ergonomics guidelines, risk assessment tools, solutions, and best practices by task or industry

Country/ organization	Tool function	Brief description	Year	Website
ACGIH	Standard and risk assessment	Lifting TLV	2008	https://www.acgih.org/forms/store/ProductFormPublic/2016-tlvs-and-beis
ACGIH	Standard and risk assessment	Hand activity level TLV	2018	https://www.acgih.org/forms/store/ProductFormPublic/2016-tlvs-and-beis
ACGIH	Standard and risk assessment	Hand-arm vibration TLV	2014	https://www.acgih.org/forms/store/ProductFormPublic/2016-tlvs-and-beis
ACGIH	Standard and risk assessment	Whole body vibration TLV	2015	https://www.acgih.org/forms/store/ProductFormPublic/2016-tlvs-and-beis
ACGIH	Standard and risk assessment	Upper limb localized fatigue TLV	2015	https://www.acgih.org/forms/store/ProductFormPublic/2016-tlvs-and-beis
ANSI/ASSE A10.40	Standard	Construction	2007	http://webstore.ansi.org/FindStandards.aspx?SearchString=A10.40&SearchOption=0&PageNum=0&SearchTermsArray=null%7cA10.40%7cnull
ANSI B11.TR1	Standard	Machine tool design, installation and use	2016	http://webstore.ansi.org/FindStandards.aspx?SearchString=B11.TR1&SearchOption=0&PageNum=0&SearchTermsArray=null%7cB11.TR1%7cnull
ILO/IEA	Risk assessment and solutions	Ergonomic checkpoints: Practical Solutions	2010	http://www.ilo.org/safework/info/instr/WCMS_178593/lang--en/index.htm
ILO	Simple risk assessment and solutions.	Ergonomic checkpoints: Agriculture	2012	http://www.ilo.org/global/publications/ilo-bookstore/order-online/books/WCMS_168042/lang--en/index.htm
ICOH/IEA	Best practices and solutions.	OHS developing countries	2009	http://www.icohweb.org/site/news-detail.asp?id=81
ISO/TR 12296	Standard	Patient handling	2012	http://www.iso.org/iso/catalogue_detail.htm?csnumber=51310
ISO 11228-1	Standard and risk assessment	Lifting and carrying	2021	https://www.iso.org/standard/26520.html
ISO 11228-2	Standard and risk assessment	Pushing and pulling	2007	https://www.iso.org/standard/26521.html
ISO 11228-3	Standard and risk assessment	Repetitive hand tasks	2007	https://www.iso.org/standard/26522.html
ISO 11226	Standard and risk assessment	Evaluation of static working postures	2000	https://www.iso.org/standard/25573.html
Australia SafeWork	Standard, risk assessment and solutions	Manual tasks	2016	http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/hazardous-manual-tasks-cop
Australia Union OHS Reps	Risk assessment and solutions.	Workstation checklist & other	2015	http://www.ohsrep.org.au/tool-kit/checklists/ergonomic-workstation-checklist

Country/ organization	Tool function	Brief description	Year	Website
Canada	Best practices	Fact sheets: many topics & tasks		https://www.ccohs.ca/oshanswers/ergonomics/
Canada: BC	Best practices	Computer workstations	2009	https://www.worksafebc.com/en/health-safety/hazards-exposures/ergonomics
Canada: Ontario	Best practices	Many topics & tasks (ladders, MMH, etc.)		https://www.labour.gov.on.ca/english/hs/topics/pains.php
China: Taiwan	Guideline	Ergonomic guide for prevention of MSDs (Chinese)	2015	
Finland	Best practices	Microscope work	2010	www.formatex.info/microscopy4/1533-1538.pdf
Germany DGUV	Best practices	General		http://www.dguv.de/ifa/fachinfos/ergonomie/index-2.jsp
Sweden	Guidelines	Forest machines	1999	https://www.skogforsk.se/english/products-and-events/other/ergonomic-guidelines-for-forest-machines/
US OSHA	Guidelines	Musculoskeletal disorders		https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Poultry processing	2013	https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Laboratory safety	2011	https://www.osha.gov/pls/publications/publication.searchresults?pSearch=ergonomics&pSearch=
US OSHA	Guidelines	Meatpacking	1993	https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Foundries	2012	https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Nursing homes	2003	https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Shipyards	2008	https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Retail grocery stores	2004	https://www.osha.gov/SLTC/ergonomics/
US OSHA	Guidelines	Computer workstation checklist		https://www.osha.gov/SLTC/etools/computerworkstations/checklist_evaluation.html
US OSHA	Best practices and solutions.	Success stories and solutions		https://www.osha.gov/SLTC/ergonomics/controlhazards.html
US NIOSH	Guidelines and solutions.	Manual material handling	2007	https://www.cdc.gov/niosh/docs/2007-131/default.html
US NIOSH	Guidelines	Retailers	2007	https://www.cdc.gov/niosh/docs/2015-100/default.html
US NIOSH	Guidelines	Shipyards		https://www.cdc.gov/niosh/topics/ergonomics/ergship/easyfix.html
US NIOSH	Risk assessment	Manual revised NIOSH lifting equation	2021	https://www.cdc.gov/niosh/docs/94-110/
UK HSE	Guidelines	General: Brief guide	2013	http://www.hse.gov.uk/pubns/ergonomics.htm

Country/ organization	Tool function	Brief description	Year	Website
UK HSE	Guidelines	Conveyer belt workstations	2012	http://www.hse.gov.uk/pubns/geis4.htm
UK HSE	Guidelines	Musculoskeletal disorders		http://www.hse.gov.uk/msd/index.htm
UK HSE	Risk assessment	Assessment repetitive task tool (ART)	2010	http://www.hse.gov.uk/msd/uld/art/index.htm
UK HSE	Risk assessment	Assessment tool: push & pull (RAPP)		https://www.hse.gov.uk/msd/mac/index.htm
UK HSE	Standard and best practices.	Lifting and handling aids		https://www.hse.gov.uk/msd/mac/index.htm
UK HSE	Standard and best practices.	Display screen equipment		https://www.hse.gov.uk/msd/mac/index.htm
UK HSE	Standard and best practices.	Manual handling tool (MAC)		https://www.hse.gov.uk/msd/mac/index.htm
UK HSE	Standard and best practices.	Pharmaceutical industry		https://www.hse.gov.uk/msd/mac/index.htm
Revised SI	Risk assessment	Distal upper limbs	1995	https://iea.cc/about/ergonomics-in-practice/tools-for-assessing-and-implementing-hfe-in-the-workplace
OCRA	Risk assessment	Upper limbs	1998	https://www.iea.cc/about/technical.php?id=51deaff9694f3#c3b
RULA	Risk assessment	Upper limbs	1993	https://www.iea.cc/about/technical.php?id=51deaff9694f3#c3b
QEC	Risk assessment	Back, arms, shoulders and legs	2008	https://www.iea.cc/about/technical.php?id=51deaff9694f3#c3b
OWAS	Risk assessment	Back, arms, shoulders and legs	1991	https://www.iea.cc/about/technical.php?id=51deaff9694f3#c3b

Chapter 6.
Workplace HFE and manual handling considerations for special populations

A core principle of human factors and ergonomics is to design the physical and cognitive demands of a task to optimize the balance between task demand and worker capacity. Sustained and repetitive exertions, awkward postures, mechanical stress from tools, and other exposures such as vibration impact overall physical demands on the worker. However, the capacity of different workers varies widely based on numerous factors such as sex, age, size, strength, fitness, ability level, and other characteristics that could impact their general emotional and physical health and thus their ability to perform work.

Additionally, some groups of people have different capacities than the "average" working population for which jobs are designed. Considering these subpopulations, or special populations, is critical as they collectively represent a large proportion of the work force. Because the general intent of HFE is to design for as many people in the working population as possible, understanding the capacity and needs of subpopulations of workers is a critical first step to designing the workplace, tools, task, and organizational factors that impact task demand. According to the Principles of Good Work Design from Australia, "workers have different needs and capabilities; good work design takes these into account.... by designing to accommodate them given the normal range of human cognitive, biomechanical and psychological characteristics of the work" (*Principles of Good Work Design*, n.d.).

6.1 Legislation concerning women and work

According to the World Bank, depending on the country, the ratio of female to male workers ranges from approximately about 26 to 31% in Middle East and North African countries to approximately 80 to 83% in North America and European countries. Overall, as the income of countries increases, so does the ratio of women to men in the workforce.

Different countries have legislation aimed at protecting women from excessive risk of injury due to handling peak loads. Many countries such as Chile, Japan, India, Mexico, and Thailand have different maximum weight limits for workers of differing sex and age. For example, in Mexico, the maximum lifted weight limit for men was lowered to 55lbs (25 kg) whereas the limits for women and legal underage youth are 22lbs (10kg) and 15 lbs (6.8kg), respectively. The Japanese Labor Standards Act also includes regulations for adolescent workers that limit lifting to 15kg (33lbs) for intermittent work and 10kg (22lbs) for consistent work. Article 211-J of the Chilean Labor Code limits the carrying, lifting, or pushing of loads to 20 kg (44lbs) for women and minors under the age of 18, which is 5 kg (11lbs) less than for men. Other countries such as the United States have recommended weight limits for all workers that are based on accommodating 75% of the female population. For example, the NIOSH Recommended Weight Lift Equation uses 51lbs (23 kg) as the maximum weight handled by men or women, which may go down

depending on the characteristics of the task such as the vertical and horizontal hand location of the lift and the frequency of the lift.

6.1.1 Pregnancy and early family child rearing

Women have the unique ability and responsibility for growing, birthing, and nursing babies who will eventually comprise our global workforce. Despite this, there is a critical lack of financial support and job protection in the way of family leave around the world, particularly in countries such as the United States. This means that women will stay at work longer throughout their pregnancy and return sooner after giving birth, requiring modifications of tasks demands, particularly physical demands. Applying human factors and ergonomic design principles provides critical guidance for support task modifications to accommodate the unique needs of these women.

In 38 countries, women can legally be fired for being pregnant. In contrast, more than 140 countries have programs to protect the employment of and financially support maternity leave with some (e.g., Finland, Sweden, Denmark) having paternity leave benefits as well. Still, many countries (110 out of 167) do not comply with Convention No. 183 of the ILO on duration of maternity leave, level of payment and source of funding (*Maternity and Paternity at Work – Law and Practice across the World*, n.d.). For example, the United States has no federally supported family leave program, causing many women to leave the workforce or immediately return to their job after giving birth to avoid being fired or losing their income. In 2021, the United States implemented the Pregnant Workers Fairness Act "to eliminate discrimination and promote women's health and economic security by ensuring reasonable workplace accommodations for workers whose ability to perform the functions of a job are limited by pregnancy, childbirth, or a related medical condition" (Nadler, 2021). This act requires reasonable accommodations for known limitations related to pregnancy, childbirth, or related medical conditions unless it produces undue hardship on the company. However, the Pregnancy Discrimination Act only applies to companies with 15 or more employees, excluding small enterprises. Therefore, many pregnant and post-partum women have no HFE accommodations made to their jobs to facilitate retention in the workforce. This is particularly hard on families that rely on women as their primary or only source of income.

▶ 6.2 Legislation concerning children, teenagers and young adults in the workplace

It has been estimated that in 2020, approximately one in ten children (160 million) worked and one in three of those that worked was out of school, a problem that perpetuates poverty and lack of security for the child. Further, the ILO estimates that 22,000 children are killed at work each year. Child labor is the exploitation of children in work that interferes with schooling and causes physical, mental, or social harm. Thus, many of the legislations for working youth have focused on work requirements that allow adequate time for education and prevent children from being employed in hazardous work.

Many teens and young adults work legally in non-hazardous jobs that do not interfere with or may even augment their education. People between the ages of 15 and 24 make up almost 21% of the world working age population. Teenagers and young adult workers typically have a higher injury frequency but lower severity than other workers.

6.2.1 Legislation addressing hazardous physical and manual handling work

Many countries have labour laws intended to protect young workers from harm and exploitation. For example in the US, the Fair Labor Standards Act (FLSA) of 1938 (29 U.S.C. Chapter 8 §201 et seq.) is designed to protect young workers' health and safety as well as their educational opportunities, particularly for those under 16 years of age. It places parameters around the allowable duration and time of work for children under the age of 16. It also includes provisions through the Secretary of Labor for restricted types of work (driving, handling heavy machinery, etc.). However, the FLSA only applies to businesses engaged in interstate commerce and triggers at a set amount of annual gross income; thus, many small businesses are not held to the same federal law but rather follow state laws that are typically less stringent. Further, there are less rigorous standards for agriculture, particularly for children who work for family farms [29 U.S.C. §213 (c); see also, 29 C.F.R. 570 (C)(3)]. Additionally, the FLSA has not been updated to match how work has changed; some of the restrictions are irrelevant and many hazards that did not exist or were not recognized earlier are not addressed in the current law.

6.2.2 Other legislation concerning children, teenagers and young adults in the workplace

Other US federal laws pertain to both adult and young workers such as the Occupational Safety and Health Act (29 U.S.C. Chapter 15 §651 et seq.). The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. §136) administered by the Environmental Protection Agency regulates the use and application of chemicals used in agriculture. However, even though youth may have adverse health outcomes with lower doses of exposure, this regulation does not differentiate exposure thresholds by age.

Some states use work permits as a way to educate children and parents on the restrictions for young workers. Washington State (WAC 296-125-020) requires permits for 16- and 17-year-old workers and uses the opportunity to provide educational pamphlets and enforce the hour and industry restrictions that protect young workers' welfare. The UK has detailed provisions around age of youth and hours, shift, and total weekly duration of work. These restrictions loosen once the child is 16 but are replaced by requirements for further education, apprenticeships, and training. The UK also has a work permit system to ensure that children are not working in certain hazardous jobs and are receiving adequate pay.

Other countries such as Australia have additional regulations on pay rate and allowable unpaid work. The "junior pay rate" allows young workers to receive a percentage of adult pay in some instances or prescribes different minimum wage rates for young adults. Unpaid work is only allowable when a trial of skills is necessary and must always include adult supervision. This is different from apprenticeships and traineeships, which include formal training, mentorship, and different pay rates. The UK Fair Work Ombudsman highlights some of the requirements for young workers in training, supervision, and communication, which are critical for protecting young workers and supporting their growth as safety-minded adult workers.

Ghana and Kenya have Acts specific to children (Children's Act of 2001- Kenya; Children's Act of 1998- Ghana) that are intended to protect workers under the age of 18 from economic exploitation, hazardous work, and educational interference. Despite substantial legislation being in place, legal enforcement remains an enormous challenge in some countries. For example, in Ghana 14.2% of children continue to work in known hazardous conditions. Adequate enforcement is also a problem in countries like the United States where migrant children have been found to work in extremely hazardous jobs at meat, swine, and poultry processing plants. Although enforcement may lead to fines and temporary cessation of illegal practices, enforcement resources are inadequate to completely eliminate dangerous and illegal employment for minors.

▶ 6.3 Legislation concerning aging workers

In many parts of the world, the workforce is aging. There are many benefits to employing older workers including knowledge retention, maturity, higher work accuracy, less turnover, higher dedication, and more positive work values with less absenteeism if these workers remain healthy and injury free. Although many studies have shown that older workers have fewer accidents and injuries relative to younger workers, when they do get injured, the severity is typically higher and, because of their age, they often take longer to heal. A well-designed workplace will reduce the chance that special accommodations are needed by older workers in addition to reducing risk to other workers. Retaining older workers is also critical to meeting gaps in workforce demands and the economic needs of national safety net systems such as social security, which require a favorable ratio of working to retired citizens.

Most legislation in the US has been focused on helping older workers acquire and keep jobs by making it illegal to discriminate against people due to their age. The first law, the Age Discrimination Employment Act (ADEA) of 1967, protects "certain applicants and employees 40 years of age and older from discrimination on the basis of age in hiring, promotion, discharge compensation or terms, conditions or privileges of employment." It treats age discrimination similarly to discrimination based on sex, race, religion, and national origin. The Protect Older Job Applicants Act of 2021 strengthens protection against age discrimination. This Act is critical since more than half of US workers may be pushed out of longtime jobs before they are ready or would choose to retire.

Other countries such as Australia (Age Discrimination Act of 2004), the UK (the Equality Act), Sweden (Swedish Employment Act of 1982; the Discrimination Act) and Brazil (Law No. 10, 741) have similar non-discrimination laws. Canada also has similar legislation to the US but has made greater effort to provide incentives for workers to stay in the workforce through investment in skills training and workplace accommodations to retain older workers. The Accessible Canada Act of 2019 made significant advances for aging workers and those with disabilities by proactively identifying, removing and preventing barriers through built environments. The "Enabling Accessibility Fund" provides financial support for community and work-based projects to facilitate retention of those with special needs due to age or disabilities. Further, the Office of Literacy and Essential Skills provides training to aging Canadians, among other underrepresented groups, to support their employment (https://social.un.org/ageing-working-group/documents/eleventh/Inputs%20MS/Canada%20-%20Right%20to%20Work.pdf).

The Madrid Plan of Action on Ageing adopted at the Second World Assembly on Ageing in April 2002 was promoted as the only international policy framework to focus on older people. To assess its implementation, the 2014 Active Ageing Index (AAI) was adapted and used as the toolkit to identify which needs of ageing workers a country is addressing well (or falling short) and why. One of the four domains assessed in the AAI is employment including the ability for older workers to be accommodated and the extent to which the country provides "age-friendly working conditions" that enable them to stay in the workforce longer. Some other approaches to retaining older workers include removing the power of employers to fire older workers at their eligible age of retirement (Argentina), providing special incentives to hire older workers (Brazil Bill No. 688/1999), and encouraging special employment agreements with workers over 60 to limit work shift duration to 4 hours per day (Brazil Bill 142/2017). One of the most broadly spread initiatives to increase inclusion of ageing workers is workforce health promotion for those over 65. A large initiative in the EU (EU-CHAFEA ProHealth65+) has been in place for some time but has garnered insufficient research on its impact in reducing absenteeism and presenteeism (present but not actively engaged) of older workers. The overall lack of legislation highlighting HFE-based accommodations in the workplace may be one reason that broad initiatives supporting older workers have had limited effectiveness.

▶ 6.4 Legislation concerning disabled workers

According to the World Health Organization, approximately 15% of the world population (1 billion people) experience some form of physical, cognitive, or emotional disability, of whom only 2-4% have significant challenges in functioning. Given the ageing population of the world, the number of people living with disabilities is expected to rise. People with disabilities – especially if they are older - often have a challenging time working due to lack of accommodations. They are more likely to be employed part time than people without disabilities. It is important to note that many people have disabilities from accidents or injuries at work; a study in the US found that 36% of people between 51 to 61 who were living with a disability were injured while working *(The Fraction of Disability Caused at Work*, n.d.).

Some countries (US, Australia, Canada, New Zealand) have anti-discrimination laws that make it illegal to discriminate against someone living with a disability while other countries embed anti-disability discrimination clauses into more general legislation (South Africa, Germany) or insert clauses into their constitution (Ghana). Most legislation requires employers to make accommodations to support employees with disabilities so long as it does not impose undue burden on the employer, a caveat that provides a loophole for employers and can be challenging to define. South Africa for example defines burden as an "unjustifiable hardship…that requires significant …difficulty or expense…and consider(s) the effectiveness of the accommodation and the extent to which it would seriously disrupt the operation of the business."

Affirmative action and quotas have been used by some countries to promote hiring of disabled workers. Germany has a 5% quota for employers with more than 20 employees, Türkiye has a 3% quota for employers with more than 50 workers, and South Africa has a 2% quota. Some countries such as China require a fee be paid to the national disability security fund that supports training and job placement for persons with a disability if a quota is not met. Incentives are used in some countries as a way to entice employers to hire workers with disabilities. In Australia, funds are available for employers who implement workplace modifications for those with disabilities. Tax incentives may also be used to entice employment relationships as can programs that provide advice and support for appropriate accommodations.

▶ 6.5 Legislation concerning migrant workers

About 4% of the total population 15 years and older are immigrants who left their home in search of work due to economic hardship. Nearly half of transnational migrant workers are employed in the US and Europe with another third working in Arab states. The number of immigrant workers is expected to grow, particularly as climate change increases the occurrence of natural disasters that threaten food security and work opportunities throughout the world. In the US alone, there were 26.3 million migrant workers in 2015 comprising 16.7% of its workforce; the immigrant workforce in the US is expected to be twice as large as the native born workforce by 2060 (Moyce & Schenker, 2018).

Many countries have legislation to protect migrant workers; however, without enforcement of such legislation, migrant workers continue to be at high risk of injury and death due to their work. For example, the US Migrant and Seasonal Agricultural Worker Protection Act (MSPA) establishes employment standards related to wages, housing, transportation, disclosures, and record keeping and applies to migrant as well as national workers. However, there is not enough enforcement of the MSPA. A similar problem has been highlighted in the UK, where one report states that "the main reason that many migrant workers face increased risks to their health, safety and welfare is simply the lack of adequate enforcement of existing regulations" (https://www.tuc.org.uk/sites/default/files/extras/safetymw.pdf). The most effective ways to safeguard migrant workers include having worker protection regulations that include migrant workers, temporary work visas, and education programs about migrant worker rights. Labor advocate groups can be extremely effective in communicating workers' rights and advocating for workers in need of protection.

Other parts of the world lack both regulations and enforcement of standards that could protect migrant workers. The Arab states have recently been highlighted for their lack of leadership and oversight in requiring employers to provide basic human dignities for migrant workers - who are currently housed in "labor camps" that include overcrowding, lack of hygiene, and virtually no requirements around worker safety. The Fair Migration Agenda was recognized by the Arab States in the Kuwait Declaration, yet both regulations and their enforcement are still lacking.

▶ 6.6 Legislation concerning gig and other informal workers

The growth of non-traditional employment and the gig economy is primarily due to employers' desire to optimize financial gains through just-in-time employment, while minimizing the costs associated with worker benefits and management. The label "non-traditional employment" is broad but collectively includes workers who perform the same work as their traditional worker counterparts, but with a lack of job security, a different relationship to the firm for whom the work is done, a paucity of benefits, and the blurring of work and personal time. Non-traditional work arrangements reduce costs associated with salary and wages, benefits, and safety risks, by shifting these costs to workers, their families, and ultimately taxpayers who will need to build larger safety nets for the rising number of people with precarious work arrangements.

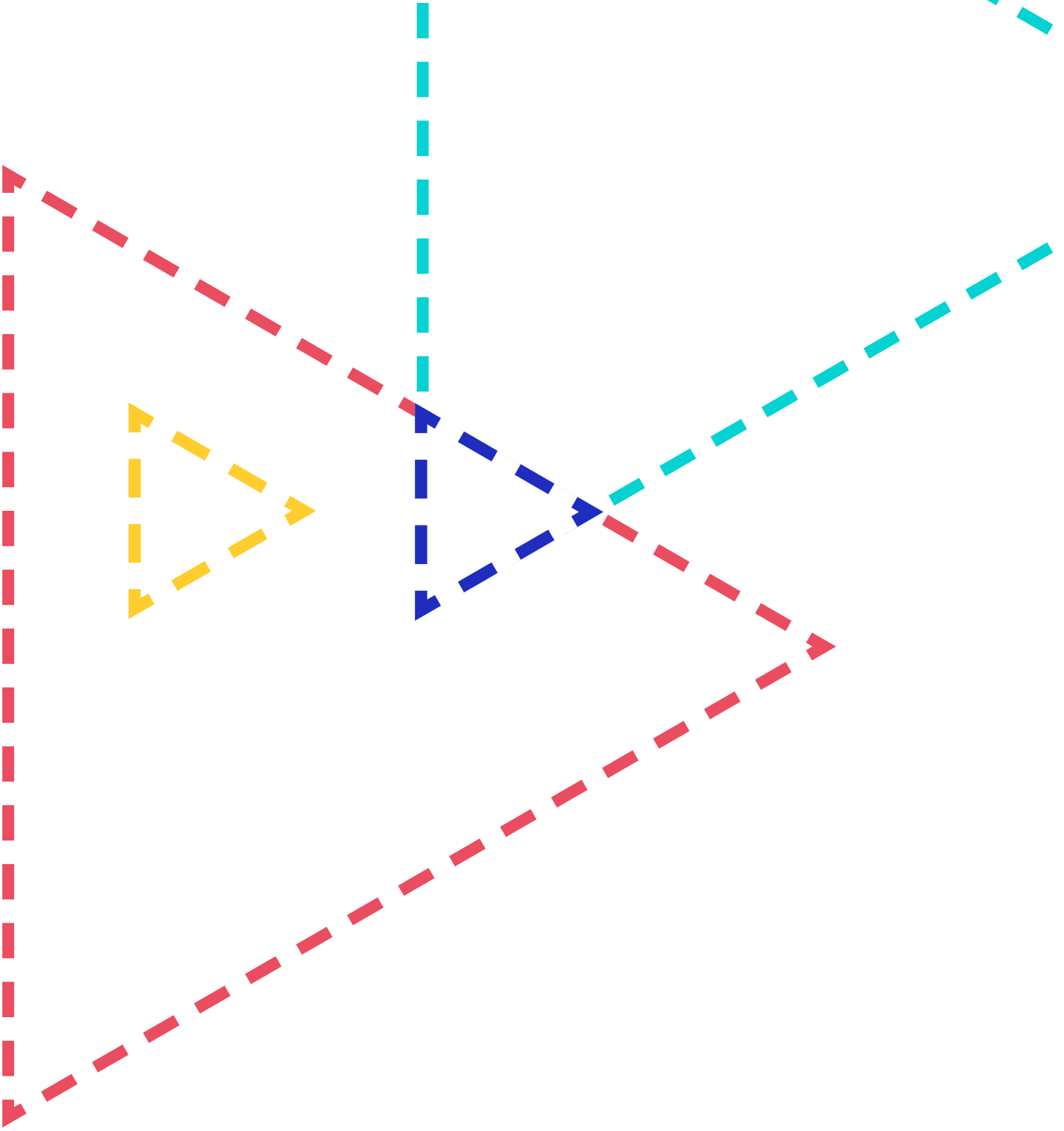
The gig economy is growing rapidly. The various arrangements of the relationship of the gig worker to the firm include: *1)* independent contractors, consultants or free-lance workers who often are self-employed; *2)* on-call workers, who are called to work only when needed; *3)* temporary workers, who typically are paid by an agency and provided to employers as needed; *4)* subcontractors, who provide workers to a customer, where the worker is often working at one customer's worksite on a regular basis; and *5)* "gig" or "platform" workers, who are treated as independent contractors who provide on-demand services using technology apps. Workers in non-traditional arrangements are not limited to those in low paying occupations, but the commonality in the various work arrangements is the diffusion of responsibility for the workers' welfare which may result in large differences in the occupational health and safety risks, stresses, and behavioral characteristics that impact worker overall well-being. The adverse impact of the gig economy is more pronounced for workers in vulnerable positions.

In California of the United States, the rights of gig workers have been a topic of intense debate. In 2019, California legislators passed a landmark bill (AB5) requiring companies such as ride and delivery services to treat their gig workers, currently classified as independent contractors, as employees. The legislation required that workers be designated as employees if the employer has any control over how they perform their tasks or if the work is part of the company's regular business. However, large tech companies like Lyft and Uber invested over 200 million dollars into a successful ballot measure that allows their drivers to be classified as independent contractors, although the ballot measure is currently being challenged as unconstitutional for numerous reasons related to workers' compensation and the blockage of unionization. Other countries like Australia exhibit similar legislative ambiguity about gig work. For example, in Australia the Fair Work Act of 2009 does not apply to gig workers. In contrast, in 2021 the UK Supreme Court ruled that Uber drivers in the UK were in fact employees and not independent contractors. Gig workers there are entitled to receive the same benefits – and protections—that all workers receive.

Africa is home to the largest percentage of gig workers globally. The informal sector makes up the largest sector of the economy in many countries of the developing world and traditionally includes work with a high level of manual handling and, consequently, WMSD risk. This is particularly the case with agricultural workers, street market workers, and domestic workers. These types of workers are often not even included in the national statistics as they are not "employed" in a typical contract situation or their type of employment is specifically excluded from the national laws (e.g. domestic employment). Most of these workers are self-employed or work on very short term, largely informal contracts as is the case with agricultural labourers. They may be organised into collectives but training in hazard reduction is rarely prioritised.

Despite the concerns around gig work, legislation and oversight are lacking due to the focus on job creation to meet the needs of a growing population. It has been suggested that financial institutions and investors will play a crucial role in guiding the gig economy to one that relies on bridge companies that can be more easily regulated. The future of work is evolving rapidly, and the growth of non-traditional workers is increasing in a way that could have substantial impacts on the health, safety and well-being of workers worldwide.

In summary, there are many different groups of people that make up special populations of workers that require consideration in terms of HFE-specific as well as OSH legislation. Appendix 1 defines characteristics of special populations that should be considered for HFE and manual handling in the workplace. It should also be noted that most workers will be part of a special population of workers at some point in their productive work life, whether by age, gender, pregnancy, or living with a disability. Thus, companies should prioritize universal design, accommodations, and job modifications to support their workforce in order to optimize diversity, productivity, and the long-term wellbeing of their workers.



Chapter 7.
Other legislation and documents relevant to HFE and manual handling

ILO has created several legislative instruments relevant to HFE. Some are directly related to HFE and manual handling but need updating and refining, such as the Maximum Weight Convention, 1967 (No. 127) and its accompanying Recommendation (No. 128). The ILO Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148) and its accompanying Recommendation (No. 156) address the environment of work. The ILO also produces codes of practice, guidance documents, and training manuals to address overall safety and health and specific risks including workplace ergonomics, teleworking, and psychosocial factors. More detailed information on ILO's instruments relevant to occupational safety and health and HFE is given in Appendix 2.

Some aspects of the workplace are relevant to HFE but are not specifically discussed in this report, such as violence in the workplace, sexual harassment, or gender equity. These are addressed in other ILO documents including the Occupational Safety and Health Convention, 1981 (No. 155) and its accompanying Recommendation (No. 164) , the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) and its accompanying Recommendation (No. 197), OSH Conventions for specific categories of risk factors, industry sectors and workers, the Violence and Harassment Convention, 2019 (No. 190) and its accompanying Recommendation (No. 206), International Labour Standards on working time such as: Hours of Work (Industry) Convention, 1919 (No. 1), Hours of Work (Commerce and Offices) Convention, 1930 (No. 30), Forty-Hour Week Convention, 1935 (No. 47), Reduction of Hours of Work Recommendation, 1962 (No. 116), Weekly Rest (Industry) Convention, 1921 (No. 14), Weekly Rest (Commerce and Offices) Convention, 1957 (No. 106), Holidays with Pay Convention (Revised), 1970 (No. 132), Night Work Convention, 1990 (No. 171), Part-Time Work Convention, 1994 (No. 175). It will be important that the planned ILO Convention and Recommendations on HFE and manual handling in the workplace are consistent with these related conventions.

At the national level, some countries have HFE-related laws, standards and guidelines targeting certain aspects of the work environment and work tools. Some instruments are industry-specific or apply to particular populations or types of work. Table 4 provides a summary of the relevant legislation and standards by country and region collected for the report.

▶ Table 4. HFE-relevant legislation and standards by country and region

	Factories	Dock workers/Cargo handling	Mining/Foundries	Construction work/Work at height	Oil & gas	Transportation/Aviation/Rail/Military	Agriculture	Food processing/Slaughterhouses	Welding/Metalwork	Service industry (eg., housekeepers)	Retail (eg., grocery)	Telework/Remote work	Noise	Lighting/Vision / Eye protection	Personal protective equipment	Disability/Illness (See also Ch. 6)
Australia						✓										
Australia: Victoria														✓		
Austria (EU directives)															✓	
Belgium (EU directives)															✓	
Brazil				✓			✓	✓					✓	✓		
Canada: Newfoundland and Labrador, Quebec, Saskatchewan														✓		
Chile			✓									✓				
China														✓		
China: Hong Kong	✓			✓									✓	✓		
China: Taiwan						✓								✓		
Czech Republic						✓								✓		
Denmark (EU directives)													✓	✓	✓	
Finland (EU directives)												✓		✓	✓	
France (EU directives)															✓	
Germany (EU directives)													✓		✓	
Greece (EU directives)															✓	
Hungary (EU directives)															✓	
Iceland (EU directives)																✓
India	✓	✓	✓	✓										✓	✓	
Indonesia			✓	✓	✓	✓									✓	
Ireland (EU directives)															✓	
Italy (EU directives)													✓	✓	✓	

	Factories	Dock workers/Cargo handling	Mining/Foundries	Construction work/Work at height	Oil & gas	Transportation/Aviation/Rail/Military	Agriculture	Food processing/Slaughterhouses	Welding/Metalwork	Service industry (eg., housekeepers)	Retail (eg., grocery)	Telework/Remote work	Noise	Lighting/Vision / Eye protection	Personal protective equipment	Disability/Illness (See also Ch. 6)
Japan		✓		✓		✓						✓				
Mexico									✓					✓		✓
Netherlands (EU directives)															✓	
Norway																✓
Peru		✓	✓			✓								✓	✓	
Poland															✓	
Portugal (EU directives)															✓	
Serbia		✓		✓			✓						✓		✓	✓
South Africa																✓
Spain (EU directives)															✓	
Sweden (EU directives)															✓	
Switzerland															✓	
Thailand													✓			
Türkiye												✓				
US: New Hampshire														✓		

Additionally, relevant standards to HFE and manual handling in the workplace developed by the ISO include:

- ISO 7726:
  1998 Ergonomics of the thermal environment – Instruments for measuring physical quantities
- ISO 7731:
  2003 Ergonomics – Danger signals for public and work areas – Auditory danger signals
- ISO 11399:
  1995 Ergonomics of the thermal environment – Principles and application of relevant International Standards
- ISO 11428:
  1996 Ergonomics – Visual danger signals – General requirements, design and testing
- ISO 11429:
  1996 Ergonomics – System of auditory and visual danger and information signals
- ISO 13731:
  2001 Ergonomics of the thermal environment – Vocabulary and symbols
- ISO 10075-2:
  1996 Ergonomic principles related to mental workload – Part 2: Design principles
- ISO 11064:
  2000 Ergonomic design of control centers – Parts 1–3
- ISO/TR 16982:
  2002 Ergonomics of human-system interaction – Usability methods supporting human-centered design.

Chapter 8. Administration and enforcement of national legislation

8.1 Competent authorities and inter-institutional coordination

Occupational safety and health regulations and guidelines are implemented within a regulatory system that gives roles to players such as employers and employees, but there must also be some form of enforcement system. This system comprises all the structures that are established by lawmakers to ensure that people comply with the laws and regulations once they become law.

At a minimum level, there may be some form of private redress. Generally, this takes the form of monetary compensation from the employer to any employee who has suffered an injury or ill health because of negligence of the employer. Such systems are reactive and require an injury to be incurred before any redress is possible. They also generally require the injured person to prove that the employer did not fulfil his or her duty of care. In some countries, notably the USA, the private redress systems run parallel to a government enforcement system. Depending on the practices of the courts, private redress systems may impose much heavier financial loads on employers than are typical for government enforcement systems; however such processes are cumbersome, expensive, and often only available in specific cases, leaving others with little chance of success. Cases where employers have been found to have neglected their duty of care and were forced to pay very large compensation payouts tend to receive publicity, which may positively impact on industry practices.

Aside from the direct financial implications, damage to an employer's reputation can also have significant indirect financial consequences. To protect themselves against financial loss, employers in high-risk industries may take out insurance against such duty of care claims and the cost may be a significant part of the operating budget. In these cases, the insurance companies may impose obligations in terms of safe work practices and they may have some system of inspection and enforcement. The influence of insurance systems will be discussed further in another section of this chapter.

Where there are statutory occupational safety and health laws, there is generally some form of government enforcement system. This typically includes inspectors who have the right to inspect the premises of employers, although access may be limited to by appointment or after an injury has been reported. Ideally, this right would be possible without any trigger event, such that the inspectors could work proactively to prevent dangerous situations and any risks to health. Traditionally, inspectors visit workplaces according to their own strategies and make site inspections. Some countries, notably within the European Union, oblige the inspectors to consult with both employer and employee representatives during such visits. This type of inspection results in a report that lists any observed departures from the legal requirements, what is needed to be done, and a time limit for compliance. The inspectors may issue fines or instigate other legal processes to force compliance.

In some countries, such as Switzerland, inspection systems do not rely on the observational skills of the labour inspectors but require companies to provide documentation proving that occupational safety and health is part of their management system. In this case, the worksite inspections are more like quality control audits, raising awareness and ensuring that the company has consulted the appropriate experts to design their safety and health systems.

There are many different models for organizing labour inspection across the world. Some inspectors are employed regionally, with a high degree of autonomy in their work, and some have other responsibilities apart from compliance checking of occupational safety and health laws. Others are employed by large occupational safety and health advisory bodies, which may have inspectors specialized in specific risks or industries. Generally, labour inspectors do not randomly choose the companies that they visit but concentrate their efforts on specific risks. They may use national statistics as a guide for setting their strategy. Often these come from the workers' compensation insurers.

Many countries have national organizations that were established by law to provide compensation as well as to recommend and promote prevention activities. This is sometimes coupled to rehabilitation services, as in Germany. Although close collaboration between labour inspectors and insurance companies is desirable for developing risk-related prevention strategies, a separation of executive and insurance functions has the advantage that insurance companies are not placed in the position of being both consultant and inspector of their own clients. Such situations may result in poor policing of the laws.

8.1.1 Research and prevention agencies

The National Institute of Occupational Safety and Health (NIOSH) in the USA is an example of an organization specifically mandated to conduct research and recommend harm prevention practices. NIOSH lifting recommendations are used over much of the world. NIOSH is separate from the Occupational Safety and Health Administration (OSHA), which creates and enforces regulations. OSHA has the power under the law to levy fines and take serious violators of their standards to court, whereas NIOSH does not. Like OSHA, the Health and Safety Executive of the United Kingdom (HSE) is mandated to be the national authority for enforcement and regulation; however, it also conducts research and provides advice on prevention practices. The French National Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (IRNS), on the other hand, was set up under the auspices of the National Health Insurance Fund to undertake research and promote occupational safety and health, as well as to train prevention technicians. It has no role in enforcement.

Within the European Union several countries, e.g., the Netherlands, Spain and others, have tried to make the consultation of HFE professionals a mandatory part of required contacts with professional occupational safety and health services. However, the success of this method of control has been limited in practice. One reason is that the legally defined qualifications for the HFE professional may be quite limited and not in accordance with IEA recommendations. Another issue is that there is a very poor link between the activities of the labour inspectors and the activities of the occupational safety and healthy services, which tend to be external to the companies and often not included in inspection activities. Even where there is communication between the occupational health services and the labour inspectors, there is a potential conflict of interest for the service providers, in that the employers pay for their services.

▶ 8.2 Limitations due to lack of enforcement

Enforcement systems may be limited by many factors but the most common are imprecise legal formulation and limitations related to the labour inspectors, either in terms of training, numbers, or powers.

Many countries have provisions that require workplaces to be "ergonomic;" however, this term is problematic from the point of view of HFE professionals, in particular because it often implies a limited perspective of HFE. Using the IEA definition of HFE, such provisions should require employers to analyze the interactions between humans and all elements of the work system to optimize human well-being and overall system performance. Clearly that goes beyond what most regulators intended when using the term. Even if the term is used to refer specically to an outcome of no harm to people, it is very unlikely that enforcement authorities would require any company to undertake an analysis of their working systems before any injuries or illness became apparent. Generally, HFE analyses are only required by inspectors if health problems have already been reported or if the inspector has been trained to check for common risks related to the HFE design of workplaces. In practice this is confined to the most common "misfits" between humans and their workplace systems. Very few labour inspectors have training in HFE, but many are trained to recognize manual handling risks related to excessive load, and some may be able to identify risks related to repetitive work or anthropometric issues such as poor workbench height. In some countries, inspectors may only require the redesign of a work system to reduce the load on the workers, leaving the company to decide exactly how they will achieve the goal. However, it is much more common for inspectors to prescribe a specific solution, according to their own experience. This may not result in the optimal solution from a HFE point of view.

The ILO has produced guidelines for labour inspection services. These cover aspects to ensure that the inspectors are unbiased in their work and also provide recommendations on the number of inspectors per worker. Compliance with laws depends on cultural factors but also on the likelihood of incurring a sanction, and this depends, in turn, on the likelihood of being inspected. If companies do not expect to be inspected, compliance with laws may be low. Sanctions that can be imposed according to occupational safety and health laws vary widely and their effect on compliance also varies according to regional cultures. Generally, the cost of non-compliance with the law must be sufficiently high to be discouraging, although in some countries and industries, the threat of loss of reputation may be more effective as a deterrent than the size of the financial fine. It is therefore necessary for the lawmakers to consider the industry and the culture when setting appropriate sanctions. For example, sanctions against working time infringements may prove to be ineffective, as labour costs in many countries and industries dwarf the size of the legally permissible sanction and make non-compliance cost effective for employers. To be effective, sanctions must make business sense.

Returning to the topic of the formulation of the law, there is ambiguity for lawmakers in terms of how general prescribed prevention measures should be. Lawmakers may opt for general provisions that can be made more precise by standards and guidelines that do not require the cumbersome process of legislation and can be adapted to changing needs. Manual handling is often dealt with in this way, with general laws prohibiting excessive physical overload or overuse, whereas load limits are set in standards. One issue here is that load limits can be easily measured, whereas other risks cannot. It is much easier for a labour inspector to ascertain that a load limit has been exceeded than that the lifting is being done in an excessively awkward posture. Labour inspectors may be unwilling to engage in a dispute with an employer based on what is perceived to be a largely subjective evaluation. Worker perceptions of muscle fatigue, a precurser to MSDs, have been shown to be unreliable indicators of overuse and psychosocial factors that impact on musculoskeletal risks such as stress and harassment cannot be ascertained by visual methods or quick measurements. It is probably for this reason that work environment psychosocial risks, that is, risks inherent in the design of the work organization, including the social contacts between people that may lead to anxiety or depression as well as musculoskeletal disorders, are only rarely included in occupational safety and health laws.

The field of HFE includes other factors that impact MSDs and other negative outcomes, such as perception, which is relevant to instrument design and lighting issues, and cognitive factors such as learning and problem solving. Some of these aspects may be found in legal frameworks, but enforcement is difficult for the same reason as described above: these factors are difficult to measure in the field and often poorly understood by inspectors. Determining underlying reasons for human error, such as understanding why people choose to ignore lifting guidelines, is also part of the HFE discipline. Requirements to conduct these expanded types of HFE analysis are not found in laws and therefore cannot be enforced.

In conclusion, even where there is a general agreement on the benefits of labour inspection to ensure compliance with legislation, the real impact of labour inspectors has often been limited, especially among vulnerable or hard-to-reach groups and in the large informal economy. Hard-to-reach groups, for example, include those with no fixed workplace, or no fixed employer. The self-employed may be particularly at risk as they generally have little or no training related to MSD, injury, or accident prevention. The recent increase in the gig economy is particularly problematic in this regard.

▶ 8.3 Status of reporting systems for occupational injuries and diseases

Acquiring statistics on occupational disorders is very useful as a steering mechanism for prevention and enforcement practices. Occupation safety and health statistics can be divided into two categories: 1) statistics on the frequency of risks and 2) statistics on the frequency of health outcomes. Very few countries have national surveys on exposure to risk but some, for example France and Switzerland, have national health surveys that include questions on common occupational risks. The European Foundation for the Improvement of Living and Working Conditions (EUROFOUND), an agency of the European Union, has carried out surveys of working conditions including safety and health risks since 1990 in all countries of the European Union. Several countries from outside the EU have participated at their own expense. This survey provides information on several well-accepted risk factors for musculoskeletal disorders as well as conditions that are known to influence the risk, such as stress and vibration. It permits cross-country comparisons as well as frequency comparisons among different risks. Manual handling, including repetitive manual tasks, is among the most frequently reported occupational health risks.

Most countries rely on outcome statistics, generally obtained from workers' compensation insurers. As many musculoskeletal disorders are slow to develop, outcome statistics will underreport the problem because people may leave the workforce or change jobs before the effects become apparent. In particular in countries where workers' compensation is not compulsory or confined to the formal sector, the statistics will not reflect the true level of the risks to health related to manual handling in the country. Manual handling tasks are particularly common in the informal work sector.

Notably, workers' compensation insurance statistics are the only source of data on occupational risks in many countries, despite being somewhat biased by what is defined as an occupational disease or injury under their rules. Many countries have a list of occupational diseases but the diseases on the lists vary from country to country. If a disease is listed, it is easier for the worker to obtain work-related compensation than if it is not listed. In many countries there are laws that define occupational disease and injury for workers' compensation insurers so that insurance coverage does not vary by company. This of course helps to standardize the statistics within a country; however, WMSDs are not always recognized as occupational diseases in terms of the compensation laws. Switzerland, for example, defines occupational diseases as disorders that are caused predominantly by work. The rule of thumb is that over 70% of diagnosed cases must be work-related. As many MSDs may be caused by non-work factors, claims for degenerative disorders exacerbated by poor working conditions tend not to be accepted by insurers and are therefore under-reported in the statistics. In other countries, particularly where national health insurance systems are robust, disorders may not be reported to workers' compensation insurers at all, particularly if they do not result in long periods of lost time or threaten employment.

Some countries, for instance Sweden, require employers to notify the inspection authorities of any accident or other harmful influence at work that has caused death or severe injury or affected several employees simultaneously. Such a system of compulsory reporting relies, of course, on the conscientiousness of employers and may be unreliable, depending on culture and industry practice.

▶ 8.4 Compensation schemes for occupational injuries and diseases due to adverse HFE factors

In most developed countries workers' compensation insurance is compulsory in all sectors. Generally, this insurance is intended to ensure that injured or ill workers are not financially disadvantaged by health issues arising from their work. Insurers may take over medical and rehabilitation costs of injured workers and provide recompense of wages to employers during periods of unfitness for work. Most compensation systems have provisions that at least to some extent financially protect people who are dependent on workers who lose their lives or become unable to continue employment. In exceptional cases, insurers may provide some lump sum benefit for loss of function. General damage for pain and suffering and punitive damages for employer negligence are generally not available in workers' compensation systems, and negligence is generally not an issue in cases. In some countries such as the US, a claim on workers' compensation insurance may in fact preclude any further rights to private negligence claims against the employer.

In terms of their role in prevention, workers' compensation insurers vary widely between nations. Another complexity is the legal threshold for obtaining compensation. The requirements vary from country to country and state to state. Permissive thresholds use language such as "cause, aggravate, or precipitate" where even if work contributed a small component (e.g., 1%) to an injury or illness, compensation will be approved. More restrictive thresholds require work to be the primary cause of the disorder having contributed more than 50% to its cause. Adjustment of insurance premiums according to risk affords the possibility to compel companies to improve their prevention activities.

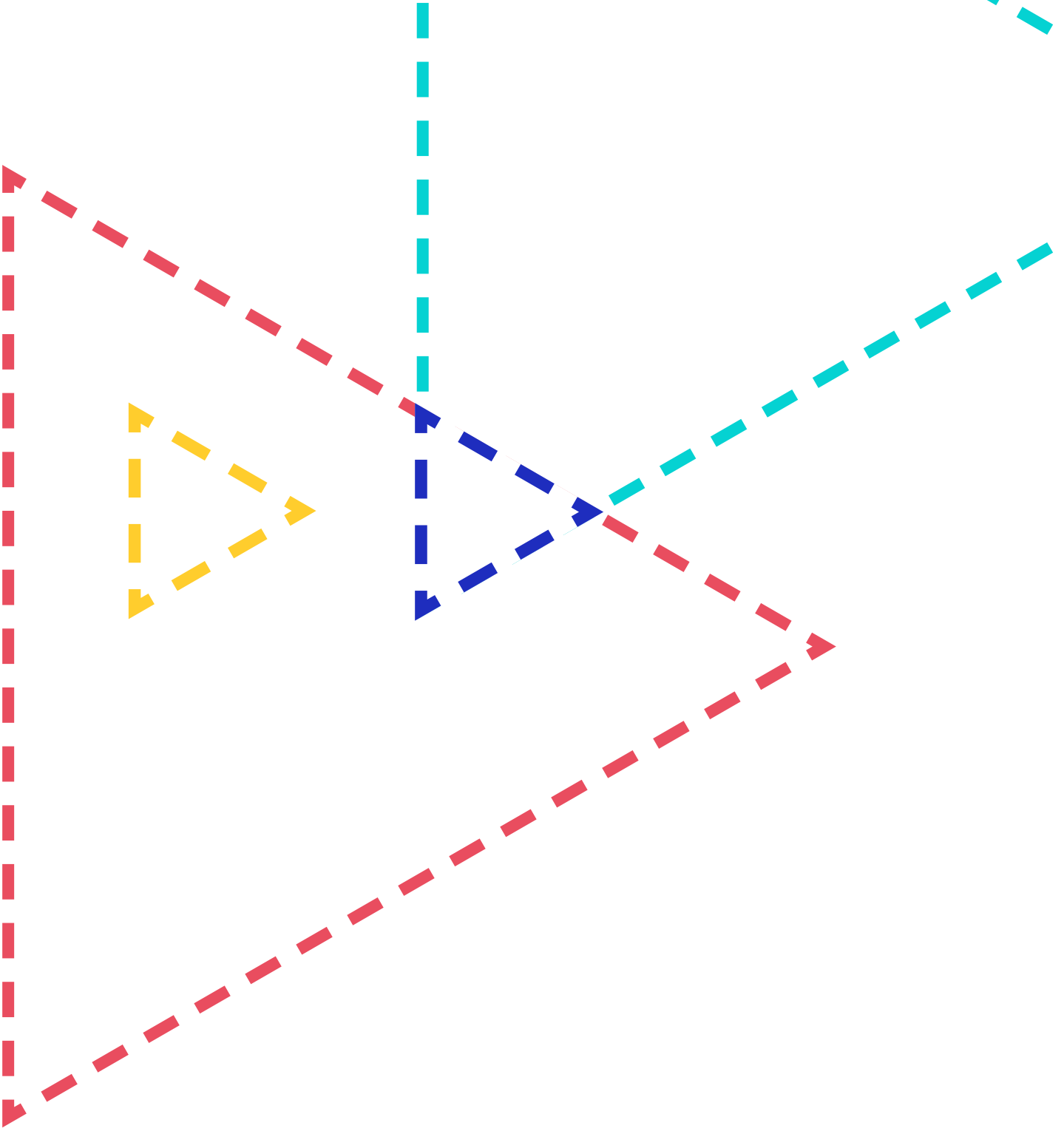
▶ 8.5 Workers' and employers' participation in workplace HFE through collective agreements

Collective bargaining agreements between unions and employer associations may contain provisions on occupational safety and health aspects. Worker participation is a general principle of HFE. Evidence shows that worker involvement in the decision-making process increases the quality of decisions as well as compliance with them. Collective bargaining agreements sometimes transfer into laws that are binding on all.

Some countries require participation of workers in the development and enforcement of laws. Within the countries of the European Union workers' participation in the management of occupational safety and health is an obligation resulting from legal requirements (European Occupational Safety and Health Framework Directive). The principles of this Directive have been incorporated into the national legislation of all EU member states. This obligation was expected to increase awareness of occupational safety and health issues as well as enhance the employees' commitment to safety and health, which will help to:

- reduce accidents and ill health and the associated costs,
- develop a positive safety and health culture,
- increase job satisfaction, and
- increase quality and productivity at the workplace.

In 2017 a comprehensive evaluation of the impact of this law was undertaken, but due to the differences between the different states in how the law was implemented and various other changes that had taken place in the working world during the years since 1989 when it was introduced, no conclusions can be drawn on whether the aims were achieved.



Chapter 9.
Practice of workplace HFE and manual handling

When creating legislation for HFE and manual handling in the workplace, it is important to consider how HFE principles and practices should be incorporated into all phases of the work design process. This chapter identifies best practices for optimal HFE related to work characteristics and environments. The overall goal of HFE in work system design is to reduce human injuries, illnesses, and suffering, and achieving this should result in decreased employee turnover, absenteeism, and workers' compensation costs, and increased work productivity and quality as well as higher worker morale. Best practices are described for the cyclical, iterative design of work characteristics and environments, training, rehabilitation and return to work while identifying potential occupational injuries, accidents, and work-related diseases associated with poor design. Interactions with other OSH factors are also discussed.

9.1 Working practices and working conditions

This section presents best practices for integrating HFE principles into iterative design cycles and management systems to ensure the development of occupational tasks with optimal work characteristics and environments that enhance the physical and psychological wellbeing of workers while also enhancing the productivity and quality of organizations.

9.1.1 Design cycle best practices

The following are important HFE aspects that should be incorporated into work characteristics and environment design cycles:

- Use a systems approach that holistically accounts for all physical, social, psychological, cognitive, economic, socio-political, cultural, and organizational aspects of the work characteristics and environment.
- Take a proactive approach to designing work tasks, systems, and environments.
  - Design work characteristics and environments optimally with the first design iteration that is operationalized, so that workers do not suffer any consequences of poor initial designs. This can extend to the design of products that are being manufactured or processed as poor product design may precipitate poor work designs.
  - Identify and address early symptoms of injury or psychological harm to workers so that poor initial designs that are operationalized can be flagged and corrected before workers suffer more serious harm.
  - Establish best practices and lessons learned from previous design flaws to facilitate more effective future proactive designs and ensure continuous improvement.

- Use an iterative approach to the design of work characteristics and environments.
  - Understand the people in the workplace and the system within which they interact.
  - Gather information to understand the goals of a new workplace design.
  - Create effective solutions for work characteristics and environments that meet all HFE goals, while simultaneously meeting production and quality standards.
  - Design options should follow a hierarchy of priorities for controlling physical and psychological hazards. Once a potential hazard is identified, the priority for solutions should occur in the following order, acknowledging that the most effective solutions have the highest priorities but are often the most difficult to implement.
    1) Elimination: remove the hazard from the design.
    2) Substitution: develop a design that replaces the hazard with a solution that is less hazardous.
    3) Engineering Controls: isolate workers from the hazard.
    4) Administrative Controls: change the way workers perform a task through training and reinforcement.
    5) Personal Protective Equipment: protect the worker from the hazard.
  - Perform quantitative assessments to evaluate and validate each proposed design solution.
    1) This should be done proactively, with simulated workplace designs, so that design parameters can be optimized before actual operationalization.
    2) Simulated work designs can be created and evaluated virtually using computer-aided design (CAD)/computer-aided manufacturing (CAM), or digital human models and/or with physical mock-ups.
    3) Assessments should be performed using a full range of HFE tools including those quantitatively and/or qualitatively evaluating biomechanical loading (e.g., lumbar compression force, joint strength demands), posture (e.g., joint angles, segment orientations), physiological demands (e.g., metabolic cost, local muscle fatigue), psychophysical thresholds (e.g., maximum acceptable loads), psychosocial demands (e.g., perceptions of work pace, freedom, control and influence over work, social interactions, access to development, fulfillment and satisfaction at work, role clarity and conflicts, behavioural, somatic and cognitive stress, and cognitive, emotional, sensory, and responsibility demands at work).
  - Once the design is in operation, continually repeat the iterative design cycle by first understanding the effects of the solution on the people and system(s), then exploring and developing more effective solutions.
    1) Continue to monitor and improve the HFE conditions throughout the lifecycle of the work characteristics and environment.
    2) Re-assess the work system and environment with the same quantitative and qualitative analysis tools used to validate the initial design.
- Provide sufficient resources and personnel to ensure workers' wellbeing while optimizing their performance and productivity.
- Solicit feedback from all stakeholders during every step of the design process.
  - Employ participatory ergonomics during all stages of the design cycle, especially when introducing new technologies.
  - When designing proactively, solicit worker feedback on prototypes of work characteristics and environments before they are implemented permanently.

9.1.2 Work characteristics and environment design best practices

The following are guidelines to ensure optimal HFE physical, cognitive/psychological, and social factors in the design of work systems and environments:

Posture

- Allow for joint postures to be as neutral as possible throughout task motions, especially for joints with the largest strength demands.
  - Avoid extreme joint rotations, especially twisting.
  - Avoid work above the shoulders.
  - Avoid non-neutral postures for long durations (e.g., computer workstations).
  - Ensure that heavier loads are handled close to knuckle height to the greatest extent possible.
  - Consider the full range of anthropometries that will perform the task(s).

Force

- Control muscle strength demands to be within the limits of the target populations (e.g., 75% of females capable).
  - Reduce the magnitude of gravitational loads and applied forces to the maximum degree possible.
  - Keep the lines of action of gravitational loads and applied forces close to the joints with the largest demands.
  - Provide lifting aids and lift assist devices where possible.
- Control passive tissue force demands (e.g., lumbar intervertebral disc compression force, tendon loads, etc.) so they are within recommended threshold limit values (TLVs) established through the scientific literature.
- Provide transportation devices where possible (e.g., carts, conveyors etc.).
- When carts are transported manually, allow for pushing versus pulling when possible.
  - Wheels should be appropriate for the surface and maintained regularly.
- Provide workers with the proper power tools instead of manual tools where possible.
  - Ensure regular maintenance of hand tools.
  - Isolate the hands and arms from vibration to the greatest extent possible.
- Control the magnitude and duration of whole-body vibration.

Repetition and duration

- Control frequencies and duty cycles such that muscles and passive tissues are provided with enough time to recover sufficiently.
- Provide daily, weekly, and seasonal work schedules that facilitate adequate sleep and physical and cognitive fatigue recovery.
- Allow workers to have some control over how daily and weekly workloads are distributed.

Cognitive workload

- Present information and data in a way that is consistent with human processing capabilities.
- Provide several options when presenting information and highlight the most important information.
- Use intuitive design where possible (e.g., red for stop, green for go).
- Provide sufficient training on novel tasks and/or when introducing new technology.

- Provide sufficient feedback on performance and errors.
- Control behavioural, somatic, and cognitive stress to acceptable levels.
- Maintain cognitive, emotional, sensory, and responsibility demands to acceptable levels.

Psychological risk factors

- Ensure a good match between workers' cognitive, emotional, and interpersonal competencies and the tasks they are assigned to.
- Ensure that human factors and ergonomics guidelines are maintained for remote and off-site work.

Worker characteristics

- Design for a large range of physical and cognitive abilities/disabilities and limitations of the populations of workers that will be exposed to work characteristics and environments.
  - Physical considerations: muscle strength and endurance, anthropometry (e.g., heights, reach envelopes etc.), flexibility, dexterity, etc.
  - Cognitive considerations: information processing, perception, memory, reasoning, decision making, etc.
- Design tasks that accommodate a large range of workers (i.e., engineering controls) versus selecting only workers that are suited to the specific work characteristics and/or environments (i.e., administrative controls).
- Account for the population differences in physical capabilities between males and females.
- Account for the effect of age on decrements in capabilities.
  - Physical considerations: general health, aerobic capacity, muscle strength, passive tissue tolerance, sensory acuity, joint ranges of motion, reaction time, heat and cold tolerance, recovery rates for tissue damage.
  - Cognitive considerations: short-term memory, speed of processing, executive cognitive function.

Work organization and other psychosocial issues

- Provide sufficient social support and open lines of communication with co-workers.
- Provide workers with an adequate level of role clarity, as well as control and influence over their work (e.g., pace of work, decision making, autonomy, starting and stopping, etc.).
- Ensure sufficient development, fulfillment, and satisfaction at work.
- Ensure that integrated automated systems and/or new technology do not increase physical or mental demands and/or monotony to unacceptable levels.
- Provide sufficient training and instruction on task performance and how to handle unexpected events. This is particularly crucial when introducing new technologies.

Health and safety

- Avoid slips.
  - Maintain sufficient ground surface friction by controlling wet or oily surfaces, including spills. This is particularly important on angled surfaces.
  - Mark and/or clean wet areas or spills immediately.
  - Control for weather hazards.
  - Remove and/or secure loose, unanchored surfaces (e.g., rugs, mats).
  - Maintain consistency, where possible, between surfaces in the same area.
  - Ensure workers have footwear with sufficient friction on the soles.
  - Provide handrails where possible.

- Avoid trips
  - Ensure unobstructed views and sufficient lighting for all surfaces.
  - Remove obstacles, clutter, and debris from walkways.
  - Eliminate hazards like wrinkled carpet, uncovered cables, open bottom drawers, and uneven steps.
- Avoid falls
  - Provide sufficient guarding for raised surfaces.
  - Maintain ladders and ensure they are secured when in use.
- Noise
  - Measure and evaluate workplace noise levels.
  - Maintain worker noise exposures to be within recommended limits based on intensity and duration.
  - Provide hearing protection in areas with high noise levels.
  - Maintain, enclose, and/or isolate loud machinery and equipment.
  - Encourage workers to identify noise and/or hearing issues.
- Hot and cold environments
  - Measure and evaluate workplace temperatures and humidity.
  - Train workers to identify thermal warning signs.
  - Provide appropriate clothing to protect against the sun and cold.
  - Provide sufficient fluids for hydration in hot/humid environments.
- Machine/robot guarding
  - Ensure machines and robots have sufficient guarding to isolate them from workers.
  - Ensure appropriate lockout and blocking procedures are in place and that workers and supervisors are sufficiently trained on those procedures.
  - Isolate workers from potential in-running nip hazards.

9.1.3 Management best practices

The following are guidelines to ensure optimal management practices for incorporating HFE into work characteristics and environments:

- Ensure that there is management support for HFE initiatives.
  - Clearly define the goals and objectives of the process and the responsibilities of stakeholders.
- Include worker input and participation in all phases of the process.
  - Involve workers in task assessments, solution development, and implementation.
  - Facilitate and encourage early reporting of work-related injuries and illnesses and feedback on potential hazards and workplace design issues.
- Create a culture of worker safety and wellbeing.
- Create an organizational culture that provides support for workers' psychological and mental health concerns.
- Provide clear leadership and communication of expectations.
- Provide sufficient training, growth, and development for all stakeholders.
- Provide immediate feedback, recognition, and rewards for ideas and initiatives presented by workers. Workers should feel empowered to protect themselves.

- Ensure management systems exist for informal work and new forms of work (e.g., platform work, crowd work, work on-demand in the gig economy, etc.).
- Acknowledge the need for workers to maintain a good balance between work, family, and personal life.

9.2 Occupational accidents and injuries due to workplace adverse HFE conditions

Many musculoskeletal injuries are associated with an acute traumatic event and are, therefore, readily identifiable as an occupational injury. For example, external loads combined with reaching arms may result in (a) muscle forces beyond workers' strength, which can result in acute muscle strains, (b) passive tissue loads that exceed workers' tolerance resulting in tendonitis, pinched nerves, and/or bursitis, and (c) lumbar intervertebral compression and shear forces that result in disc herniation or prolapse. A trip, slip, or fall due to unsafe work conditions and/or working at heights can result in ligament sprains, fractured bones, muscle strains, and/or lacerations and bruises.

Inadequate machine guarding can result in workers being struck by or caught in moving machinery. This can occur in factories or with farm and construction equipment, resulting in crushed hands and arms, severed fingers, lacerations, bruises, blindness, etc. Poor signage or unsafe traffic flow conditions can result in workers being struck or run over by a moving vehicle (e.g., lift truck), falling from a vehicle, being hit by objects falling from a moving vehicle, or being stuck under or crushed by an overturned vehicle - causing fractured bones, cervical spine injuries, and/or lacerations.

Working in the heat or with hot substances can result in heat exhaustion and/or skin burns. Working outdoors can also result in acute injuries due to forces of nature or drowning. Handling medical waste or other sharp objects or tools with inadequate personal protective equipment or poor working conditions can result in skin punctures and lacerations.

Additionally, experiencing or witnessing a severely traumatic incident at work can result in acute mental stress and even post-traumatic stress disorder.

9.3 Occupational and work-related diseases due to workplace adverse HFE conditions

Some work-related musculoskeletal injuries/disorders have a gradual onset without an identifiable acute event. At first, the worker may only experience short episodes of fatigue, discomfort, or numbness that diminishes overnight away from work or over the weekend. However, with continued exposure to the HFE hazards, symptoms can progress to persistent pain. A health care provider may have difficulty diagnosing a specific disorder during the early stages because the clinical examination is normal. Only after the condition worsens will abnormal findings on the examination emerge, such as localized muscle weakness, loss of sensation, tenderness, or limited joint range of motion. Furthermore, some conditions (e.g., carpal tunnel syndrome) may be difficult to label as work-related because they are also associated with personal factors, such as increasing age, obesity, or pregnancy.

The following are common work-related musculoskeletal injuries/disorders of gradual onset:

Low back

- Low back pain/sciatica – Sciatica refers to back pain, and possible weakness that extends to the buttock and possibly down the back of the leg.
- Herniated disc of the lumbar spine – low back pain, sciatica, and herniated disc.

Shoulder and neck

- Trapezius muscle strain (cervical strain) – pain in the upper back and neck region with increased muscle tone and tenderness.
- Rotator cuff tear – shoulder pain in certain shoulder positions, possible limited range of shoulder motion.
- Shoulder impingement or tendonitis – shoulder pain with limited range of motion and impingement.
- Shoulder bursitis – inflammation or irritation of the shoulder bursa with pain and swelling.
- Brachial plexus neuropathy (Neurogenic thoracic outlet syndrome) – compression of one of the nerves between the spine and the shoulder.
- Herniated disc of the cervical spine - neck pain, radicular symptoms, and herniated disc.

Hand, wrist, forearm, and elbow

- Epicondylitis (medial and lateral) – pain on the inside (medial) or outside (lateral) area of elbow especially during resisted wrist flexion or extension.
- Olecranon bursitis – inflammation or irritation of the bursa at the olecranon with swelling and pain.
- Wrist tendonitis or tenosynovitis (including DeQuervain's Disease) - pain with localized tenderness in an extensor or flexor compartment of the wrist.
- Trigger finger – pain in fingers with opening and closing of the hand, with difficulty opening the hand fully. May include popping, locking of fingers in flexion, and a nodule on flexor tendons.
- Dupuytren's contracture – ring or little finger cannot be straightened completely due to thick fibrous cords that form under the skin on the palm side of the hand.
- Carpal tunnel syndrome – numbness in the thumb, index or middle finger worse with sustained pinch or grip; wakes worker from sleep and may be aggravated by certain hand maneuvers.
- Cubital tunnel syndrome – numbness in the small and ring finger with tenderness on the inside of the elbow at the ulnar groove. Worse with sustained elbow flexion.
- Radial tunnel syndrome – pain and paresthesias in extensor forearm and back of the hand with tenderness just distal to the lateral epicondyle (posterior interosseus nerve).
- Hand Arm Vibration Syndrome (Vibration White Finger) – pain, numbness of fingers with color change of fingers (blanching) especially with exposure to cold. Primary damage is to the small vessels and nerves in the fingers but may extend to involve bones, joints, and median nerve.
- Focal dystonia of the hand or forearm (writer's cramp) – localized involuntary movements of the fingers or hand, tremor, or muscle cramps.
- Non-specific musculoskeletal disorder – non-localizing pain or paresthesias in the upper extremity without abnormal findings on physical examination.

Lower extremities

- Prepatellar bursitis – knee pain with swelling in front of the kneecap.
- Knee meniscal disease – tear of the meniscus in the knee.

In addition to physical injuries and work-related diseases, poorly design work task characteristics and environments can also negatively affect workers cognitively and psychologically. Stress at work can result in anxiety, depression and/or burnout, and have negative effects on self-esteem and sleep and acute and/or chronic effects on the function of the endocrine, immune neurological and/or vascular systems, which can inhibit neural responses to tissue damage, compromise tissue damage recovery following an injury, and promote the release of noradrenaline, which increases muscle activity. Burnout, mental fatigue, poor social support at work, work intensification, new production methods, low levels of job control, and work-life imbalances have been found to be associated with MSDs. Chronic stress may also result in negative behaviours ranging from improper task biomechanics and postures with increased muscle strain, especially in the upper extremities, to violence and substance abuse.

The ILO List of Occupational Diseases Recommendation, 2002 (No. 194) recognizes the following diseases caused by workplace exposure to adverse HFE conditions and psychosocial risk factors as occupational in origin:

Musculoskeletal disorders

- Radial styloid tenosynovitis due to repetitive movements, forceful exertions, and extreme postures of the wrist.
- Chronic tenosynovitis of hand and wrist due to repetitive movements, forceful exertions, and extreme postures of the wrist.
- Olecranon bursitis due to prolonged pressure of the elbow region.
- Prepatellar bursitis due to prolonged stay in a kneeling position.
- Epicondylitis due to repetitive forceful work.
- Meniscus lesions following extended periods of work in a kneeling or squatting position.
- Carpal tunnel syndrome due to extended periods of repetitive forceful work, work involving vibration, extreme postures of the wrist, or a combination of the three.
- Other musculoskeletal disorders not mentioned in the preceding items where a direct link is established scientifically or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the musculoskeletal disorder(s) contracted by the worker.

Mental and behavioural disorders

- Post-traumatic stress disorder.
- Other mental or behavioural disorders not mentioned in the preceding item where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the mental and behavioural disorder(s) contracted by the worker.

▶ 9.4 Interactions with other OSH risk factors

Factors outside of the design of work characteristics and environments that can affect the risk of negative physical and/or psychological outcomes include personal risk factors for each worker and the overall management system.

9.4.1 Personal risk factors

Individual differences can have a large effect on a worker's response to a work system or environment and these include genetics, age, gender, obesity, circadian rhythms, experience on the job, education, chronic disease status (coronary heart disease, hypertension, arthritis, musculoskeletal pain, diabetes), preexisting conditions, and smoking, alcohol and drug use (prescribed or illicit). For example, obesity could increase the joint loading for a given task and age and gender may affect the muscle strength and tissue tolerance to withstand those loads.

9.4.2 Management systems

Management characteristics that impact risk include safety culture, reward systems, training and development, communication and feedback, scheduling, and standardization of work processes. For example, if a poor safety culture is exhibited by supervisors and/or colleagues, a worker may be more likely to ignore standard operating safety procedures resulting in either an accident or chronic injury. Further, with time pressures and production rates beyond acceptable levels, a worker may be less likely to take rest breaks essential for adequate mental, muscular, cardiovascular, or tissue recovery, increasing the risk of a musculoskeletal or mental injury. An organizational culture that encourages workers to "push through" discomfort and does not promote open communication and feedback when discomfort arises may result in late symptom reporting and subsequent injuries or WMSDs. Organizations that do not provide adequate resources may in essence prohibit the initiation of effective task redesigns. Organizations that prioritize the early return of injured workers for the sake of production over health and safety may place workers at a higher risk of a health outcome setback or could lead to negative social and psychological responses from co-workers and/or supervisors. Finally, factors like downsizing, restructuring, privatization, deregulation, lack of job mobility, alternative work arrangements (e.g., subcontracting, working from home), and job insecurity can result in social and financial stress on workers which can in turn adversely affect their physical safety and mental health.

▶ 9.5 Rehabilitation and return to work

While effort must be made to eliminate work-related physical and psychological injuries or illnesses, they will continue to occur. In such cases, best practices must be employed to safely, effectively, and efficiently rehabilitate workers followed by an early and safe return to work (RTW). Organizations with a commitment to maintaining early and considerate communication with injured/ill workers are more likely to achieve an early and safe RTW; the longer the rehabilitation takes the lower the chances that an injured or ill employee will RTW.

Vocational rehabilitation must be designed specifically for each unique injury and individual so workers can (a) return to their original job, or (b) be assigned to a job that is compatible with the work restrictions provided by their physician, is safe, available, and productive, and restores earnings to what was earned before the injury. It is optimal to have functional abilities evaluations/assessments before and after injuries to identify the specific effects of a work-related injury or illness on physical and cognitive capacity so that this can be targeted with rehabilitation. As time progresses over the course of rehabilitation, exercises should progressively reflect the specific postures, movements, force demands, frequencies, durations, information processing, memory demands, etc. of the original work task so work conditioning can be implemented within the clinic, then ramped up to full capacity through work hardening in the actual work environment.

WSMDs should trigger a HFE assessment of the original task to identify any redesigns that could reduce the risk of future disorders and allow for injured workers to RTW as early as possible but safely. This process should be included within the iterative design cycle for constant improvement of all work characteristics and environments. For example, if a worker injures his or her shoulder performing work above the shoulder and the physician prohibits them from working above the shoulder, earlier RTW may be facilitated if the task is redesigned to eliminate the need to reach above the shoulder through changes in the workspace or the addition of assistive devices. The hierarchy of priorities for modifying the task should be the same as those discussed previously: (1) eliminate the hazard; (2) substitute the hazard; (3) engineering controls; (4) administrative controls; and (5) personal protective equipment. All stakeholders should work together to reach an agreement on the best option(s) for accommodating the RTW. Once implemented, the returning workers must be properly trained on the redesigned task or accommodated work and be given time to ramp up their capabilities to the new physical and cognitive demands.

Within this framework, organizations must be flexible with task allocation and design, maintain contact with injured workers during rehabilitation to confirm that their return is valued, ensure that supervisors and co-workers fully support workers on their return, educate all stakeholders on the value of injured workers' return and the systems in place to modify or accommodate work to suit their capabilities, and outline the process to follow when workers are injured on the job. Finally, workers must be encouraged to fully engage in the rehabilitation process, attend all sessions, remain flexible with the RTW, agree to functional abilities evaluations/assessments and maintain communication with their employer.

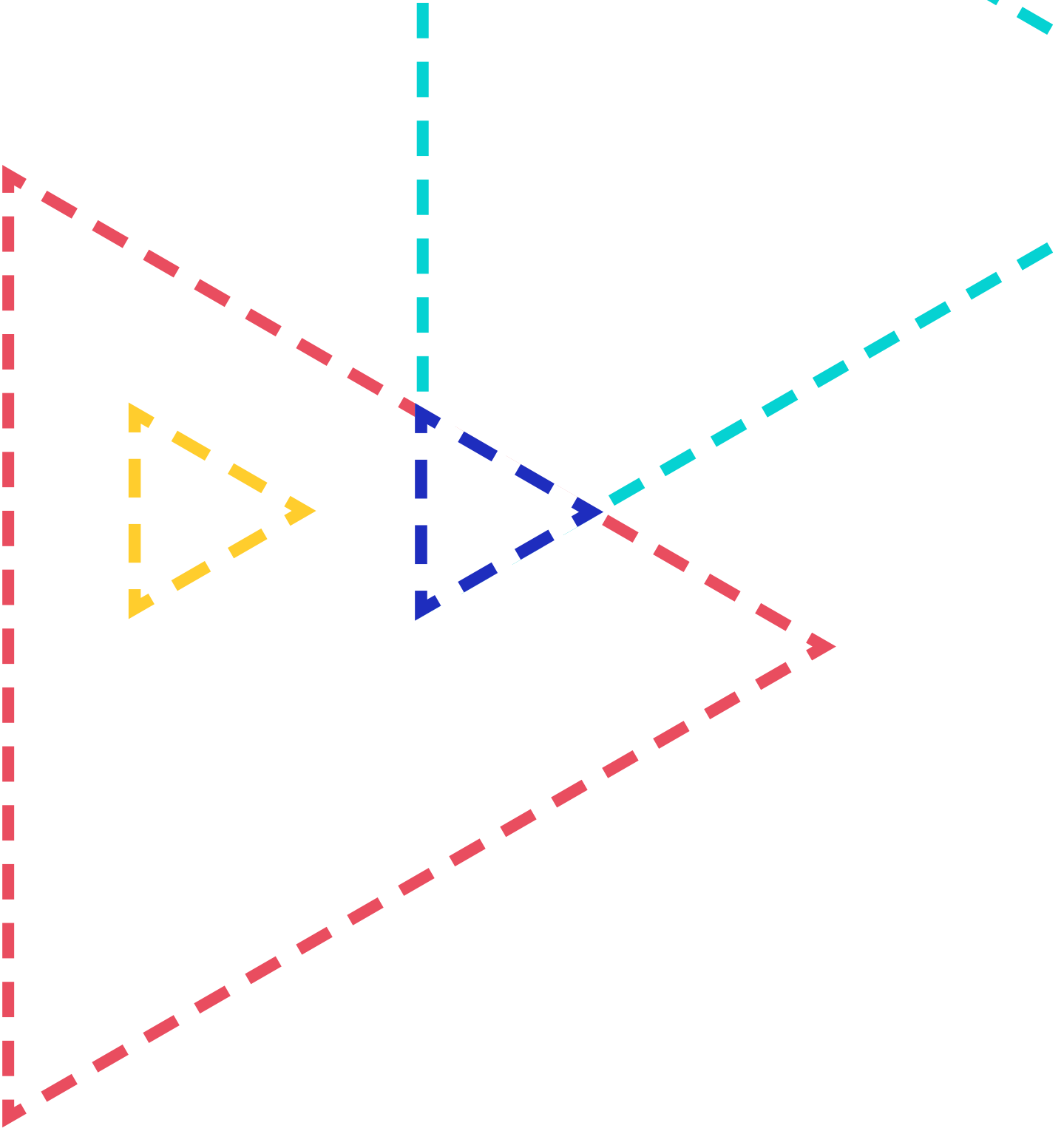
▶ 9.6 Training and information on HFE

The workplace is constantly changing with the introduction of new task designs as well as changes in organizational characteristics, personnel, productivity demands, societal norms, regulations, popular opinion, public health circumstances, available technologies, and national, regional and municipal policies and regulations. In response, organizations must ensure adequate and updated training with continuous monitoring, feedback, and refinement for all aspects of work related to HFE. As with task design, an iterative approach should be used to incorporate the most current and relevant information into programs of training and continuous learning for all stakeholders, including workers, supervisors, and management. Training is an essential component of the effective implementation of the HFE systems approach for HFE and manual handling in the workplace.

An effective training and information program should have the following characteristics:

- Focus on mitigating physical and psychological hazards and ensuring the safety and health of all stakeholders.
- Facilitate the proactive design processes.
- Incorporate current and updated feedback from all stakeholders into the development, implementation, and assessment of all information materials and training.
- Adapt all training to the local culture and social norms.
- Ensure acknowledgment and commitment from all stakeholders regarding the goals, relevance, and expected outcomes of all training programs.
- Incorporate the most beneficial current technologies, tools, and techniques and explain their benefits, even if their integration may result in temporary reductions in productivity.
- Include constant assessment and improvement with every training cycle, including stakeholder buy-in and evaluation of the effectiveness and comprehensiveness of the material.

- Prioritize engineering controls through effective HFE designs rather than adopting a primary focus on administrative controls that place the responsibility on workers to ensure their own health and safety.
- Training should account for cognitive decrements associated with increasing age using practice periods and behavioral reinforcement to achieve positive training effects.
- Provide recognition and rewards for those developing and/or actively engaging in training and information programs.



Chapter 10.
Coverage and limitations inherent in the scope of legislative provisions

Current legislative and other provisions concerning HFE and manual handling in the workplace vary widely across countries and regions in terms of:

- Specificity and types of HFE factors covered.
- Scope of legislation (e.g., types of enterprises covered).
- Mandatory vs. voluntary status.
- Enforcement policies and capabilities.

10.1 Specificity and types of HFE factors covered

General OSH legislation is common across countries and regions, and most nations have at least a general duty clause to regulate or promote OSH. However, the existence and types of specific HFE provisions varies across countries. As outlined in Table 1, factors such as manual handling parameters (load limits, repetitive movements, etc.), MSD prevention, or display screen and other work equipment are regulated in more countries than participatory HFE, or cognitive and psychosocial factors. In the majority of countries in our collected sample, preventive measures such as HFE risk assessments or preventive HFE programs with monitoring of workers are not standard. Countries with socialized medical care tend to have more restrictive HFE requirements, which is probably a byproduct of the medical cost savings associated with reducing HFE related risks.

Traditionally laws have concentrated overwhelmingly on physical aspects and outcomes of work tasks. This tends to place the burden of responsibility for prevention on workers themselves or on low level supervisors rather than those who set up the work systems; that is, the organizational aspects of the task are generally designed by high level managers, often with little input from workers. This may account for why there has been little improvement in the incidence of WMSDs, injuries, and accidents despite the introduction of laws. It is often the organizational aspects of the workplace and work tasks that are most relevant to risk and they can rarely be altered by the worker.

Legislative provisions that focus on physical tasks such as manual handling and physical outcomes such as WMSDs, injuries, and accidents often neglect relevant cognitive, mental health, and psychosocial antecedents and consequences. To fully address HFE risks and provide protection for OSH and decent work, competent authorities should take a holistic perspective of the worker and the workplace and create regulations that recognize all HFE factors of work tasks and the work environment and protect all aspects of worker safety, health, and wellbeing.

▶ 10.2 Scope of legislation

Even when specific HFE legislative provisions exist in countries, they typically do not cover all workers. Some legislation applies only to larger businesses, leaving workers in small businesses unprotected. Additionally, non-traditional workers such as contractors, gig-workers, or remote workers are not always covered by existing legislation, and large employer organizations who benefit from workers not classified as employees fight any efforts to extend protections to them. In many countries, special populations such as disabled workers, pregnant women, or young or older workers are protected by laws that specify work and manual load limits and prohibit discrimination or bias. These types of laws, however, are neither universal nor consistent across the globe. Moreover, some legislation puts the burden of proof on workers – for example the US Age Discrimination Employment Act (ADEA) of 1967. A decade ago, age discrimination protection was eroded in a supreme court ruling that has made it more difficult for those experiencing discrimination to prove wrongdoing. Other populations such as migrants still struggle to have local OSH protections extended to them.

Much of the HFE and manual handling legislation in countries and regions is industry- or sector-specific. Industries that require hazardous activities such as heavy lifting or loading, work at height, agriculture, or mining are candidates for manual handling and MSD prevention legislation. Limited legislation exists for work environment characteristics such as noise or lighting, and personal protective equipment is only sometimes covered as part of these legislative provisions. It is clear that the scope of HFE and manual handling legislation is limited. Competent authorities should ensure that any legislative standard extends to all workers, regardless of the characteristics of the person or type of organization or work.

▶ 10.3 Mandatory vs. voluntary status

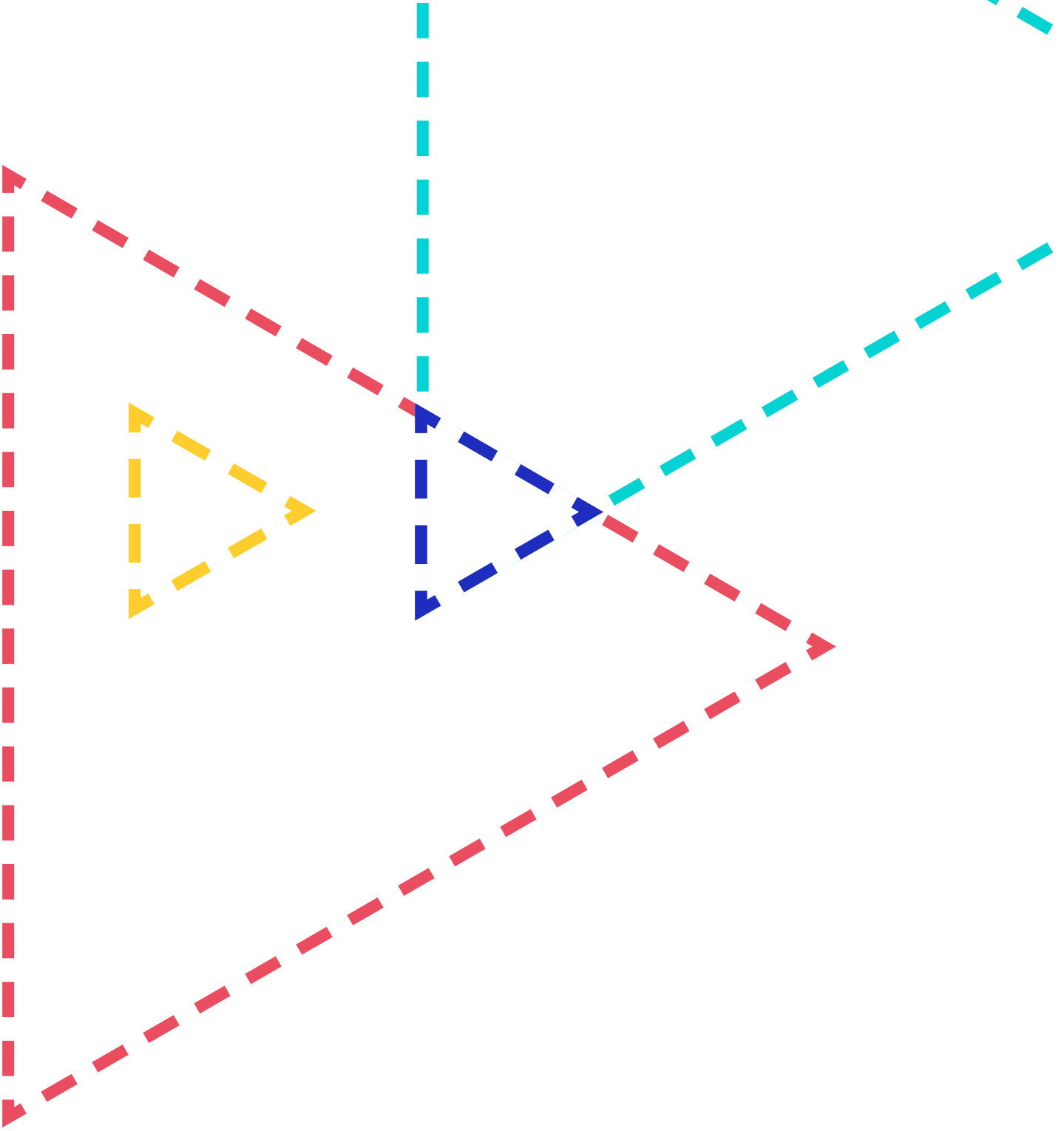
The number of voluntary standards and guidelines concerning HFE and manual handling in the workplace far exceeds the number of legislative provisions. HFE-related standards and guidelines from international organizations such as ISO or ACGIH may be adopted by countries, but the legal power of these varies. Accountability for compliance is often put on employing organizations rather than local authorities and is not adequately monitored. Some countries have found informal ways to regulate HFE factors – for example, the UK requires young workers to obtain work permits and these come with restrictions that control factors such as work hours and shifts. However, unless legal incentives are in place to foster conformance with HFE and manual handling protective measures, compliance is likely to be low.

▶ 10.4 Enforcement policies and capabilities

Compliance with general HFE and manual handling policies and regulations is difficult to measure. The result is that even when legislation is in place, legal enforcement does not always take place. General regulations either (1) simply require the employer to prevent negative outcomes such as WMSDs, injuries, or accidents, or (2) list the processes that must be followed by the employer but do not specify assessment methods or required interventions (e.g., performance-based rules). The advantage of general regulations is that they provide flexibility for the employer to identify effective HFE solutions that are specific to the risks of their workplace. The disadvantage of general regulations is that their general nature makes it difficult for the employer or the safety inspector to determine when the employer is in compliance. Prescriptive regulations (see Chapter 4), in contrast, make it easier to know when the employer is in compliance;

however because work is complex, one solution may not be appropriate for all work places. In addition, even if new HFE assessments or solutions are identified as effective in reducing risk, it may take some time for prescriptive regulations to be changed to adopt the new methods.

Quantifiable, easily measured aspects of legislation such as load limits are more likely to be enforced than subjective measures such as awkward postures. This means that many critical HFE aspects of work tasks and the work environment that are not readily quantifiable are effectively unregulated. Competent authorities should ensure that a legislative standard on HFE and manual handling in the workplace not only covers all critical HFE aspects of work tasks and the work environment but also provides guidance on enforcement processes and procedures.



Chapter 11.
Elements to be considered for inclusion in laws, regulations, standards, and guidelines on HFE and manual handling in the workplace

11.1 Definitions

Human factors/ergonomics (HFE) refers to the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance (International Ergonomics Association, 2001; https://iea.cc/about/what-is-ergonomics.

Optimization refers to the best design solution depending on the goals of the design and available resources. It should focus on balance within the work system.

Systems approach refers to the step-by-step, iterative, analytical procedure that examines and takes into account interactions among persons, tasks, tools and technologies, physical environment, and organizational conditions rather than concentrating on any individual part of the system.

▶ 11.2 Core principles

The following core HFE principles must be respected, promoted and realized:

- Ensure worker safety, health, and wellbeing in the optimization of work systems as a top priority.
- Design and manage HFE in the workplace to ensure organizational and worker alignment, continuous evaluation and learning, and sustainability.
- Create a safe, healthy, and sustainable work environment from a holistic perspective, understanding and providing for human needs.
- Account for individual differences and organizational contingencies in the implementation of HFE in the workplace.
- Make use of collective, trans-disciplinary knowledge and full participation of workers for designing systems, detecting problems, and creating solutions for HFE in the workplace.

▶ 11.3 General HFE in OSH policies

OSH policies at the national and enterprise levels should include:

- The use of a systems approach for implementation of HFE in the workplace. Workers, employers, and qualified HFE professionals should be involved in accomplishing this HFE approach.
- A match between worker characteristics and work system requirements. Human physical and cognitive capabilities should be addressed holistically and all relevant human characteristics, including culture, knowledge, experience, needs, capabilities, and limitations should be accommodated.
- Engagement of all relevant stakeholders for effective implementation of HFE in the workplace and promotion of a HFE participatory approach. The participation of employers (high-level management in particular) as well as workers is a critical aspect of HFE in the workplace.
- Evaluation before and after a work system design. This is essential to effective implementation of HFE in the workplace.
- Implementation of proactive HFE measures to ensure worker safety, health, wellbeing, and sustainability and early consideration of HFE in work design and process improvement, as well as identifying and addressing early symptoms of injury or harm to workers. Proactive measures should also address new trends and disruptive technologies in the workplace, such as non-standard work arrangements and intelligent information and communication technologies.
- Tailoring HFE in the workplace to characteristics of the organization to cover the technological, personnel, and external environmental subsystems.
- Promotion of a sustained continuous learning process for monitoring, evaluation, feedback, training, refinement, and redesign. The implementations of HFE in the workplace should be continuously evaluated and refined according to input from workers and other stakeholders. Factors that should be considered include changing organizational characteristics, societal norms, regulations, popular opinion, and technologies (both existing and emerging).

▶ 11.4 General HFE systems approach

A structured, step-by-step, iterative process-based framework model should be adopted to implement a systems approach in which workplace elements (humans, tasks, tools and technology, the work environment, and organizational characteristics) are considered from a holistic perspective for HFE in the workplace.

The systems approach should be supported by sufficient resources (e.g., budget, time) and personnel. Company management should ensure that adequate resources and personnel are allocated to the implementation of HFE in the workplace. Work system design that considers the physical, cognitive, psychosocial, and organizational needs of workers may seem expensive but will improve performance, worker sustainability and wellbeing, and reduce the potential for injuries and incidents over the long run.

A work system designed using the HFE systems approach should be continuously monitored and evaluated for suitability, validity, and impact on workers and the organization. It is important to ensure that the proposed work system design is correct and valid before it is implemented and as it is managed. Appropriate trials and tests should be carried out depending on the operational complexity and potential risks of the work system.

HFE in the workplace should be optimized with due considerations given to human wellbeing and system performance. Generally, there is no absolutely correct solution. Optimization depends on the goals of the design and also on available resources and should focus on balance within the work system.

Continuous improvements to the workplace through monitoring and refining practices should be at the heart of the HFE systems approach.

▶ 11.5 Consideration and design for all relevant characteristics of workers

Demographics of the workers should be taken into consideration in the implementation of HFE in the workplace, especially during the conceptual stage. Workers' characteristics such as age, societal background and expectations, gender, and diversity can make a difference in what is needed and how they perform in their work.

Human physical capabilities and limitations should be considered in the implementation of HFE in the workplace. Anthropometric tables of worker population by country, region, or locale should be used or created as needed to ensure accurate accommodation for relevant features. This is especially critical as many times work systems are designed by teams of designers in different and distant places from where they will actually be used. HFE quantitative assessment methods should be used to measure maximum acceptable loads to control musculoskeletal integrity and avoid pain and injury. Technological features in work systems should be designed so that their future operation will respond adequately to human capabilities and limitations and therefore reduce organizational and human failures that could arise. The concept "anthropotechnology" is useful to take into account.

Human cognitive capabilities and limitations should be considered in the implementation of HFE in the workplace. Cognitive aspects of workers include perception, memory, reasoning, information processing, and decision making. Insufficient attention to these requirements can cause stress and jeopardize worker psychological health as well as the ability to perform work tasks.

Occupational psychosocial factors should be considered in the implementation of HFE in the workplace. For instance, exposure to psychosocial risk factors can be controlled through proper allocation of function between workers and technology to ensure optimal workload and avoid conflicting job demands. Special considerations must be made to protect at-risk and lone workers.

The implementation of HFE in the workplace should be an integral part of the OSH management system at the enterprise level. Consistency should act as a firewall against abuses, as well as ensure opportunities for improved job control and the avoidance of stress, hostility, depression, or hopelessness. These factors have been associated with physical as well as psychological health, particularly heart disease.

As the workforce grows older, some general characteristics of aging should be taken into account in the implementation of HFE in the workplace. These changes include physical decrements in aerobic capacity, general health, visual and aural acuity, strength for lifting and gripping, reaction time, ability to move limbs and joints freely, tolerance for heat and cold, and capability to recover from physical work and slips or trips. Additionally, older workers may have cognitive decrements in short-term memory and less tolerance for paced work. Work system design as well as training should be adaptive to these changes. Effective training programmes for the adult workforce include practice periods, behavioral reinforcement, and positive training effects.

Workers should be provided with the appropriate tools to perform work and communicate as needed. The purpose of tools is to make work easier (physically and cognitively) and improve productivity. This means that physical and cognitive capabilities and limitations should be considered. Having all stakeholders engaged in the tool selection process is key, as a holistic HFE perspective requires attention to organizational, cultural, and environmental factors as well as human characteristics of workers. HFE principles and guidelines can guide the process of selecting, training for, evaluating, and maintaining tool selection.

Workers should retain an adequate degree of control over their work. Knowledgeable worker control and guidance should be incorporated into work system design especially with respect to factors such as starting and stopping, the pace of the work, autonomy, and decision making.

Clear, unambiguous instructions and procedures should be designed based on HFE graphic design guidelines.

Allocation of task functions between workers and automated tools should be based on appropriate HFE models. It is important to give careful consideration to which task elements are assigned to the human worker versus the automation to avoid overly rigid, unworkable, or 'leftover' allocation. Central to HFE work system design is the specification of a clear and unambiguous role for the operator to provide the basis for a meaningful job. From this point of view, functions should be allocated to automated systems only if they are separable from the role and do not conflict with it.

Work systems increasingly involve technological tools, such as robotic, intelligent, and autonomous systems (RIAs), artificial reality/virtual reality (AR/VR), and wearable (exoskeleton) devices. These tools have the potential to greatly reduce risks in the short term at work but introduce new considerations and challenges for human cognition as well as potential physical risks of long-term use. They should be incorporated into work system design in ways that facilitate human performance and do not hinder it. Cognitive and physical issues inherent in these technologies should be addressed. These issues include the length of time it takes the human to become situationally aware enough to take control successfully if the automation process fails, how to maintain human worker skill levels needed to take control when the need arises, or how to ensure that these tools will not increase cognitive workload. When HFE principles are used to incorporate them into work system design, these technologies can enhance worker capability to a great extent.

Work system safety and sustainability are critical factors for HFE in the workplace. Work systems should engage workers in positive ways and should not generate risks or dangers for the people who are involved in their operation. Sustainable work systems are essential for long term worker wellbeing and performance as well as for productivity and quality. Sustainable work systems also enable workers to contribute effectively to economic and other goals and afford resilience for workers and organizations.

Work demand should be balanced with human capacity. Balancing work demand and human capacity allows for the optimization of productivity and quality while minimizing the risk of negative outcomes such as fatigue, discomfort, stress, or injury. HFE requirements include:

- Maximize the safety, health, and wellbeing of workers while enhancing productivity.
- Consider estimated workload required to accomplish a task as well as individual differences in load capacity prior to design.
- Ensure that the introduction of technological tools occurs along with training on their use and does not increase physical or cognitive stress.
- Design tasks to increase the diversity and age range of people who can perform them.
- Consider the environmental, economic, socio-political and cultural factors that may impact worker capacity and sustainability.
- Incorporate HFE risk assessments into organizational safety audits.

▶ 11.6 Participatory HFE methodologies

The implementation of HFE in the workplace should involve employers, workers and their representatives, external advisors, internal HFE specialists, and safety and health committees where they exist. Summoning and incorporating a diversity of expertise in different aspects of the design and operation of a work system is especially important when it is complex in nature, requires many workers for its operation, and/or the risks of faults in its operation are very high. This approach will facilitate understanding by all parties of the work that is actually done, the difficulties involved, and the ways in which workers may compensate for the discrepancy between the prescribed work tasks and the actual work situation, and also may enhance the collective perspective and cooperation.

Workers should be engaged in the design or redesign of their own work and workplaces, or during the introduction of new technologies. Workers know about many of the complex interactions among physical design factors in their workplace, how their work is organized and the psychosocial conditions that affect their work, and how their lifestyle and influences outside the workplace can affect their safety and wellbeing. Workers and employers can jointly learn the merits of HFE actions through existing or reported good practices in their own or similar workplaces. Participatory steps can lead to planning and implementation of multifaceted HFE practices feasible in the local context. The following participatory approach is suggested:

- Seek out, select, and involve workers from the planning stage of work design or redesign and encourage suggestions.
- Focus on benefits of applying HFE measures in improving safety, health, wellbeing, and working conditions in the workplace.
- Organize workplace-level dialogue among workers and employers about priority actions by utilizing locally adapted HFE toolkits.
- Engage workers to pilot planned changes and provide feedback about the improvement process.
- Listen to feedback, incorporate suggestions, and communicate about decisions before large scale implementation of changes.
- Recognize and reward workers for their involvement.

Risks of not using Participatory HFE methods include:

- Work system design does not address the needs of workers who will use it.
- Workers cannot use or do not accept work system.

Benefits of Participatory HFE methods include:

- Maximized 'buy-in' from all stakeholders involved with the work system and its components.
- Avoidance of a single point of view perspective on the work system.
- Higher levels of worker engagement, commitment to change, and ownership of the resulting work system design or redesign.

▶ 11.7 Proactive measures

11.7.1 HFE design

HFE in the workplace should be considered early on in work system design, especially when introducing new tasks, workspaces, or environments. It is better to promote proactive HFE programmes such as Prevention through Design (identifying problematic areas and implementing improvements and solutions ahead of time) rather than to rely on reactive measures (addressing problems after they have occurred).

Considerations at early stages of a work system design include:

- Involve all stakeholders that will interact with the new space or task.
- Assess organizational readiness for change.
- Strive to identify and understand as clearly as possible the culture, educational background, and technical profile of the workers that will operate and maintain the new work system.
- Incorporate feedback from stakeholders who perform similar tasks or have similar workspaces.
- Incorporate HFE foundational principles and guidelines as new emerging technologies are introduced into work systems.
- Involve HFE knowledge workers/consultants in the planning stage and every phase thereafter.

Promoting movement and postural variation through work systems design is part of some proactive programmes in organizations with sedentary occupations. The goal of this type of design is to facilitate worker safety, health, wellbeing, and sustainability by incorporating opportunities for movement into work systems. For example, open offices may have architecturally designed workspaces that encourage and support various work activities, such as standing conference desks, huddle areas with soft seating, exterior pathways for walking to meetings, and alternative workstations with dynamic components. These various workspace configurations supporting different kinds of knowledge work encourage varying and adopting healthy computing postures as well as promoting effective task performance. Introduction of activity-promoting innovations in the office and computing workplace should follow recommendations for tool selection, equipment, and workplace facility design and should be accompanied by appropriate training and follow-up evaluation.

11.7.2 Proactive HFE design for new forms of work

New ways of working and varied forms of employment and work can create special situations that should be addressed. This is particularly important because of the relative informality of many contemporary work arrangements and workplaces. HFE guidelines should be proactively incorporated into new types of work systems to mitigate HFE risks. It is useful to adopt the perspective that work should be adaptable to the worker population, including those who have special needs, and also should be adaptable in time according to the development of technology and the evolution of human capacities, age, abilities, biological rhythms, etc. 'Adaptable' refers not only to physical issues, but also to changes over time in workers' conditions. Giving workers a degree of autonomy to regulate their own activities and production will mitigate stress or anxiety that may result when workers do not feel empowered to change their way of acting to reduce physical and psychological risks.

11.7.3 Proactive programmes

Proactive programmes are essential to promote physical and psychological health and avoid work-related adverse incidents, injuries, and harm to workers and should be developed in parallel with work system design. Key aspects of such programmes include:

- A clear programme goal, supported by all stakeholders, that all problems in work system design will be reported, recorded, and addressed.
- Information to workers about the nature, signs, and symptoms of MSDs and other physical, cognitive, or psychosocial hazards, and why it is so critical to address them as early as possible.
- Clear and concise information on the reporting process with regular encouragement to engage in the process as needed.
- Support and engagement from supervisors and managers at all levels with no negative consequences or threats of negative consequences for reporting problems.
- Clear communication channels with OSH committees or occupational health services.
- Immediate response to the reporting of symptoms that includes problem management, exposure/hazard assessment, and control/mitigation of exposures using the hierarchy of controls.

Risks from lack of proactive measures include:

- Factors such as lack of training, lack of knowledge or understanding of the relevant regulations, resulting in a failure to report problems.
- Pressure to complete tight task deadlines without any breaks.
- Risk of fatigue and exhaustion caused by excessive working hours.
- Psychosocial risks such as work-related stress resulting from the precariousness of the employment, ratings assigned to workers from employers or clients, intensity of work, interruptions and distractions making concentration difficult.
- Quality deficits and production problems.
- Physical and psychosocial problems related to work with computing technology and mobile devices.

Benefits of proactive measures include:

- Jobs and work environments that support worker physical, cognitive, and psychosocial needs.
- Addressing of safety and health issues before they become unmanageable, expensive, or require long-term treatment.
- Ensuring balance among work system components to support worker wellbeing and performance.
- Database of problem reports combined with assessment of the work tasks, workstation, workspace, work organization, and work environment, which can determine the need for job analysis and redesign.

▶ 11.8 Tailor HFE to organizational characteristics

11.8.1 Traditional organizations and forms of work

Type of organization should be identified and taken into account when implementing HFE in the workplace, as it will impact the design of work systems. The specific characteristics of the organization will guide the adoption of different HFE design aspects and components of the system.

The organizational **subsystem(s)** that will be involved and impacted should be identified and taken into account. The **size** an organization should be identified and taken into account. Characteristics of HFE in the workplace should be tailored to the size and level of resources available to the organization. These will impact organizational readiness, ability to implement changes, and strategies for work system design. Large organizations, medium-size organizations, and small organizations have different characteristics. Small organizations, for example, rely on different resources than medium or large organizations and work on a smaller scale. Workers in small organizations typically have a broad understanding of the work and its impact on the organization and can have a greater impact on cost reduction and productivity than in larger organizations. Although it is important for enterprises of all sizes to acknowledge, understand, and work with local cultures and resources, it is even more critical for small organizations to do so. Strategies for implementing HFE in workplaces in small organizations should recognize and account for the advantages of small size and capitalize on local knowledge, low-cost solutions, and resources.

To best utilize local knowledge and resources:

- Engage local people to make HFE improvements.
- Build on local good practices.
- Use local, low cost practical improvements.
- Use locally adjusted training (e.g., train-the-trainer).
- Provide immediate feedback for workers' ideas and initiatives - recognize and reward workers for HFE improvements stemming from them.
- Build HFE competencies into the organization through local professional organizations and resources including universities.
- Engage local authorities to support changes proposed at the small organization level.

The **maturity and readiness** of the organization should be assessed and taken into account. Organizations will vary in their ability and readiness to implement comprehensive changes to HFE in the workplace. Organizational readiness is impacted by many factors including the status of national, regional, and city policies and regulations related to HFE, and in turn will impact strategies for integration of HFE into workplaces and work systems. Organizations can audit their level of maturity and progress over time using an organizational readiness tool.

Risks of insufficient attention to organizational factors include:

- Risk of failure (non-adoption) of a work system as a whole and rejection of work design changes by front-line staff and managers.
- Errors from work environment factors such as poor job design or poor error correction systems.
- Costs due to increased turnover of workers.

Benefits of paying attention to organizational factors include:

- Enhanced employee health, wellbeing and performance.
- Better adoption of innovations and changes.
- Improved employee-management relations.
- Early detection of conflicts to determine effective resolutions.

Opportunities should be given for contractors and labour supply agents to adhere to HFE foundational principles and guidelines. As assurance processes, contractors' forums may be established with appropriate terms of reference. These forums should be guided by HFE experts and focus on the following:

- Ensuring that work systems and processes in contracting agencies are consistent with the foundational HFE principles and guidelines.
- Sharing effective practices and lessons learned.
- Promoting innovation to drive continuous improvement and create a legacy of collaboration and management of the escalation of key risks and issues.

11.8.2 Non-traditional organizations and forms of work

HFE principles and guidelines should be applied to remote workplaces and work systems, such as telework or flexible workstations in off-site or satellite work offices. Technological tools such as mobile devices and the Internet of Things (IoT) have made it possible for many cognitive and knowledge worker tasks to be accomplished remotely and virtually. The safety and health of remote workers as well as their ability to be productive and effective when working should be protected through HFE design and implementation of these jobs. Special considerations apply to the design and management of informal work and new forms of work, including platform work, crowd work, and work on demand in the gig economy. Potential HFE risks to these workers should be addressed through a HFE systems approach. Considerations to recognize and take into account include:

- The need for a HFE systems approach to ensure the safety, health, wellbeing, and sustainability of informal workers, who typically do not have access to organizational resources and protections and are at high risk for adverse events.
- The need for a HFE systems approach to define, design and evaluate jobs of the gig economy in order to create appropriate work systems.
- The responsibilities of all actors (i.e., employers, contractors, and workers) for the implementation of these new types of labour practice and how HFE issues can be incorporated and addressed within those responsibilities. Unionization, worker centres, cooperatives, and online forums represent a host of initiatives aimed at encouraging communication and contact between workers, engaging with employers, and increasing workers' political and legal consciousness about opportunities to advocate for their rights and improve workplace standards.
- The need to embed HFE principles and guidelines in the hands and minds of all actors through education and training.
- How HFE as a discipline can help workers to protect their life at work and to advocate for themselves when involved in these new labour practices.

▶ 11.9 Sustain a continuous learning process

Implementing HFE in the workplace involves creating a process for continuous learning by providing information, education, and updated training. An iterative approach and step-by-step process centred on HFE principles and guidelines should be used as part of reporting, evaluation, and continuous learning for HFE in the workplace and in work systems. It is important to collect information and use feedback to refine HFE in work systems and training in anticipation of relevant social and technological trends and changes. Training is an essential component of effective implementation of the HFE systems approach in the workplace. Training should engage the trainees such that they are active participants and have sufficient opportunities for practice. Importantly, training should not be used as the primary strategy to control a hazard or reduce exposure or as a substitute for hazard mitigation. Exposure reduction through elimination, substitution, redesign, or administrative controls should be accomplished as primary interventions.

Key components of an effective training programme include:

- Input from all stakeholders on training for work systems.
- Training workshops and programmes that are adapted to local industries and workplaces.
- Engagement and contribution of all stakeholders in the development, implementation, and assessment of the work systems and training.
- Active buy-in of all stakeholders regarding the need, purpose, and expected outcomes of the training.
- Simulation of future work system use (equipment and procedures) during training with opportunities for feedback on proper use.
- Appropriate integration of new tools, technologies, techniques, etc. with acknowledgement of potential temporary reductions in productivity requirements as changes to the work system are assimilated.
- Assessments during training and post training to ensure outcomes have been met and the work system is functioning smoothly.

Continuous monitoring and refinement should take place to ensure that work systems are functioning as intended and the goals of training have been met. Continuous monitoring, feedback, and refinement are essential components of effective implementation of HFE design and management of work systems. Systematically monitoring work systems from HFE perspective during regular daily operations will help ensure that the actual procedures for use, maintenance, and service respond to the real situations in which the systems are installed and functioning and will also ensure both productivity and welfare of workers.

The actual conditions of use inevitably change over time and can alter the effective functioning of the work system - for example, changes in management styles, personnel turnover, periodic maintenance tasks, and higher demands for increasing its productivity. It may also happen that the work system is sold to other companies and/or exported to other countries. Systematic, long-term monitoring of work system functioning from the HFE perspective helps to identify and fix possible operational deviations, ensuring appropriate operational and human sustainability. An audit inspection based on HFE principles and guidelines is essential in those cases.

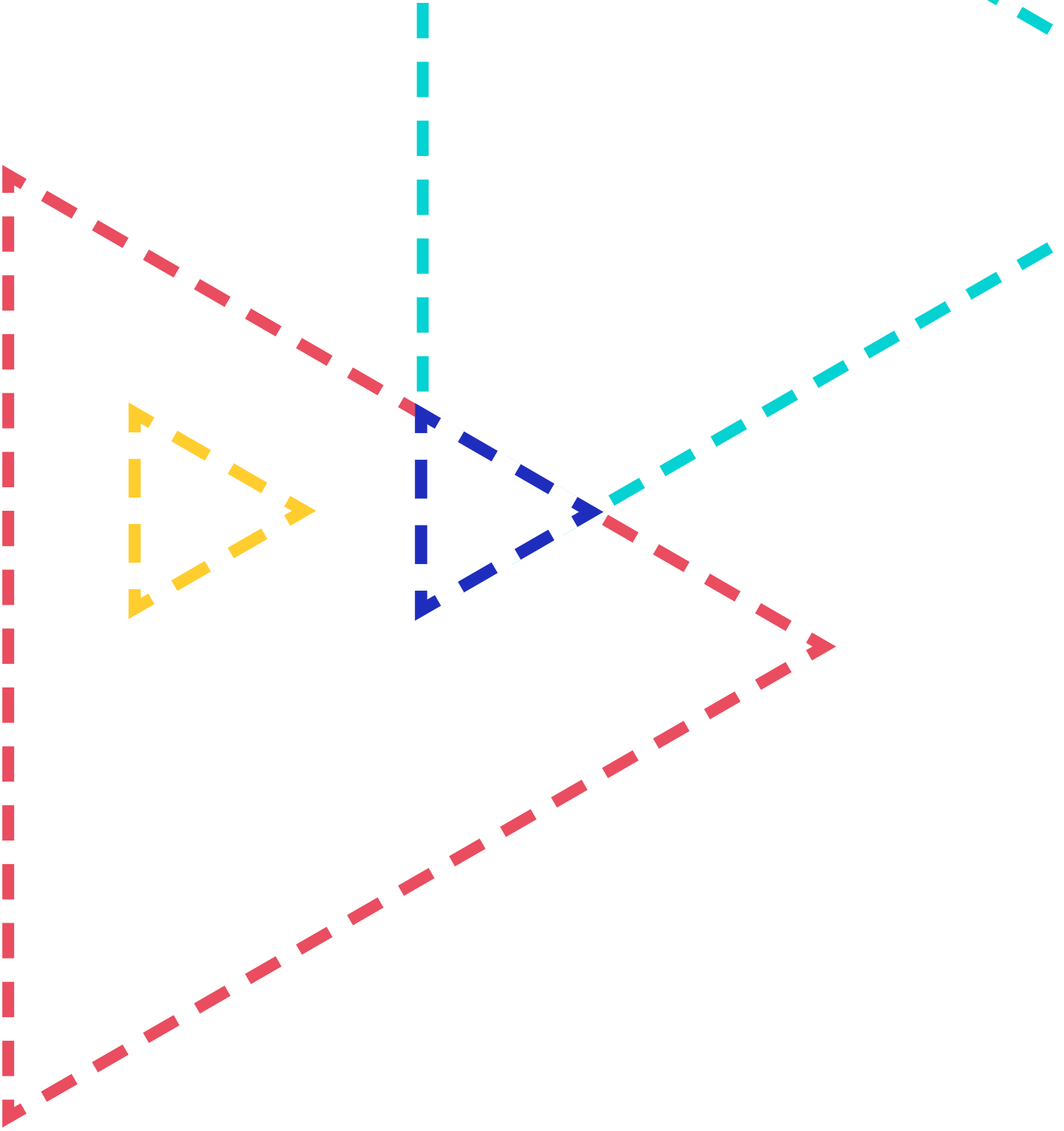
It is highly recommended that those involved in meaningful HFE actions or improvements are rewarded and recognized. Recognition of individual and/or collective efforts must be an essential part of the promotion of HFE actions in organizations worldwide.

Risks of not using continuous learning approach include:

- Danger of repeating earlier mistakes.
- Failure to capitalize on early learning during projects and other work redesign initiatives.
- Obsolescence of work system design due to failure to update for changing conditions.

Benefits of continuous learning approach include:

- Improved morale and job satisfaction, less absenteeism and turnover because the employer is responsive to workers' needs when making work system modifications.
- Positive organization climate and appreciation of HFE efforts.
- Potential for organizational excellence.



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Appendix 1. Characteristics of special populations that should be considered for HFE and manual handling in the workplace

This Appendix describes common subpopulations and describes differentiating characteristics that should be considered when designing tasks that are balanced with their unique capacities. To paraphrase SafeWork Australia, the goal of designing work should be to design "good work" that is healthy and safe by minimizing hazards and risks to optimize human performance, job satisfaction, and productivity (*Principles of Good Work Design*, n.d.). Understanding the challenges and needs of workers in subpopulations allows HFE practitioners, researchers, and legislators to promote "good work" for all workers.

Women and Work

Unique differences of women

There are numerous biological differences between men and women that impact their physical capacity to perform work. The largest differences between men's and women's muscular strength across age groups have been well documented and explain important differences in relative workload given the demand of a certain task. Absolute strength differences have been proposed to be due to differences in muscle mass that directly impact the number of force-producing muscle fibers in any given muscle. Thus, in every working age group, population strength averages are lower for women than men in terms of grip force, pinch force, and other commonly used muscle groups for work (shoulder, legs etc.). In fact, some studies have documented that, at their strongest age between 20 to 30 years, women's strength is comparable to the strength of men at the age of 60-70 years. Thus, given the same task demand, women are consistently working at a higher percentage of their capacity than men.

Best practices for job design

Designing work to accommodate as much of the female population as possible should be a primary design goal. Achieving this not only protects female workers from risk of injury, but it vastly increases the number of skilled workers who can perform the job. Designing for women includes:

- Lowering the required grip and pinch requirements of jobs through tool design, workstation design, and/or semi-automation.
- Ensuring the size of hand tools is set to optimize their grip strength.

- Lowering the magnitude of loads lifted and hand forces exerted to increase resistance to fatigue.
- Acknowledge that women are working at a higher percentage of their capacity than men and be sure to provide adequate recovery time for tasks based on women's increased relative workload.
- Educate female workers about the risks of working at a higher relative workload and encourage them to identify, report, and respond to symptoms early.

Pregnant women

Unique differences

As a woman progresses through her pregnancy, there are some key changes that impact her work capacity for certain tasks. First, anthropometric changes, particularly the increase in abdominal girth, will increase the compressive forces on the spine and the demands of muscular workload. The growing baby will change center of mass in the mother challenging the balance and efficiency of her gait. The increase in load from baby increases biomechanical loading and the horizontal distance increases for loads carried. Hormonal changes increase the laxity of ligaments and contribute to spinal instability. Hormonal changes can also cause extreme fatigue which can be magnified by sleep disruptions in the last trimester due to positional discomfort and the frequent need to urinate throughout the night. The ability to regulate body temperature can also be impacted leading to increased risk of heat stress. Additionally, respiratory changes and the increase in cardiovascular load can increase the effort exerted to complete a specific task. The third trimester can also be accompanied by increased peripheral edema in the lower extremities with reduced lymphatic and venous return. This makes prolonged standing particularly difficult for pregnant women. In fact, prolonged standing has been associated with stillbirths, spontaneous abortions, low birth weights, and pre-term deliveries (Waters & Dick, 2015).

Best practices for job design

Facilitating task modifications to accommodate pregnant women is the best way to keep them working throughout most of the pregnancy and increases the chance that they will return after maternity leave. Some factors to consider include the physical requirements of the job, control of how and when the job is performed, the flexibility of the job, and assigned shifts. Notably, these are the same factors that generally help protect and retain most workers. In particular, for pregnant women consider the following (Morrissey, 1998):

- Implement general lift recommendations that suggest a maximum lift of 10-12kg 12 times or less per day, particularly after week 24 of gestation.
- Implement the Revised NIOSH Lift Equation Provisional Recommended Weight Limit (RWL) for manual lifting during pregnancy which takes into account different characteristics of the lift (Waters et al., 2014).
- Occupational tasks should not require more than 140 to 150 bpm which is equivalent to a rating of "somewhat hard" on the Borg scale of perceived exertion.
- Shift work should avoid rapidly rotating and night shifts.
- Standing work should be reduced to less than 2 hours by providing a seat and/or reducing the duration of standing tasks.
- Provide adequate job control so pregnant women can take a rest when needed, particularly to use the bathroom more frequently.
- Be aware of heat and cold stress and ensure early and adequate measures to avoid these are taken early in the pregnancy.
- Vibration and noise stress should be minimized through task modifications, PPE, and/or dampening devices.
- Eliminate reaches above the shoulder (60in or 152.5cm) and below the waist (36in or 91.4cm).

- Provide flexibility during pregnancy for medical appointments and post birth for mother/baby wellness checks. Extending flexibility to mothers (and fathers) with young children may optimize retention of workforce.
- Improve maternity leave availability and child caregiving, which are the two of the most important policies that a country, or organization, can implement to support pregnant and new mothers and retain them in the workforce.

Children, teenagers, and young adults in the workplace

Unique differences

Individual characteristics of young workers that increase risk of injury and accidents include their physical, cognitive, and psychosocial maturity and level of experience (Hanvold et al., 2019). Younger workers tend to have less safety compliance, more safety neglect, and less risk aversion than their more mature older counterparts. However, there are differences in the jobs typically performed by young workers that also increase their risk. Globally, factors that increase the number of injuries among teenage and young adults include (Breslin & Smith, 2005; Hanvold et al., 2019):

- More workplace hazards associated with young worker jobs.
- Violations of child labor laws.
- Fast pace of work.
- Minority status.
- Lack of skills and experience.
- Lack of supervision.
- Lack of high-quality safety training.

Best practices for manual material handling (MMH) and job design

Protecting teenage and young adult workers requires a multifaceted approach from legislators, employers, labor organizations, parents, and health care providers. Strategies should include:

- Discussion of workplace safety between parents and health care providers and teens and young adults to support their self-advocacy for safety on the job.
- Job safety training specific to teens and young workers.
- Oversight and mentorship of young workers by more senior, safety minded workers or supervisors.
- Communication of age restricted tasks to all workers, supervisors, and managers. Use visual cues to remind all workers and supervisors of age restricted activities and respond quickly if age-based restrictions are broken.
- Provision of flexibility of schedules to accommodate education allowance with work.
- Limits on tasks that are hazardous since for young workers: 1) hazard recognition can be limited; 2) perceptions of risk can be lower; 3) likelihood of voicing safety concerns is lower; and 4) awareness of legal protections is limited (Guerin, 2020).
- Education around some of the most dangerous tasks for young workers such as: lifting objects, working at elevation, working with knives, food slicers or hot substances, operating equipment or motor vehicles, and running equipment and machinery (https://ohsinsider.com/top-7-dangers-young-workers/).

The aging workforce

Unique differences

Physical, cognitive, and psychosocial changes with age require modifications in how tasks are designed to support optimal performance at work. Some of the physical and cognitive changes of the older worker include:

- Loss of about 15-20% of strength by the age of 60.
- Loss of range of motion or flexibility.
- Reduced functional breathing capacity, which can affect one's ability to perform heavy physical labor.
- Loss of balance; increased risk of slips trips and falls.
- Increased recovery time needed.
- Reduced sleep or irregular sleep, which can be exacerbated by a change in work hours or exposure to excessive light and noise.
- Reduced thermoregulation that can reduce the body's ability to regulate in hot and cold temperatures leading to an increased risk of overheating.
- Vision and auditory deficits that make it hard to read small print or hear higher pitch sounds and voices.
- Fluid intelligence declines (inductive reasoning, selective attention, information processing) while verbal tasks remain constant or improve; changes to short term memory and selective attention may impact the learning of a new skill which could be exacerbated by a busy environment with lots of stimuli.

Best practices for job design

- Provide adequate training that allows extra learning time and is practically based with adequate justification and logic.
- Adjust training to the types of learners based on their individual experience and needs.
- Apply practices that reduce the chance of injury or occupational illness such as having equipment in good working condition, training on safe work procedures, low hazard exposures, supportive management styles, and risk assessments that take into account aging factors.
- Provide and support workplace health promotion initiatives (active living, healthy eating, stress awareness, violence prevention programs, etc.).
- Incorporate programs such as Work Ability Promotion, which has been strongly associated with the Work Ability Index (https://workbox.chrodis.eu/repository/pdf/WAI_Work-Ability-Index.pdf) indicating that it supports a high quality and productivity of work and the ability to function well and stay in good health. This program has been developed around 4 pillars including:
  - Making adjustments to the physical environment.
  - Making adjustments to the psychosocial environment.
  - Promoting health and healthy lifestyle.
  - Updating professional skills.

Persons with disabilities

Unique differences

Persons living with a disability will have unique capacities for work based on their individual situations. A secondary impact on their capacity could stem from lack of accessible education and training, which can lead to a large gap in education between those living with and without a disability. Physical barriers can be obstacles to people with disabilities and may present challenges during the interview, application or employment process. Transportation challenges can also make going to and from work unfeasible. Despite physical challenges to work, perhaps the biggest obstacle is the discrimination that people living with a disability face because their abilities and needs for accommodation are misunderstood. Due to this, those who can conceal their condition often do when applying for education and work opportunities.

Best practices for job design

- Establish an organizational culture that is welcoming to people living with a disability by educating all workers (especially supervisors and managers) about discrimination and bias and how to be an ally to a worker with a disability.
- Provide/participate in supported employment that integrates competitive labor market placements with supportive services.
- Work with people with disabilities to understand what accommodations might be necessary.
- Provide high decision latitude so that persons with a disability can take breaks when needed and perform tasks in a way that is optimized for him/her/them.
- Take advantage of legislative incentives for employing persons with disabilities to help support needed accommodations.
- Ensure job postings, interviews and selection procedures are completely accessible.
- Provide flexible work schedules and shift durations as part of job accommodation.
- Adapt the work environment to the needs of the worker.
- Provide person-centered job placements that identify jobs that meet the interests and abilities of people with a disability.
- Apply universal design to the workplace since it accommodates all workers, particularly those with more common disabilities. (https://www.funduszeeuropejskie.gov.pl/media/72628/Dostepnosc_angielski.pdf).

Migrant workers

Unique differences

For numerous reasons, migrant workers are often engaged in jobs that are hazardous to their health, sometimes referred to as 3-D jobs - dirty, dangerous, and demanding. Compared to other workers, they typically work for longer hours for less pay in more hazardous conditions that impact their physical and emotional welfare, particularly since they are at higher risk of human rights violations at work. Unsurprisingly, migrant workers have high rates of adverse health outcomes, workplace injuries, and fatalities. The risk of deportation and/or loss of job silences migrant workers in even the most dangerous and precarious of work situations, so their safety issues are often not addressed.

Best practices for job design

- Provide PPE, training, instructions, and warning labels in multiple languages to meet the needs of the migrant workforce.

- Provide safety trainings with adequate time to "tell, show, do and apply" the material.
- Implement systems that include surveillance and track implementation of safety trainings, including ergonomic training.
- Include migrant workers in the development and implementation of training.
- Designate a migrant worker(s) to communicate concerns of a group to supervisors to subdue fears of retaliation.
- Apply HFE principles to all workers, regardless of legal status, immigration status, or nation of origin.

Gig workers

Unique differences

Lower paid workers in non-traditional employment, who tend to be female and/or of color, are more likely to have increased exposure to physical, chemical, or safety hazards and lower pay relative to their traditional worker counterparts (Cummings & Kreiss, 2008). The increase in risk of injury, illness, and death among non-traditional workers has been well documented (Kivimaki, 2003; Morris, 1999; Silverstein et al., 2002; Smith et al., 2010; Virtanen et al., 2005). A Finnish study found 1.2 to 1.6 times higher risk of all-cause mortality among temporary workers compared to those with permanent employment, and interestingly, those who moved from temporary to permanent employment had lower mortality rates than those who stayed in temporary employment (Kivimaki, 2003). Several issues and practices impact the health and safety of non-traditional workers:

- Employers who shift risk by hiring non-traditional workers to perform tasks with higher exposures or safety risks (Rousseau & Libuser, 1997; Thébaud-Mony, 1999).
- Lack of clarity in and responsibility for the management of safety protocols and training of such workers (Morris, 1999).
- Little if any training or provision of personal protective equipment (PPE).
- Increased risk of psychological distress and disorders such as depression and anxiety due to increased job strain and lack of social support at work (Marchand & Blanc, 2010).
- Little control over schedules and last minute changes to work (Cummings & Kreiss, 2008), making it difficult to manage work-family conflicts and maintain job security. This increases the risk of material hardships such as food insecurity, housing instability, and challenges with childcare.
- Increased work-family conflict with precarious employment.
- Unpredictable schedules that tend to exacerbate poor eating and exercise habits (Bohle et al., 2004) and high job strain, commonly increased among workers in non-traditional position. This has been shown to reduce sleep quality and quantity which in turn affects physical activity, eating habits, disease and substance abuse (Barnes & Zimmerman, 2013).

Best practices for job design

- Ensure PPE and training are provided to non-traditional workers, regardless of how long they will be working for a given employer.
- Enforce existing workplace health and safety regulations.
- Assess company use of independent contractors to make sure they are not being given high exposure jobs disproportionately.
- Include non-traditional workers in health and safety training.

Appendix 2.
ILO Instruments relevant to HFE and manual handling in the workplace

Conventions

Labour Inspection Convention, 1947 (No. 81)
Hygiene (Commerce and Offices) Convention, 1964 (No. 120)
Employment Injury Benefits Convention, 1964 (No. 121)
Maximum Weight Convention, 1967 (No. 127)
Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148)
Occupational Safety and Health Convention, 1981 (No. 155)
Occupational Health Services Convention, 1985 (No. 161)
Safety and Health in Construction Convention, 1988 (No. 167)
Safety and Health in Mines Convention, 1995 (No. 176)
Safety and Health in Agriculture Convention, 2001 (No. 184)
Protocol of 2002 to the Occupational Safety and Health Convention, 1981 (No. 155)
Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)
Maritime Labour Convention, 2006, as amended (MLC, 2006)
Violence and Harassment Convention, 2019 (No. 190)

Recommendations

Labour Inspection Recommendation, 1947 (No. 81)
Protection of Workers' Health Recommendation, 1953 (No. 97)
Welfare Facilities Recommendation, 1956 (No. 102)
Hygiene (Commerce and Offices) Recommendation, 1964 (No. 120)
Employment Injury Benefits Recommendation, 1964 (No. 121)
Maximum Weight Recommendation, 1967 (No. 128)
Working Environment (Air Pollution, Noise and Vibration) Recommendation, 1977 (No. 156)
Occupational Safety and Health Recommendation, 1981 (No. 164)
Occupational Health Services Recommendation, 1985 (No. 171)
Safety and Health in Construction Recommendation, 1988 (No. 175)
Safety and Health in Mines Recommendation, 1995 (No. 183)

Safety and Health in Agriculture Recommendation, 2001 (No. 192)

List of Occupational Diseases Recommendation, 2002 (No. 194)

Promotional Framework for Occupational Safety and Health Recommendation, 2006 (No. 197)

Work in Fishing Recommendation, 2007 (No. 199)

HIV and AIDS Recommendation, 2010 (No. 200)

Domestic Workers Recommendation, 2011 (No. 201)

Violence and Harassment Recommendation, 2019 (No. 206)

Codes of practice

Protection of workers against noise and vibration in the working environment – 1977

Safe design and use of chain saws – 1978

Occupational exposure to airborne substances harmful to health – 1980

Radiation protection of workers (ionizing radiations) – 1987

Prevention of major industrial accidents – 1991

Safety and health in construction – 1992

Safety and health in forestry work - 1992

Safety in the use of chemicals at work – 1993

Recording and notification of occupational accidents and diseases – 1996

Safety, health and working conditions in the transfer of technology to developing countries – 1988

Safety in the use of synthetic vitreous fibre insulation wools (glass wool, rock wool, slag wool) – 2001

Ambient factors in the workplace – 2001

Safety and health in the non-ferrous metals industries – 2001

Safety and health in ports – 2003

Safety and health in the iron and steel industry – 2005

Safety and health in underground coalmines – 2006

Safety and health in agriculture – 2011

Safety and health in the use of machinery – 2013

Safety and health in opencast mines – 2018

Safety and health in shipbuilding and ship repair (Revised edition) – 2019

Safety and health in textiles, clothing, leather and footwear – 2022

Guidelines

Guide to health and hygiene in agricultural work – 1979

Occupational Safety and Health Series, No. 72: Technical and ethical guidelines for workers' health surveillance – 1998

Guidelines on occupational safety and health management systems, ILO-OSH 2001

Guidelines for implementing the occupational safety and health provisions of the Maritime Labour Convention, 2006 – 2015

Manuals and training material

Occupational Safety and Health Series, No. 50: Human stress, work and job satisfaction: A critical approach – 1983.

Safety-health and working conditions: Training Manual – 1987

Improving working conditions and productivity in the garment industry: An action manual – 1998

Health, safety and environment: A series of trade union education manuals for agricultural workers – 2004

Framework guidelines for addressing workplace violence in the health sector: The training manual – 2005

Ergonomic checkpoints (2nd edition) – 2010

SOLVE: Integrating health promotion into workplace OSH policies - Trainer's guide – 2012

Ergonomic checkpoints in agriculture (2nd edition) – 2014

Work improvement in neighbourhood development: Global action guide for WIND – 2014

HealthWISE - Work improvement in health services - Action manual – 2014

Practical guide on teleworking during the COVID-19 pandemic and beyond – 2020

Managing work-related psychosocial risks during the COVID-19 pandemic – 2020

Participatory action-oriented training (PAOT) (For Wind and Wise) – 2020

Additional related publications and materials

Bus drivers: Occupational stress and stress prevention – 1996

International research project on job retention and return to work strategies for disabled workers: Study report, USA – 1999

Guidance for the prevention of stress and violence at the workplace – 2001

Tackling hazardous child labour in agriculture: guidance on policy and practice: user guide – 2006

Compressed working weeks, Conditions of Work and Employment Series No. 12 – 2006

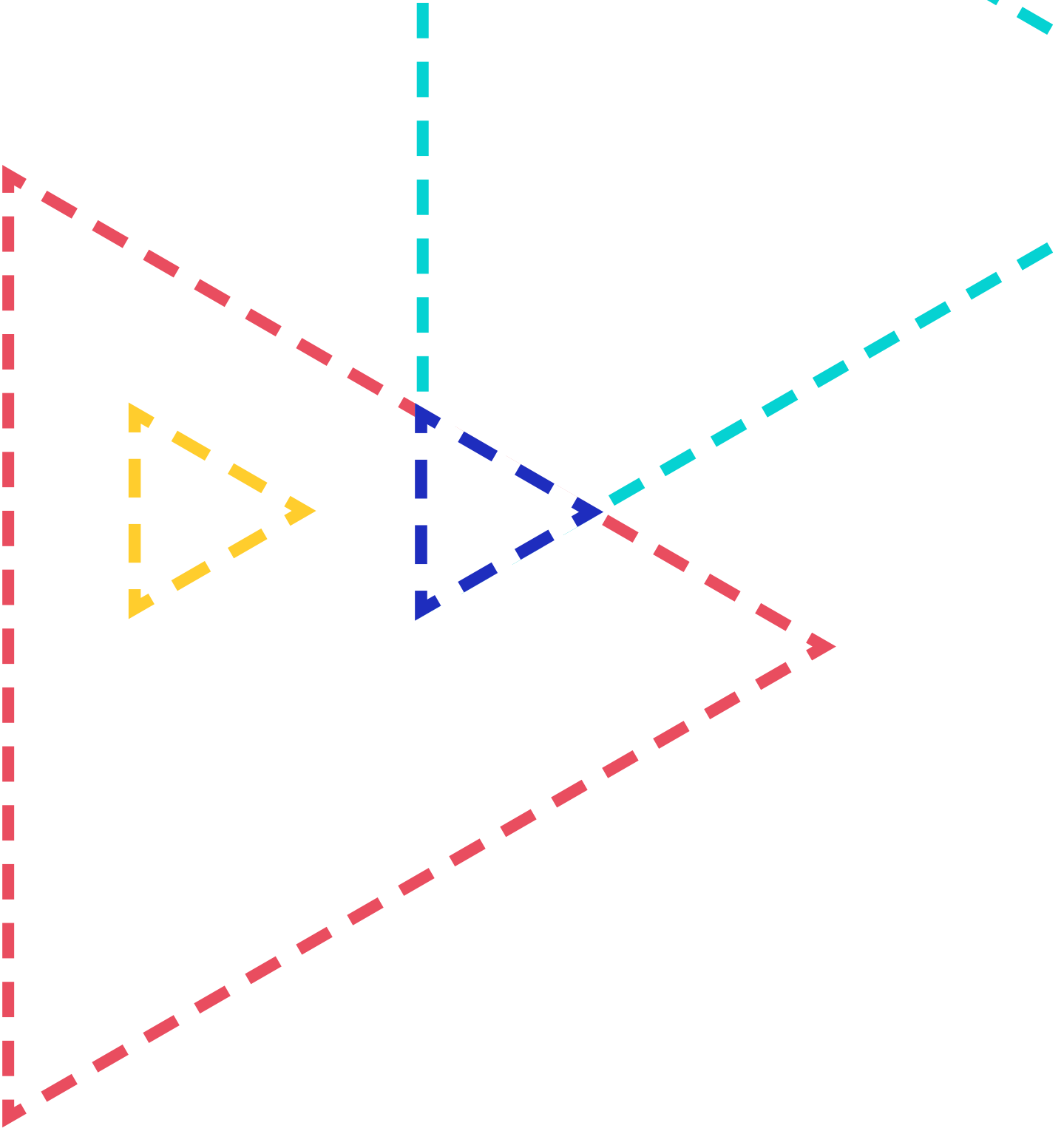
Working time, health, and safety: A research synthesis paper, Conditions of Work and Employment Series, No. 31 – 2012

Rural-relevant tools: Guidance on policy and practice – "Agriculture Kit" – 2011

Building a preventative safety and health culture – 2013

ILO global database on occupational safety and health legislation

Principles and guidelines for human factors/ergonomics (HFE) design and management of work systems – 2021



Appendix 3. IEA survey of HFE legislation – template and responses

Format for collecting HFE related information*

Country	**Country name in English**
Document ID	Document number or any other identifier
Document title	Document title in local language
	Document title in English (give a translation if there is not a formal English title)
Relevant article	If possible
Document type	Select (constitution, law, act, code, guideline, policy, recommendation, other [specify])
Relevant to	Select as many as apply (general workplace HFE, manual handling, injury prevention, Occupational safety and health, cognitive or psycho-social HFE)
What is specified	Very brief description of the content
Related document	Referenced national or international document (e.g., ILO or ISO document)

* This format was used for collecting relevant information from the IEA Federated Societies. Entries are shown as submitted by respondent.

ARGENTINA

Country	Argentina
Document ID	Ministry of Labor, Employment and Social Security Resolution 295/2003
Document title	Technical specifications on ergonomics and manual lifting of loads
Relevant article	Technical specifications on ergonomics and manual lifting of loads
Document type	Guideline (regulations)
Relevant to	Ergonomics program. manual material handling – repetitive movements
What is specified	Work-related musculoskeletal disorders are recognized as a major occupational health problem that can be managed using an ergonomics for health and safety program.

Country	Argentina
Document ID	National Decree 49/2014
Document title	List of occupational diseases
Relevant article	List of occupational diseases
Document type	Guideline (Regulations)
Relevant to	List of Occupational Diseases
What is specified	List of Occupational Diseases and their respective risk agents, clinical pictures, exposure and activities capable of determining occupational disease.

Country	Argentina
Document ID	Superintendence of labor risks, Ministry of labor, Employment and social security resolution 886/2015
Document title	Ergonomics protocol
Relevant article	Ergonomics protocol - HFE in general
Document type	Guideline (Regulations)
Relevant to	Ergonomics Protocol - HFE in general - Risk assessment and management
What is specified	The Protocol will be mandatory for all employers, except those whose ergonomics management protocol is of similar characteristics and provided that it includes the different steps of risk identification, risk assessment, definition of measures for correction and prevention, and its implementation and monitoring for each job position.

Country	Argentina
Document ID	superintendence of labor risks, ministry of labor, employment and social security resolution 3345/2015
Document title	Manual handling lifting and carrying, pushing and pulling
Relevant article	Manual material handling
Document type	Guideline (regulations)
Relevant to	Manual material handling
What is specified	The Protocol sets maximum limits for heavy object moving tasks, set maximum limits for pushing or pulling heavy objects based on ISO Standards.
Related document	ISO 11228-1

AUSTRALIA

Country	**State of Victoria, Australia**
Document title	Compliance Code: Plant, Edition 2, 2019
Relevant article	Large parts of the document
Document type	Code (mandatory)
Relevant to	Plant Designers (Part 2.1), Manufacturers (Part 2.2), Suppliers (Part 2.3), and to employers and managers responsible for use of plant (Part 3)
What is specified	Risk management requirements, including information, instruction, training and supervision, guarding where relevant, and design-related hazards including design of operator controls and warning devices, powered mobile plant. For employers, hazard sources including materials processed, plant location, systems of work and associated risk management requirements, including application of the hierarchy of risk control. Hazard checklist covers a large and diverse set of hazards, including those affecting risk of slips, trips, falls and risk of musculoskeletal disorders, as well as various forms of traumatic injury.
Related document	Regulation 74 of Victoria's OHS Regulations

Country	**State of Victoria, Australia**
Document title	Hazardous manual handling (Edition 2, 2019)
Document type	Compliance Code (Evidence of a failure to observe a compliance code may be used as evidence in proceedings for an offence under the OHS Act or Regulations. A WorkSafe inspector may cite a compliance code in a direction or condition in an improvement notice or a prohibition notice as a means of achieving compliance).
Relevant to	This Code applies to employers, employees, designers, manufacturers and suppliers. Additionally, it may be useful for workers' Health and Safety Representatives.
What is specified	**'Hazardous manual handling'** defined as work requiring the use of force exerted by a person to lift, lower, push, pull, carry or otherwise move, hold or restrain: • a thing, live person or animal if the work involves one or more of the following: – repetitive or sustained application of force – sustained awkward posture – repetitive movement – application of high force involving a single or repetitive use of force that it would be reasonable to expect that a person in the workforce may have difficulty undertaking – exposure to sustained vibration • live persons or animals • unstable or unbalanced loads or loads that are difficult to grasp or hold. **Musculoskeletal disorder (MSD)** is defined (para.6) S**pecifies required risk management processes**, including hazard identification, risk assessment, risk control in accord with the hierarchy of control, and review and revision of control actions, as well as requirements for designers, manufacturers and suppliers. **Specifies risk controls** to consider, including alterations to: ***Workstation or work area design:*** Working heights, position, space ***Workplace environment:*** Vibration, cold conditions, heat and humidity, windy conditions, floors and surfaces, lighting ***Systems of work:*** Workload and pace of work; Resources and support ***Things used in the hazardous manual handling:*** Tools and equipment
Related document	Victoria's OHS Act 2004 and OHS regulations 2017

Country	State of Queensland, Australia
Document title	Work health and safety consultation, cooperation and coordination: Code of Practice, 2021.
Document type	Code of Practice (Evidence of a failure to observe a Code of Practice may be used as evidence in proceedings for an offence under section 26A of the WHS Act (or a higher standard if available). Courts may regard a Code of Practice as evidence of what is known about a hazard, risk or control and may rely on the Code in determining what is reasonably practicable in the circumstances to which the Code relates. An inspector may cite a compliance Code in a direction or condition in an improvement notice or a prohibition notice as a means of achieving compliance).
Relevant to	All duty holders under the WHS Act and the WHS Regulation – that is, "persons conducting a business or undertaking (PCBUs), designers, manufacturers, importers, suppliers and installers of plant, substances or structures, officers." Workers and other persons at the workplace also have duties under the WHS Act.
What is specified	When and how to consult with workers, and why consultation is important. What is effective consultation? What is effective consultation with other duty holders? PCBUs must consult with workers when: • Identifying hazards and assessing risks to health and safety arising from the work carried out or to be carried out • Making decisions about ways to eliminate or minimize those risks • Proposing changes that may affect the health or safety of workers • Developing work health and safety procedures.
Related document	Section 274 of the Work Health and Safety Act 2011 (WHS Act), Queensland *Work health and safety Regulation 2011* (WHS Regulation), Queensland

Country	Australia
Document title	Heavy vehicle (fatigue management) national regulation, 2018
Relevant article	Whole document
Document type	Regulation (mandatory), under the heavy vehicle national law (Queensland)
Relevant to	Owners and operators of heavy vehicles. Its purpose is prevention of errors and resultant injuries/fatalities arising from driving performance of specified heavy vehicle drivers (truck, fatigue-regulated bus), separately for solo and 'two up' driving.
What is specified	Specifies maximum work requirements and minimum rest requirements (hours/minutes), taking account of preceding work history (hours), time of day/night, requirement for drivers to keep a work diary, odometer requirements.
Related document	OHS/WHS Acts of each Australian jurisdiction

Country	State of Victoria, Australia
Document title	Confined spaces (Edition 2, 2019)
Document type	Compliance Code (Compliance with a compliance code demonstrates compliance with the OHS legislative duty covered by the code provision. Evidence of a failure to observe a compliance code may be used as evidence in proceedings for an offence under the OHS Act or Regulations. A WorkSafe inspector may cite a compliance code in a direction or condition in an improvement notice or a prohibition notice as a means of achieving compliance).
Relevant to	Designers, manufacturers and suppliers of plant that includes or is intended to include a confined space. Employers, those with management and control of workplaces, employees and the self-employed.
What is specified	How to identify hazards and control risks associated with working in a confined space, and related information employer's duty to consult with employees. Many hazards are covered, including (not confined to): hazardous manual handling, and the physiological and psychological demands of working in a confined space.
Related document	OHS Act s24 of and OHS Regulations r11

Country	State of Victoria, Australia
Document title	Communicating occupational health and safety across languages (2008)
Document type	Compliance Code (Evidence of a failure to observe a compliance code may be used as evidence in proceedings for an offence under the OHS Act or Regulations. A WorkSafe inspector may cite a compliance code in a direction or condition in an improvement notice or a prohibition notice as a means of achieving compliance).
Relevant to	Workplaces with employees whose language skills require use of non-English languages to understand information, receive training and participate in consultation. Employers, those with management and control of workplaces, employees and the self-employed.
What is specified	• identifying language groups within the workforce • techniques for communicating across languages • suitable approaches to providing information and undertaking consultation • using translators, interpreters and bilingual staff • effective ways to provide training
Related document	Section 22(1) (c) of Victoria's Occupational Health and Safety Act 2004

Country	State of Queensland, Australia
Document title	How to manage work health and safety risks: Code of Practice, 2021
Document type	Code of Practice (Evidence of a failure to observe a Code of Practice may be used as evidence in proceedings for an offence under the WHS Act or Regulations. A WorkSafe inspector may cite a compliance code in a direction or condition in an improvement notice or a prohibition notice as a means of achieving compliance)
Relevant to	All duty holders under the WHS Act and the WHS regulation – that is, "persons conducting a business or undertaking (PCBUs), designers, manufacturers, importers, suppliers and installers of plant, substances or structures, officers. Workers and other persons at the workplace also have duties under the WHS Act.
What is specified	How to identify hazards, assess risks, control risks applying the hierarchy of risk control, and review effectiveness of controls. Examples of hazards include (not confined to): • Manual tasks (involving sustained or awkward postures, high or sudden force, repetitive movements or vibration) … risk of MSDs • Gravity (falling objects, falls, slips and trips of people) … risk of fractures, etc. including death • Psychosocial (excessive time pressure, bullying, violence and work-related fatigue) … risk of psychological or physical injury or illness • Machinery & equipment (being hit by moving vehicles, or caught in moving parts) … risks as for Gravity
Related document	Queensland's WHS Act 2011 (section 26A), and WHS regulation 2011

Country	Australia
Document title	Rail Safety National Law National Regulations 2012, Schedule 1. Content of safety management system, Clause 17. Human Factors https://legislation.nsw.gov.au/view/whole/html/inforce/current/sl-2012-0617
Relevant article	17. Human Factors Procedures to ensure that human factor matters are taken into account during the development, operation and maintenance of the safety management system and for the integration of human factors principles and knowledge into all relevant aspects of operational and business systems.
Document type	Statutory Regulations
Relevant to	Rail industry - Human factors in the SMS and for integration into systems.
What is specified	That the rail organisations must take human factors into account when developing, operating and maintaining their safety management system and that human factors must also be integrated into the rail organisation's relevant business and operational systems.
Related document	AS7470 Human Factors Integration in Engineering Design – General Requirements Rail Industry Safety and Standards Board (RISSB) - Guideline – Integration of Human Factors in Engineering Design Rail Industry Safety and Standards Board (RISSB) - Guideline – Integration of Human Factors across the Project Lifecycle Rail Safety and Standards Board (RSSB) – Guideline GEGN8613 Iss 1. Application of human factors within safety management systems.

Country	State of Victoria, Australia
Document title	Occupational Health & Safety Regulations 2017 http://classic.austlii.edu.au/au/legis/vic/consol_reg/ohasr2017382/
Relevant article	PART 3.1--HAZARDOUS MANUAL HANDLING 26. Hazard identification 27. Control of risk 28. Review of risk control measures
Document type	Statutory Regulations
Relevant to	Hazardous manual handling in Victorian workplaces
What is specified	Regulated requirements for hazard identification, control of risk and review of risk control measures for manual handling by employers in Victoria, Australia.

Country	State of New South Wales (NSW), Australia
Document title	Work Health and Safety Act 2011.
Document type	Act
Relevant to	Workplace health and safety in NSW
What is specified	Legislative requirements for workplace health and safety

Country	State of New South Wales (NSW), Australia
Document title	Work Health and Safety Regulation 2017.
Relevant article	Part 4.2 – hazardous manual tasks (Clause 60 and 61)
Document type	Regulation
Relevant to	Workplace health and safety in NSW
What is specified	Legislative requirements for managing hazardous manual tasks

Country	State of New South Wales (NSW), Australia
Document title	Code of Practice – Hazardous manual tasks (NSW)
Relevant article	Work Health and Safety Act 2011.
Document type	Code of Practice
Relevant to	All those who hold duties/obligations under the Work health and safety act and regulations in NSW
What is specified	Provides information on the Legislative requirements for managing hazardous manual tasks, to assist duty holders achieve compliance and a minimum level of protection.

Country	State of New South Wales (NSW), Australia
Document title	Code of Practice – How to manage Work Health and Safety Risks (NSW)
Relevant article	Work Health and Safety Act 2011.
Document type	Code of practice
Relevant to	All those who hold duties/obligations under the Work health and safety act and regulations in NSW
What is specified	Provides information on the Legislative requirements for managing risks (risk management principles), to assist duty holders achieve compliance and a minimum level of protection.

Country	State of New South Wales (NSW), Australia
Document title	Code of Practice – Work Health and Safety consultation, cooperation and coordination (NSW)
Relevant article	Work Health and Safety Act 2011.
Document type	Code of practice
Relevant to	All those who hold duties/obligations under the Work health and safety act and regulations in NSW
What is specified	Provides information on the Legislative requirements for consultation, to assist duty holders achieve compliance and a minimum level of protection.

Country	State of New South Wales (NSW), Australia
Document title	Hazardous manual tasks systems self-assessment tool (NSW)
Relevant article	Work Health and Safety Regulation 2017 and Act 2011.
Document type	Guidance
Relevant to	All those who hold duties/obligations under the Work health and safety act and regulations in NSW
What is specified	Provides information on the Legislative requirements for managing hazardous manual tasks. It identifies what an appropriate system should contain in order for a business to effectively (and legally) manage hazardous manual tasks in the workplace.

BELGIUM

Country	Belgium
Document ID	Act of 4 August 1996 on well-being of workers in the performance of their work
Document title	The Act of 4 August 1996 on well-being of workers in the performance of their work and its implementing decisions apply to every employer who employs workers in Belgium.
Relevant article	Art 4
Document type	Law
Relevant to	all OSH risks
What is specified	Definition of well-being at work in 1996 with specification of ergonomics and psychosocial aspects. 1, work safety; 2, protecting workers' health at work; 3, psychosocial aspects of work; 4, ergonomics; 5, work hygiene; 6, embellishing the workplaces; 7, the enterprise's measures regarding the natural environment, relating to their influence on points 1° to 6°.
Related document	This Act transposes into Belgian law the framework Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.

Country	Belgium
Document ID	Well-being code, available in French and in Dutch: Code du bien-être au travail
Document title	Well-being code
Relevant article	All the 10 books but especially book 8 (ergonomics constraints), book 1, title 3 (psychosocial risks), book 3 (workplaces), book 5 (environmental and physicals factors) ...
Document type	Legislation
Relevant to	all OSH risks
What is specified	One main document, the code, to gather all the legislatives documents needed to comply with the well-being law. This code shows the importance of a global and multidisciplinary approach (all the OSH risks) and the participation of the workers for risks prevention and improvement of the working conditions. Book 8 equates HFE and MSD (musculoskeletal disorders) (ergonomics constraints) and gathered mainly the texts concerning the 2 main MSD European directives (manual handling and display screen).
Related document	This Act transposes also into Belgian law all the OSH European directives.

BRAZIL

Country	Brazil
Document ID	Law No. 6514 of December 22, 1977
Document title	Consolidation of labor laws
Relevant article	Chapter V of Title II – The general rules for the protection of labor, comprising 70 articles (from 154 to 201)
Document type	General labor regulation law
Relevant to	General workplace
What is specified	Injury prevention, and Occupational safety and health

Country	Brazil
Document ID	Ordinance No. 3214, JUNE 8, 1978
Document title	Regulatory standards, initially 28, today there are 37
Relevant article	Regulatory standard numbers 1, 3, 5, 7, and 17
Document type	Code and policy
Relevant to	HFE, Injury Prevention, Occupational safety and health
What is specified	Mandatory standards for all companies specify engineering and occupational safety issues and occupational health

Country	Brazil
Document ID	Regulatory standard number 17, November, 1990
Document title	Ergonomics
Relevant article	17.6 - work organization
Document type	Code
Relevant to	HFE
What is specified	General ergonomic standards of mandatory compliance, on furniture, tools, occupational environment and work organization

Country	Brazil
Document ID	Ordinance n. 555, April, 2013
Document title	Regulatory standard number 36
Document type	Normative guideline
Relevant to	HFE
What is specified	It instituted mandatory breaks, 60 minutes for 8 hours of work, to work in slaughterhouses.

Country	Brazil
Document ID	Ordinance n. 313, March 2012
Document title	Regulatory standard number 35
	Industrial safety and health work normative. HFE in general
Document type	Normative guideline
Relevant to	Work at height
What is specified	This gives a guide for organizations to provide safe and healthy performance for work at height.

Country	Brazil
Document ID	Ordinance n. 200, January 2011
Document title	Regulatory standard number 34
	Working conditions and environment in ship construction and ship repair
Document type	Normative Guideline
Relevant to	Working conditions and environment in the construction and ship repair
What is specified	Establishes the minimum requirements and safety protection measures, to health and the working environment in the activities of the shipbuilding and ship repair industry.

Country	Brazil
Document ID	Ordinance n. 202, December 2006
Document title	Regulatory standard number 33
	Working in confined spaces
Document type	Normative Guideline
What is specified	It is a norm for confined work, which establishes preventive measures, administrative measures, personal measures, training and measures for emergency situations, being the first regulatory norm to provide for the assessment of psychosocial risk factors.

Country	Brazil
Document ID	Ordinance n. 86, March 2005
Document title	Regulatory standard number 33
	Working conditions in agriculture
Document type	Normative Guideline
What is specified	Establishes the precepts to be observed in the organization and in the work environment, in order to make the planning and development of agricultural activities compatible, livestock, forestry, forestry and aquaculture with the safety and health and environment of work.

CANADA

Country	Canada
Document ID	CSA – Z412-17
Document title	Office ergonomics – an application standard for workplace ergonomics
Document type	Standard
Relevant to	Computer workstation and human interaction
What is specified	Provides standards on computer workstation design and set up.

Country	Canada
Document ID	CSA Z1004----12 (R2017)
Document title	Workplace ergonomics – a management and implementation standard
Document type	Standard
Relevant to	Application of an ergonomics management system in the workplace
What is specified	Details the plan do check act method to the implementation of an ergonomics program within a workplace for the reduction of injuries and process optimization.

Country	Canada
Document ID	SOR/86-304
Document title	Canada occupational health and safety regulations
	https://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304/index.html
Relevant article	Part XIV – Division III Manual Materials Handling
Document type	Federal Regulations
Relevant to	Labour Code (R.S.C., 1985, c. L-2) – Canada Labour Code
What is specified	Guidelines for MMH, Instruction required for employees who carry out lifting over 10kg, requirement for a work procedure for varying weight limitations (over 10kg, and over 45kg).

Country	Canada
Document ID	SOR/86-304
Document title	Canada occupational health and safety regulations
	https://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304/index.html
Relevant article	Schedule II - Part XIX – Hazard Prevention Program
Document type	Federal Regulation
Relevant to	Labour Code (R.S.C., 1985, c. L-2) – Canada Labour Code
What is specified	Under Part XIX of the Regulations entitled Hazard Prevention Program, employers are responsible for developing, implementing and monitoring a program for the prevention of hazards in the workplace, including ergonomics-related hazards, with the following components: • an implementation plan • a hazard identification and assessment methodology • hazard identification and assessment • preventive measures • employee education • a program evaluation

Country	Canada
Document ID	Occupational health and safety act (o.C. 2012-005)
Document title	Newfoundland and Labrador Health and Safety Regulation 5/12
Relevant article	Sections 43.8 Manual Handling, 50(1), 51(1), 52, 54(1), 55(1),56(1)
Document type	Regulations
Relevant to	MSI prevention, risk control, education and training, consultation, manual materials handling and seating or standing work.
What is specified	Requirements for identifying hazards related to MSI, control measures for those risks, required education and training on controls, and general requirements for lifting and handling with no specified weight or force thresholds.

CHILE

Country	Chile
Document ID	Ministry of the interior: N ° 1 of Art. 574 of DFL 178, Social welfare, published on May 28, 1931
Document title	Act 2951
	Act 2951
Relevant article	Labor standards act
Document type	Guideline (Law)
Relevant to	Prolonged Standing and time to lunch
What is specified	No. 1 of Art. 574 of DFL 178, Social Welfare, published on May 28, 1931, consolidated this law into a single text with the other work-related laws. It establishes that, in warehouses, shops, bazaars, warehouses, merchandise warehouses and all similar commercial establishments, the employer shall maintain enough seats or chairs available for all the dependents or employees. The dependents or employees will have the right to a break of an hour and a half, at least, each day, for lunch. The suspension of work may alternate between employees of the same establishment and will not necessarily be simultaneous for all of them.
Related document	ISO 2631

Country	Chile
Document title	Act 3915
	Ley 3915
Relevant article	Labor standards act
Document type	Guideline (Law).
Relevant to	Manual load handling
What is specified	N ° 3 of Art. 574 of DFL 178, Social Welfare, published on May 28, 1931, consolidated this law into a single text with the other work-related laws. Article 576 provides that said consolidated text will govern 6 months after its publication. The weight of the bags containing any kind of products, intended for loading by force of man, may not exceed eighty kilograms.
Related document	ISO 11228-1, Ergonomics — Manual handling — Part 1: Lifting and carrying

Country	Chile
Document ID	Ministry of labor and social security; undersecretary of social security, Law no. 3,500, 1980, Law no. 19,404 16-AGO-1995
Document title	Act 19404
	Ley 19404
Relevant article	Labor standards act
Document type	Guideline (Law)
Relevant to	Heavy jobs
What is specified	Introduces modifications to decree law N ° 3,500, of 1980, and dictates rules relating to pensions for old age, considering the performance of heavy jobs.
Related document	Safety and health in opencast mines: An ILO code of practice (ISBN 92-2-107103-0), Ginebra, 1991

Country	Chile
Document ID	Ministry of labor and social security, law N° 20,949, 17-SEP-2016
Document title	Act 20.949
	Ley 20.949
Relevant article	Labor standards act
Document type	Guideline (Law)
Relevant to	Manual load handling
What is specified	This law modifies the Labor Code. Among its objectives, it aims to avoid work absenteeism caused by low back pain, for which it updates the regulations for the protection of health and physical conditions of workers who carry out manual handling tasks, reducing the weight in loading and unloading operations, from 50 to 25 kilograms. Likewise, it establishes that minors under 18 years of age and women may not carry or transport loads greater than 20 kilograms.
Related document	ISO 11228-1, Ergonomics — Manual handling — Part 1: Lifting and carrying

Country	Chile
Document ID	Ministry of labor and social security; undersecretary of social security. 17-ENE-2018
Document title	Decree N°. 63 of 2.005
	Decreto 63 de 2.005
Relevant article	Labor standards act
Document type	Guideline (Law)
Relevant to	Manual load handling
What is specified	Approves regulation for the application of law N° 20.001, which regulates the maximum human load.
Related document	ISO 11228-1, Ergonomics — Manual handling — Part 1: Lifting and carrying

Country	Chile
Document ID	Ministry of health; undersecretariat for public health. 08-NOV-2012
Document title	Decree N° 28 of 2012
	Decreto N° 28 de 2012
Relevant article	Labor standards act
Document type	Guideline (Law)
Relevant to	Chronic intermittent hypobaric from high altitude
What is specified	Modifies decree N° 594, of 1999, regulation on basic sanitary and environmental conditions in workplaces
Related document	Safety and health in opencast mines: An ILO code of practice (ISBN 92-2-107103-0), Ginebra, 1991.

Country	Chile
Document ID	Ministry of health; undersecretariat for public health. 08-NOV-2012
Document title	Exempt Decree N°. 804, October 8, 2012
	Decreto N° 804 exento, October 8, 2012
Relevant article	Labor standards act
Document type	Guideline (Regulations)
Relevant to	Work-related musculoskeletal disorders
What is specified	Approves general technical standard for identification evaluation of risk factors for work-related musculoskeletal disorders (TMERT).
Related document	ISO 11228-3:2007 Ergonomics — Manual handling — Part 3: Handling of low loads at high frequency

Country	Chile
Document ID	Ministry of labor and social security, 17-ENE-2018
Document title	Decree N° 48 2018
	Decreto N°48 2018
Relevant article	Labor standards act
Document type	Guideline (Law)
Relevant to	Manual load handling
What is specified	Introduces modifications in the regulation for the application of law N° 20.001, which regulates the maximum human weight load, contained in the supreme decree N° 63, of 2005, of the ministry of labor and social security.
Related document	ISO 11228-1, Ergonomics — Manual handling — Part 1: Lifting and carrying

CHINA

Country	Hong Kong, China
Document ID	Cap. 509
Document title	Cap. 509 Occupational safety and health ordinance
Document type	Labour legislation documents
Relevant to	Safety and health of persons
What is specified	An Ordinance to ensure the safety and health of persons when they are at work, to provide for related matters, and to consequentially amend the factories and industrial undertakings ordinance and the administrative appeals board ordinance. [23 May 1997] L.N. 281 of 1997 (Format changes—E.R. 2 of 2018) (Enacting provision omitted—E.R. 2 of 2018) https://www.elegislation.gov.hk/hk/cap509

Country	Hong Kong, China
Document ID	Cap. 59AF
Document title	Cap. 59AF Factories and industrial undertakings (safety management) regulation
Document type	Labour Legislation documents
Relevant to	Safety management
What is specified	Factory and industrial regulation related to safety management. Safety management functions connected with the carrying on of an industrial undertaking that relates to the safety of personnel in the undertaking, including— (a) the planning, developing, organizing and implementing of a safety policy; and (b) the measuring, auditing or reviewing of the performance of those functions; https://www.elegislation.gov.hk/hk/cap59AF?xpid=ID_1438403503271_001

Country	Hong Kong, China
Document ID	cap509A
Document title	Occupational safety and health regulation
Document type	Labour Legislation documents
Relevant to	Occupational safety and health
What is specified	It Includes: Accident prevention, fire precautions, workplace environments, hygiene at workplaces, first aid at workplaces, and manual handling operations. https://www.elegislation.gov.hk/hk/cap509A?xpid=ID_1438403291395_001

Country	Hong Kong, China
Document ID	cap509B
Document title	Occupational safety and health (Display screen equipment) regulation
Document type	Labour legislation documents
Relevant to	Occupational safety and health
What is specified	(1) This Regulation applies to a workstation in a workplace that is— (a) provided by a person responsible for the workplace to be used by users for work; (b) not intended for use by the public; and (c) normally used or intended to be normally used by users. (L.N. 58 of 2002) https://www.elegislation.gov.hk/hk/cap509B

Country	Hong Kong, China
Document ID	cap59S
Document title	Factories and industrial undertakings (protection of eyes) regulations
Document type	Labour legislation documents
Relevant to	Occupational safety and health
What is specified	Eye protectors, shields or fixed shields provided under these regulations for the use of persons in any industrial undertaking to which these regulations apply shall be made in conformity with such specifications as the Commissioner may, by notice in the Gazette, declare to be approved specifications for the purposes of these regulations. https://www.elegislation.gov.hk/hk/cap59S

Country	Hong Kong, China
Document ID	cap59T
Document title	Factories and industrial undertakings (noise at work) regulation
Document type	Labour legislation documents
Relevant to	Occupational safety and health
What is specified	1) Where a proprietor's employee is likely to be exposed to a first action level or above or to a peak action level or above, the proprietor shall ensure that a person who by reason of his training and experience is competent to carry out a noise assessment makes a noise assessment which is adequate for the purposes— (2) Where there has been a significant change in the work to which the assessment relates or where the proprietor has reason to believe that the assessment is no longer adequate for the purposes referred to in subsection (1), the proprietor shall ensure that a further noise assessment is made under subsection (1). (3) The person who carried out the assessment shall prepare an assessment report in the form, and containing the information, that the Commissioner may, by notice in the Gazette, require. (4) Within 28 days after completing an assessment the proprietor shall send a copy of the assessment report to the Commissioner. (5) The proprietor shall make the assessment report available at all reasonable times for inspection by an occupational safety officer. (32 of 2000 s. 48) https://www.elegislation.gov.hk/hk/cap59T

Country	Hong Kong, China
Document title	Construction sites (safety) regulations (Cap. 59, section 7)
Document type	Labour legislation documents
Relevant to	Occupational safety and health
What is specified	These regulations apply to— (a) all construction work; (b) all construction sites; and (c) the machinery, plant, tools, gear and materials with which any construction work is carried on. https://www.elegislation.gov.hk/hk/cap59I?xpid=ID_1438403505190_003

Country	Taiwan, China
Document title	職業安全衛生法
	Occupational safety and health act
Relevant article	Act for protecting worker of occupational accidents
Document type	Act
Relevant to	Occupational safety and health
What is specified	The content of this act includes the prevention of repetitive tasks and other musculoskeletal diseases, the prevention of shift work, night work, and long-time work, the prevention of physical or mental violations due to the duties, and the protection for workers in evacuation, emergency case, rest or other matters.
Related document	Guidelines on occupational safety and health management systems (ILO-OSH 2001), ISO 45001, and ISO 20646

Country	Taiwan, China
Document title	職業安全衛生管理辦法
	Occupational safety and health management policy
Relevant article	Occupational safety and health act
Document type	Policy
Relevant to	Occupational safety and health
What is specified	Employers should establish their occupational safety and health executive records or documents within institutions with less than 30 workers. On the other hand, employers should establish their occupational safety and health executive regulations or human-hazard prevention projects within institutions with more than 100 workers.
Related document	ILO-OSH 2001

Country	**Taiwan, China**
Document title	勞動部勞動及職業安全衛生研究所處務規程
	Regulations of the institute of labor and occupational safety and health of the ministry of labor
Document type	Law
Relevant to	Injury prevention
What is specified	The Occupational Health Research Group handles matters including the prevention of human engineering hazards in the workplace and the study of on-site improvement techniques.
Related document	ISO 28002, ISO 16090, and ISO 17776

Transportation & aviation

Country	**Taiwan, China**
Document title	交通部運輸研究所辦事細則
	Rules for the administration of the institute of transportation of the ministry of transport
Document type	Law
What is specified	The responsibility of the transportation safety group includes the analysis and research items of the human factors engineering subject of transportation.

Country	**Taiwan, China**
Document title	航空器飛航作業管理規則
	Aircraft Flight Operation Regulations
Document type	Law
Relevant to	Cognitive, psycho-social HFE
What is specified	Aircraft users and flight crew members in flight operations and emergency situations should abide by the principles of human factors stipulated in various operating manuals, procedures, and checklists.

Country	**Taiwan, China**
Document title	航空人員檢定給證管理規則
	Regulations Governing Licences and Ratings for Airmen
Document type	Law
Relevant to	Cognitive, psycho-social HFE
What is specified	The pilots of various types of aircraft should pass the human factors studies related to human abilities, extreme knowledge, threats, and negligence management that have an impact on the safety and efficiency of aviation operations.

Country	**Taiwan, China**
Document ID	Document number of any other identifier
Document title	航空產品與其各項裝備及零組件維修廠設立檢定管理規則
	Regulations of repair station certification and management for aviation products, appliances and parts
Document type	Law
Relevant to	Cognitive, Psycho-social HFE
What is specified	The maintenance plant personnel training program should include maintenance resource management training to enhance coordination and cooperation among staff and flight crews, and reduce accidents caused by poor human factors.

Military

Country	**Taiwan, China**
Document ID	(concealed due to security issues)
Document title	作業空間與空間配置要點
	Principles for work space and space allocation
Document type	Regulations
Relevant to	HFE in military systems
What is specified	The document provides general principles for the design of standing and sitting tasks in terms of space requirements and allocations. The space designs and allocations for particular types of consoles and confined space such as ladders, tunnels, passages, platforms are also regulated along with their coloring and illumination.
Related document	MIL-STD-1472F

CZECH REPUBLIC

Country	**Czech Republic**
Document ID	262/2006
Document title	Labour Code
Relevant article	§101 - 108
Document type	Law
Relevant to	Labour law in general
What is specified	HSE and HFE rules for employers and employees

Country	**Czech Republic**
Document ID	258/2000 Sb.
Document title	Public Health Protection Law
Document type	Law
Relevant to	Health and Safety general
What is specified	HSE and HFE Standards and limits, work environment condition etc.

Country	**Czech Republic**
Document ID	NV 361/2007
Document title	Occupational Health Conditions
Document type	Government Regulation
Relevant to	HSE and HFE standards and parameters
What is specified	HSE and HFE Standards and limits, work environment condition etc.
Related document	EN_1005_1-5

Country	**Czech Republic**
Document ID	373/2011 Sb.
Document title	Occupational Health Care Services
Document type	Law
Relevant to	Occ. Health Care services
What is specified	Standards and procedures for OHC services

EQUADOR

Country	Equador
Document ID	CD 513
Document title	Regulation of the General Insurance of Labor Risks
Relevant article	Art.14 "technical parameters for risk assessment" Art. 55 “Mechanisms for the Prevention of Risks at Work”
Document type	Labor Law
Relevant to	Technical parameters for risk assessment Mechanisms for the Prevention of Risks at Work

FINLAND

Country	Finland
Original name	Työturvallisuuslaki
Name	Occupational safety and health Act (738/2002)
Type of legislation	Law, Act
Adopted on	2002-08-23
Published on: **ISN:** **Link:** **Bibliography:**	Soumen Säädöskokoelma, 2002-08-30, No. 738, pp. 3695-3711 FIN-2002-L-62320 https://www.ilo.org/dyn/natlex/natlex4.detail?p_isn=62320&p_lang=en Soumen Säädöskokoelma, 2002-08-30, No. 738, pp. 3695-3711 Unofficial English translation FINLEX, Ministry of Justice, Finland PDF (consulted on 2011-05-27) Acts on-line in Finnish and Swedish FINLEX, Ministry of Justice, Finland PDF (consulted on 2011-05-27)
Abstract/Citation	Contains 68 sections covering, inter alia, objectives (improvement of work environment, prevention of occupational injuries and diseases) and scope of application, employers’ general obligations (care for workers’ occupational safety and health, evaluation of risks at work, work involving special risks, planification of work environment, guidance for workers, provision of personal protective equipment); cooperation between employers and workers; workers’ obligations and right to refuse work (reporting of errors and deficiencies, work clothes and equipment, workers’ right to refuse to execute work in specified circumstances); specific provisions regarding work conditions (ergonomics, risk for violence at work, harassment, dangerous work executed by single worker, night work, ventilation and light at work, chemical and dangerous substances, machinery and occupational safety, risks for occupational injuries, alarm and rescue work); specific situations (information and cooperation at common work places, obligations for employers and self-employed at common work places); obligations for other persons whose activities influence work environment (manufacturers of products, persons installing work equipment and machinery, persons in transport of dangerous goods);and penal sanctions and miscellaneous. Repeals Occupational Health and Safety Act (No. 299 of 1958). Unofficial English translation available.

Amending text(s)	• 2013-05-24 (FIN-2013-L-97915) Act (364/2013) amending the Occupational Safety and Health Act (738/2002). • 2013-05-03 (FIN-2013-L-97914) Act (329/2013) amending the Occupational Safety and Health Act (738/2002). • 2012-06-15 (FIN-2012-L-94593) Act (396/2012) amending the Occupational Safety and Health Act (738/2002). • 2008-11-14 (FIN-2008-L-87292) Act (709/2008) amending the Occupational Safety and Health Act (738/2002). • 2007-05-11 (FIN-2007-L-79779) Act (No. 562 of 2007) amending the Occupational Safety and Health Act (Labour Protection Act) (No. 738 of 2002). • 2006-01-20 (FIN-2006-L-73025) Act (No. 53 of 2006) to repeal s. 51(2) of the Labour Protection Act (No. 738 of 2002). • 2005-12-22 (FIN-2005-L-72991) Act (No. 1199 of 2005) to amend the Labour Protection Act (No. 738 of 2002).
Implementing text(s)	• 2011-06-16 (FIN-2011-R-90576) Council of State Ordinance (644/2011) concerning safety during blasting and excavation operations. • 2010-02-25 (FIN-2010-R-89165) Council of State Ordinance (146/2010) on the protection of workers from risks arising from exposure to optical radiation. • 2009-07-01 (FIN-2009-L-87580) Ministry of Social Affairs and Health Ordinance (557/2009) on concentrations found to be harmful. • 2009-03-26 (FIN-2009-R-87425) Government Regulation on Safety in Construction (205/2009). • 2008-06-12 (FIN-2008-R-87137) Council of State Ordinance (403/2008) on the Safe Use and Inspection of Work Equipment. • 2006-01-26 (FIN-2006-R-73028) Council of State Ordinance (No. 85 of 2006) respecting protection of workers against risks caused by noise. • 2005-01-27 (FIN-2005-R-74952) Ordinance No. 48 of 2005 by the Council of State on the protection of workers from risks caused by vibrations. • 2004-11-26 (FIN-2004-L-74951) Act No. 1016 of 2004 on the compliance with requirements of technical equipment. • 2004-07-01 (FIN-2004-R-67979) Council of State Ordinance (633/2004) respecting workers' protection in connection with the loading and unloading of ships. • 2003-06-18 (FIN-2003-R-65003) State Council Ordinance (No. 576 of 2003) to prevent danger that explosive atmosphere may cause to workers. • 2003-06-18 (FIN-2003-R-65004) State Council Ordinance (No. 577 of 2003) respecting occupational safety and health requirements. • 2003-06-18 (FIN-2003-R-65005) State Council Ordinance (No. 578 of 2003) on prefabricated construction work.
Related text(s)	• 2014-12-30 (FIN-2014-L-101087) Act (1345/2014) amending the Act (759/2004) on the Protection of Privacy in Working Life. • 2012-12-28 (FIN-2012-L-94474) Act (916/2012) on Public Employment and Corporate Services. • 2012-06-15 (FIN-2012-L-94473) Act (395/2012) on the working and living environment for ships personnel and catering standards on board ships. • 2002-08-23 (FIN-2002-L-62321) Act (No. 747 of 2002) to amend section 8a of the Labour Market Subsidies Act (No. 1542 of 1993).

GERMANY

Country	Germany - Law
Document ID	Arbeitsschutzgesetz vom 7. August 1996 (BGBl. I S. 1246), das zuletzt durch Artikel 1 des Gesetzes vom 22. Dezember 2020 (BGBl. I S. 3334) geändert worden ist
Document title	Gesetz über die Durchführung von Maßnahmen des Arbeitsschutzes zur Verbesserung der Sicherheit und des Gesundheitsschutzes der Beschäftigten bei der Arbeit (Arbeitsschutzgesetz - ArbSchG)
	Occupational Health and Safety Act
Document type	National legal ordinance
Relevant to	HFE in general
What is specified	The Occupational Health and Safety Act provides a framework for health and safety. Companies are obliged to assess working conditions and implement improvement measures. Hazards and work-related health risks are to be avoided. Knowledge of occupational science is to be implemented.
Related document	European framework directive on safety and health at work (Directive 89/391/EEC) Europäische Rahmenrichtlinie über Sicherheit und Gesundheitsschutz bei der Arbeit (Richtlinie 89/391/EWG)

Country	Germany - Law
Document ID	Gesetz über Betriebsärzte, Sicherheitsingenieure und andere Fachkräfte für Arbeitssicherheit vom 12. Dezember 1973 (BGBl. I S. 1885), das zuletzt durch Artikel 3 Absatz 5 des Gesetzes vom 20. April 2013 (BGBl. I S. 868) geändert worden ist.
Document title	Arbeitssicherheitsgesetz – AsiG
	Occupational Safety Act
Document type	National legal ordinance
Relevant to	HFE in general
What is specified	Occupational safety specialists and company doctors must be appointed in companies. They are to support the companies in all questions of occupational safety and also ergonomics.

Country	Germany
Document ID	Produktsicherheitsgesetz vom 27. Juli 2021 (BGBl. I S. 3146, 3147), das durch Artikel 2 des Gesetzes vom 27. Juli 2021 (BGBl. I S. 3146) geändert worden ist.
Document title	Produktsicherheitsgesetz – ProdSG
	Product Safety Act
Document type	National legal ordinance
Relevant to	HFE in general
What is specified	Products, especially machines, must be safe. The principles of ergonomics must be observed.
Related document	Directive 2006/42/ec of the European parliament and of the council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)

Country	Germany - Regulation
Document ID	Lastenhandhabungsverordnung vom 4. Dezember 1996 (BGBl. I S. 1841, 1842), die zuletzt durch Artikel 294 der Verordnung vom 19. Juni 2020 (BGBl. I S. 1328) geändert worden ist
Document title	Lastenhandhabungsverordnung – LasthandhabV
	Ordinance on occupational safety and health protection during manual handling of loads
Relevant article	Occupational Health and Safety Act (Arbeitsschutzgesetz)
Document type	National legal ordinance
Relevant to	Manual handling of loads
What is specified	This ordinance states the employer's responsibility and gives instructions to provide technical, organizational or personal measures to minimize health risks and hazards (especially for the lower back) for employees during manual handling of loads. It addresses all manual material handling activities; no specific limiting values for handled load weights are listed.
Related document	EWGRL 269/90 (CELEX Nr: 390L0269) EWGRL 270/90 (CELEX Nr: 31990L0270) EWGRL 269/90 (CELEX Nr: 31990L0269) EGRL 10/2003 (CELEX Nr: 32003L0010) EGRL 44/2002 (CELEX Nr: 32002L0044)

Country	Germany - Regulation
Document ID	Lärm- und Vibrations-Arbeitsschutzverordnung vom 6. März 2007 (BGBl. I S. 261), die zuletzt durch Artikel 5 Absatz 5 der Verordnung vom 18. Oktober 2017 (BGBl. I S. 3584) geändert worden ist
Document title	Lärm- und VibrationsArbeitsschutzverordnung – LärmVibrationsArbSchV
	Occupational Health and Safety Ordinance on Noise and Vibration
Relevant article	Occupational Health and Safety Act (Arbeitsschutzgesetz)
Document type	National legal ordinance
Relevant to	Work under the influence of noise or vibrations
What is specified	This ordinance is meant to guard employees from actual or potential danger to health and safety due to the effect of noise or vibrations. It provides instructions/procedures for the employer regarding risk assessment and measurement of noise and vibrations. It also states action and limit values for both of the hazardous influences, protective measures, instructions/briefings for employees, exceptions and offences. Regarding noise the ordinance describes daily-, weekly and peak sound limit values. The upper action value is specified for LEX,8h = 85 dB(A) or LpC,peak = 137 dB(C). The lower action value is set at LEX,8h = 80 dB(A) or LpC,peak = 135 dB(C) (ear protection not taken into account). Regarding vibrations a distinction between vibration of the hand-arm-system and vibrations of the whole body is made. For hand-arm-vibrations the action value is specified for A(8) = 2,5 m/s^2 with an exposure limit value of A(8) = 5 m/s^2. The action value for whole body vibrations is mentioned as A(8) = 0,5 m/s^2 with exposure limit values of A(8) = 1,15 m/s^2 along the X and Y axes and A(8) = 0,8 m/s^2 along the Z axis.
Related document	EWGRL 270/90 (CELEX Nr: 31990L0270) EWGRL 269/90 (CELEX Nr: 31990L0269) EGRL 10/2003 (CELEX Nr: 32003L0010) EGRL 44/2002 (CELEX Nr: 32002L0044)

Country	Germany - Regulation
Document ID	Verordnung zur arbeitsmedizinischen Vorsorge vom 18. Dezember 2008 (BGBl. I S. 2768), die zuletzt durch Artikel 1 der Verordnung vom 12. Juli 2019 (BGBl. I S. 1082) geändert worden ist"
Document title	Verordnung zur arbeitsmedizinischen Vorsorge - ArbMedVV
	Preventative Occupational Medicine Ordinance
Relevant article	Occupational Health and Safety Act (Arbeitsschutzgesetz) Occupational Safety Law/Act (Arbeitssicherheitsgesetz)
Document type	National legal ordinance
Relevant to	Identification and prevention of work-related illnesses and occupational diseases
What is specified	This ordinance focuses on early identification and prevention of work-related illnesses and occupational diseases through occupational health programs/occupational medical precautions, which are meant to contribute to maintaining employability and to further develop workplace health and safety procedures. It specifies essential requirements, exceptions and offences. This ordinance focuses on early identification and prevention of work-related illnesses and occupational diseases through occupational health programs/occupational medical precautions, which are meant to contribute to maintaining employability and to further develop workplace health and safety procedures. It specifies essential requirements, exceptions and offences. The ordinance addresses occupational exposure to hazardous substances (part 1), biological agents (part 2), and physical agents (part 3) as well as work using respiratory protective devices or display screen equipment (part 4) very generally while distinguishing between compulsory and propositional precautionary measures. Specific action values are stated in the rules relating to occupational medicine (Arbeitsmedizinische Regelungen – AMR).

Country	Germany - Regulation
Document ID	Berufskrankheiten-Verordnung vom 31. Oktober 1997 (BGBl. I S. 2623), die zuletzt durch Artikel 1 der Verordnung vom 29. Juni 2021 (BGBl. I S. 2245) geändert worden ist
Document title	Berufskrankheitenverordnung - BKV
	Occupational Diseases Ordinance
Document type	National legal ordinance
Relevant to	HFE in general
What is specified	This ordinance explains the structure of the German process of occupational disease compensation. It also provides a list of all 84 occupational diseases currently recognized in Germany. Occupational diseases are categorized in numbers as follows: (1) diseases caused by chemical agents, (2) diseases caused by physical agents, (3) diseases caused by infectious agents or parasites, (4) diseases of the respiratory system, pleure, peritoneum or ovaries, (5) skin diseases and (6) diseases caused by other causes.
Related document	Volume VII of the German Social Insurance Code (SGB VII)

Country	Germany - Regulation
Document ID	Betriebssicherheitsverordnung vom 3. Februar 2015 (BGBl. I S. 49), die zuletzt durch Artikel 7 des Gesetzes vom 27. Juli 2021 (BGBl. I S. 3146) geändert worden ist
Document title	Betriebssicherheitsverordnung – BetrSichV
	Industrial Safety Regulation
Document type	National legal ordinance
Relevant to	HFE in general
What is specified	Work equipment in the company must be safe. Risk assessment and regular inspections are necessary. The state of the art is described in the regulations.
Related document	DIrective 2009/104/ec of the European parliament and of the council of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at work

Country	Germany - Regulation
Document ID	Arbeitsstättenverordnung vom 12. August 2004 (BGBl. I S. 2179), die zuletzt durch Artikel 4 des Gesetzes vom 22. Dezember 2020 (BGBl. I S. 3334) geändert worden ist
Document title	Workplace Ordinance (Arbeitsstättenverordnung – ArbStättV)
Document type	National legal ordinance
Relevant to	HFE in general
What is specified	Workplaces in the company must be safe. Risk assessment and regular inspections are necessary. The state of the art is described in the regulations.
Related document	Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace

HUNGARY

Country	Hungary
Document ID	33/1998 NM
Document title	Rendelet a munkaköri, szakmai, illetve személyi higiénés alkalmasság orvosi vizsgálatáról és véleményezéséről
	Decree on the medical examination and assessment of fitness-for-work, fitness-for-profession and personal hygiene
Relevant article	Occupational safety and health Act
Document type	Ministerial decree
Relevant to	Manual Handling, Injury Prevention, Occupational Safety and Health, Cognitive or Psycho-social HFE
What is specified	Amongst many other exposures, employment in several work conditions is forbidden or subject to restriction/assessment for vulnerable groups: females in different age groups (incl. pregnant and breast feeding), young (<18 years) persons and old males (>65 years) doing physical work. Relevant exposures are: different levels of moderate and heavy physical work, manual handling of loads, awkward postures, risk of RSI of the hands, time pressure, high information load, high accident risk, adverse climate, heat, cold, alternating heat and cold, wet/damp, hand-arm vibration above 2.5 m/s2, whole body vibration above 0.5 m/s2, ionizing radiation, microwaves, noise exposure above 87 dBA-TWA or 140 dBC, caisson.
Related document	Directive 92/85/EEC, Directive 94/33/EC

INDIA

Country	India
Document ID	Act No. 63 of 1948
Document title	Factories Act, 1948, With Amendments (up to 1987)
Document type	Legislation
Relevant to	Health and safety in factories
What is specified	This legislation gives the requirements for factories to provide safe and healthy workplaces by preventing work-related injury and disease.
Related document	ILO Occupational safety and health Convention, 1981 (No. 155)

Country	India
Document ID	Act 54 of 1986
Document title	The Dock Workers (Safety, Health and Welfare Act), 1986
Document type	Legislation
Relevant to	Health and Safety in Docks
What is specified	This legislation gives the requirements for docks and ports to provide safe and healthy workplaces by preventing work-related injury and disease
Related document	ILO Occupational safety and health (Dock Work) Convention, 1979 (No. 152)

Country	**India**
Document ID	Act No. 35 of 1952
Document title	The Mines Act, 1952 (Amended up to 1983)
Document type	Legislation
Relevant to	Health and Safety in Mines
What is specified	This legislation gives the requirements for mines (including oil exploration) to provide safe and healthy workplaces by preventing work-related injury and disease
Related document	ILO Safety and Health in Mines Convention, 1995 (No. 176)

Country	**India**
Document ID	Act No. 37 of 2020
Document title	The Occupational Safety, Health and Working Conditions Code, 2020
Document type	Legislation (awaiting Notification and implementation)
Relevant to	Umbrella legislation for Health and Safety
What is specified	The Code seeks to regulate health and safety conditions of workers in establishments with 10 or more workers. It subsumes and replaces 13 labour laws relating to safety, health and working conditions. These laws include: Factories Act, 1948; Mines Act, 1952; Dock Workers Act, 1986; Contract Labour Act, 1970; and Inter-State Migrant Workers Act, 1979. Welfare facilities, working conditions and work hours for different types of establishments and workers will be prescribed by the central or state governments through rules.
Related document	ILO Occupational safety and health Convention, 1981 (No. 155)

Country	**India**
Document ID	Sections 67 & 68
Document title	Factories Act, 1948, With Amendments (up to 1987)
Document type	Legislation
Relevant to	Employment of young persons
What is specified	Sec 67 – No child less than 14 Sec 68 – Children (14&+) or adolescents require certificate of fitness
Related document	ILO C138 - Minimum Age Convention, 1973 (No. 138) Medical Examination of Young Persons Recommendation, 1946 (No. 79)

Country	India
Document ID	Section 34, Rule 64
Document title	Factories Act, 1948, With Amendments (up to 1987) Model Rules framed under Factories Act
	Maximum weight to be lifted (Factories)
Relevant article	Quantitative limits are fixed by individual states as per Rules promulgated
Document type	Legislation
Relevant to	Manual Material Handling
What is specified	(a) Adult male: 55 Kilograms (50 kilograms in some States) (b) Adult female: 30 Kilograms (c) Adolescent male: 30 Kilograms (d) Adolescent female: 20 Kilograms
Related document	ILO R128 - Maximum Weight Recommendation, 1967 (No. 128)

Country	India
Document title	The Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Central Rules, 1998
	Maximum weight to be lifted (Construction Industry)
Document type	Legislation
Relevant to	Manual Material Handling
What is specified	Adult male 50 kg Adult female 30 kg Adolescent male 30 kg Adolescent female 20 kg
Related document	ILO R128 - Maximum Weight Recommendation, 1967 (No. 128), Safety and Health in Construction Convention, 1988 (No. 167)

Country	India
Document ID	Section 17, Rule 30
Document title	Factories Act, 1948, With Amendments (up to 1987) Model Rules framed under Factories Act
	Minimum Illumination requirements
Document type	Legislation
Relevant to	Illumination in Factories
What is specified	At point of operation 65 lux at 91.4 cm from floor (Lower in some states) general 22 lux, 5.5 lux for passageways
Related document	ILO Encyclopaedia of Occupational Health & Safety, 46. Lighting, Table 8. Recommended levels of maintained illuminance for locations/tasks

INDONESIA

Country	**Indonesia**
Document ID	Laws/Acts No 14 1969
Document title	Principal Provisions Concerning Labor
Document type	Laws/Acts
What is specified	This law regulates the protection of workers' work. Every worker is entitled to protection for safety, health, decency, maintenance of work morals and treatment in accordance with human dignity and religious morals. The government fosters work protection which includes occupational safety norms, occupational health and hygiene norms, work norms, and the provision of compensation, treatment and rehabilitation in the case of work accidents.

Country	**Indonesia**
Document ID	Laws/Acts No 23 1992
Document title	Health
Document type	Laws/Acts
What is specified	This law regulates occupational health to achieve optimal work productivity. Occupational health includes occupational health services, prevention of occupational diseases, and occupational health requirements. Every workplace is required to provide occupational health.

Country	**Indonesia**
Document ID	Laws/Acts No 13 2003
Document title	Employment
Document type	Laws/Acts
What is specified	This law regulates working hours and the right to protection for occupational safety and health. Every company is required to implement SMK3 which is integrated with the company's management system.

Country	**Indonesia**
Document ID	Laws/Acts No 36 2009
Document title	Health
Document type	Laws/Acts
What is specified	This law states that there is an obligation for workplace managers to improve health and prevent occupational diseases.

Country	Indonesia
Document ID	Government Regulation No 50 2012
Document title	Implementation of Occupational Health and Safety Management System
Document type	Government Regulation
What is specified	This law guarantees and protects the implementation of an occupational health and safety management system in the workplace through the prevention of work accidents and occupational diseases. The implementation of the OHS management system aims to increase the effectiveness of planned, measured, structured, and integrated occupational safety and health protection; prevent and reduce work accidents and occupational diseases by involving elements of management, workers/ laborers, and/or trade unions/ labor unions; and create a safe, comfortable and efficient workplace to boost productivity.

Country	Indonesia
Document ID	Presidential Regulation No 7 2019
Document title	Occupational Disease
Document type	Presidential Regulation
What is specified	This regulation regulates occupational diseases which include prevention and control in the workplace.

Country	Indonesia
Document ID	Government Regulation No 88 2019
Document title	Occupational Health
Document type	Government Regulation
What is specified	This regulation regulates the occupational health of workers and the company's obligation to maintain the occupational health of workers.

Country	Indonesia
Document ID	Regulation of the Minister of Manpower and Transmigration No. Per.02/MEN/1980
Document title	Workforce Health Checks in the Implementation of Occupational Safety
Relevant to	Ministerial Regulation
Related document	For health disorders and disorders caused by special work, the provisions of the Labor Social Insurance shall apply in accordance with the prevailing laws and regulations.

Country	Indonesia
Document ID	Regulation of the Minister of Manpower and Transmigration No PER.03/MEN/1982
Document title	Labor Health Service
Document type	Ministerial Regulation
What is specified	Health Service is a health effort carried out with the aims to: 1. Provide assistance to the workforce in adjusting themselves both physically and mentally, especially in adjusting their work to the workforce. 2. Protect the workforce against any health problems arising from work or the work environment. 3. Improve the health of the body, mental (spiritual) condition and the physical ability of the workforce. 4. Provide treatment and care and rehabilitation for workers who are sick.

Country	Indonesia
Document ID	Regulation of the Minister of Manpower and Transmigration No PER.08/MEN/VII/2010
Document title	Personal Protective Equipment
Document type	Ministerial Regulation
What is specified	This rule describes the personal protective equipment used for each type of risk exposure.

Country	Indonesia
Document ID	Regulation of the Minister of Manpower and Transmigration No 4 2014
Document title	Working Time and Rest Time in Upstream Oil and Gas Business Activities
Document type	Ministerial Regulation
What is specified	The contents of the article explain the details of working and rest time in the sector

Country	Indonesia
Document ID	Regulation of the Minister of Manpower No 26 2014
Document title	Implementation of Occupational Health and Safety Management System Implementation Assessment
Document type	Ministerial Regulation
What is specified	Contents of the article regard occupational safety and health management system audits

Country	Indonesia
Document ID	Regulation of the Minister of Health No 70 2016
Document title	Industrial Work Environment Health Standards and Requirements
Document type	Ministerial Regulation
What is specified	Industrial work environment health requirements including: a. physical factor requirements; b. biological factor requirements; c. manual load handling requirements; and d. health requirements on environmental media. In order to meet the standards and requirements for the health of the industrial work environment in accordance with this Ministerial Regulation, each industry must conduct periodic monitoring. Monitoring can involve cooperation with other parties who have competence in the fields of industrial hygiene, occupational health and/or environmental health. Monitoring is carried out by: a. observation, measurement, and surveillance of factors such as physical, chemical, biological, and manual load handling, as well as indicators of biological exposure according to the potential hazards in the work environment; and b. inspection, observation, measurement, surveillance, and risk analysis on environmental media. Monitoring is carried out at least once a year, or every time there is a change in the process of industrial activities that has the potential to increase the level of health hazards in the work environment, and/or in accordance with the provisions of laws and regulations. Monitoring results must be evaluated. Monitoring is carried out by personnel who have received education and/or training in the field of occupational health or industrial hygiene.

Country	Indonesia
Document ID	Regulation of the Minister of Health No 66 2016
Document title	Hospital Occupational Health and Safety
Document type	Ministerial Regulation
What is specified	Identification of potential hazards is the first step in health risk management in the workplace. At this stage, identification of potential health hazard exposure of workers, patients, transporters and visitors is carried out, which may include: 1) physical, for example noise, temperature, vibration, slippery floor 2) chemical 3) biological 4) ergonomics, for example static position, manual handling, lifting weights 5) psychosocial, for example workload, superior- subordinate relationships or the relationship between workers is not harmonious 6) mechanical 7) electrical.

Country	Indonesia
Document ID	Regulation of the Minister of Health No 48 2016
Document title	Office Occupational safety and health Standards
Document type	Ministerial Regulation
What is specified	In implementing the office K3 plan, the office manager and/or building manager must make efforts to maintain work safety, occupational health, office work environment health, and office ergonomics in accordance with Office K3 standards. Office Ergonomics Standards include: a. work area; b. layout of office equipment; c. chair; d. workbench; e. work posture; f. corridor; g. duration of work; and h. manual load handling.

Country	Indonesia
Document ID	Regulation of the Minister of Manpower No 5 2018
Document title	Occupational health and safety work environment
Document type	Ministerial Regulation
What is specified	This regulation is related to the control of biological factors, ergonomics and work psychology in order to meet the standards.

Country	Indonesia
Document ID	Regulation of the Minister of Manpower No 8 2020
Document title	Occupational safety and health of lift and transport planes
Document type	Ministerial Regulation
What is specified	This regulation states that the controller which includes levers, steering wheel and buttons must be uniform in function, motion and color. In addition, it must also be ergonomically designed and safe for the operator. The controller with a computerized system must be equipped with a monitor that provides operating information.

Country	Indonesia
Document ID	Regulation of the Minister of Public Works No 05//PRT/M/2014
Document title	Guidelines for Occupational Health and Safety Management System (SMK3) Construction in the Public Works Sector
Document type	Ministerial Regulation
What is specified	Occupational Diseases are diseases caused by work, work tools, materials, processes and the work environment. This regulation provides guidelines regarding construction K3 management in general work.

IRELAND

Country	Ireland
Document ID	Statutory Instrument Number 10 of 2005
Document title	Safety, Health and Welfare at Work Act 2005
Relevant article	Legislation
Document type	Legal requirements
Relevant to	All workplaces in the Republic of Ireland
What is specified	It details all provisions and responsibilities for occupational health and safety management in Ireland http://www.irishstatutebook.ie/eli/2005/act/10/enacted/en/print
Related document	International health and safety management standards, ILO

ITALY

Country	Italy
Document ID	Italian council of ministers and presidency of the republic Law, n. 123 August 2007 Application decree n. 81 April 2008
Document title	Measures regarding the protection of health and safety in the workplace
Relevant article	Application decree n. 81 April 2008 Last update (24/12/2020)

Country	Italy
Document ID	Law
Relevant article	Health and safety in workplaces
What is specified	This gives a regulatory framework for organizations to provide safe and healthy workplaces by preventing work-related injury and proactively improving systems performance.
Related document	https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52004DC0062

Country	Italy
Document ID	Legislative Decree 81/2008
Document title	Implementation of Article 1 of Law no. 123, concerning the protection of health and safety in the workplace
Relevant article	Legislative Decree 81 April 2008 Last update (24/12/2020)
Document type	Italian Law
Relevant to	Health and safety in workplaces
What is specified	The law provides a regulatory framework for organizations to provide safe and healthy workplaces by preventing work-related injury and proactively improving systems performance.
Related document	UNI EN ISO 11228 part 1 UNI EN ISO 11228 part 2 UNI EN ISO 11228 part 3 UNI EN 1005 part 2 UNI EN ISO 11226

Country	Italy
Document ID	Regione Lombardia - Decree 16750 21/12/2017
Document title	Guidelines for the Health Surveillance of subjects exposed to the risk of biomechanical overload Linee di indirizzo per la Sorveglianza Sanitaria dei soggetti esposti al rischio da sovraccarico biomeccanico
Relevant article	Regione Lombardia - Decree N. 3958 22/04/2009
Document type	Regional law – National guidelines
Relevant to	Health surveillance
What is specified	The document provides a regulatory framework for Health Surveillance for workers exposed to biomechanical overload.
Related document	UNI EN 1005 part 2 UNI EN ISO 11228 part 1 UNI EN ISO 11228 part 2 UNI EN ISO 11228 part 3 ISO TR 12295 ISO TR 12296

Country	Italy
Document ID	Regione Lombardia - Decree 7661 23/09/2015
Document title	Regional guidelines for the prevention of musculoskeletal pathologies associated with repeated movements and strains of the upper limbs
	Linee guida regionali per la prevenzione delle patologie muscolo scheletriche connesse con movimenti e sforzi ripetuti degli arti superiori
Relevant article	Regione Lombardia - Decree N. 3958 22/04/2009
Document type	Regional Law – National guidelines
Relevant to	Health and safety in workplaces
What is specified	The document provides a regulatory framework for organizations to provide safe and healthy workplaces by preventing work-related upper-limbs biomechanical overload.
Related document	UNI EN ISO 11228 part 3 ISO TR 12295

Country	Italy
Document ID	Decree n.17 February 2019
Document title	Adaptation of national legislation to the provisions of Regulation (EU) no. 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686 / EEC. (19G00023)
	Adeguamento della normativa nazionale alle disposizioni del Regolamento (UE) n. 2016/425 del Parlamento Europeo e del Consiglio del 9 marzo 2016 sui dispositivi di protezione individuale e che abroga la Direttiva 89/686/CEE del Consiglio. (19G00023)
Document type	Law
Relevant to	Personal protective equipment
What is specified	Simplifies and clarifies the existing framework for placing these devices on the market, as well as improving the transparency, effectiveness and harmonization of existing measures.
Related document	https://eurlex.europa.eu/search.html?scope=EURLEX&text=2016%2F425&lang=en&type=quick&qid=1631001875544

Country	Italy
Document ID	Decree n.133, 14 August 2020
Document title	Safety provisions for health and socio-health professions in the exercise of their functions
Relevant article	Psychosocial risks
Document type	Law
Relevant to	Monitoring of episodes of violence or sentinel events that may give rise to acts committed with violence or threats to the detriment of health and socio-health professions in the exercise of their functions.
What is specified	Institution of a National Observatory on the safety of health and socio-health professions at the Ministry of Health.
Related document	https://www.gazzettaufficiale.it/eli/id/2020/09/09/20G00131/sg

JAPAN

Country	**Japan**
Document title	Regulations on labor standards for adolescents
Relevant article	Labor standards act
Document type	Guideline (Regulations)
Relevant to	Manual material handling
What is specified	This regulation established in 1954, revised in 2016, shows weight limits for material handling as follows: 15kg for young male workers under 16 years old under intermittent work, and 10kg under continuous work.
Related document	ISO 11228-1

Country	**Japan**
Document title	年少者労働基準規則
	Ordinance on labor standards for adolescents
Relevant article	Labor standards act
Document type	Regulation
Relevant to	Manual Handling
What is specified	This regulation was established in 1954, most recently revised in 2016. This shows weight limits for material handling as follows: 15kg for young male workers under 16 years old on intermittent work, and 10kg on continuous work.
Related document	ISO 11228-1

Country	**Japan**
Document ID	Act No. 128 of December 5, 2007
Document title	労働契約法
	Labor Contracts Act
Relevant article	Occupational safety and health Act Guideline for Occupational safety and health management system (Ministry of Labour Notification No.53)
Document type	Act
Relevant to	HFE in general
What is specified	Article 5 in Labor Contracts Acts, states consideration to the safety of a worker as follows. - Article 5: In association with a labor contract, an Employer is to give the necessary consideration to allow a Worker to work while ensuring the employee's physical safety. Based on this, in Japan, employers are obliged to estimate the probability of safety and health risks of workers and establish the countermeasures for them. This contributes to enhancing the introduction and promotion of activities for OSHMS.
Related document	Occupational safety and health management system (ILO, ISO 45001)

Country	Japan
Document ID	Act No. 57
Document title	労働安全衛生法、労働安全衛生規則
	Occupational safety and health Act, Ordinance on industrial safety and health
Relevant article	Labor standards act
Document type	Act
Relevant to	HFE in general
What is specified	This act was established in 1972. The purpose of this Act is to secure, in conjunction with the Labor standards act (Act No. 49 of 1947), the safety and health of workers in workplaces, as well as to facilitate the establishment of comfortable working environment, by promoting comprehensive and systematic countermeasures concerning the prevention of industrial accidents, such as taking measures for the establishment of standards for hazard prevention, clarifying the safety and health management responsibility and the promotion of voluntary activities with a view to preventing industrial accidents. Based on the act, mandatory screening using the Job Stress Questionnaire has been launched in Japan since 2015 when workers have regular annual medical checkups.

Country	Japan
Document title	事業場における労働者の健康保持増進のための指針
	Guidelines for maintaining and promoting the mental health of workers in the workplace
Relevant article	- Guidelines for maintaining and promoting the mental health of workers - 13th Industrial Accident Prevention Plan (from 2018 to 2022) - Occupational safety and health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	Mandatory screening using the Job Stress Questionnaire has been launched in Japan since 2015 as part of workers' regular annual medical checkups. This provides practical guideline for it.

Country	Japan
Document title	過労死等防止対策大綱
	Ordinance for measures to prevent death from overwork (Karoshi)
Relevant article	Occupational safety and health Act
Document type	Ordinance
Relevant to	HFE in general
What is specified	This ordinance requires employers to record and manage the sleep time of professional drivers for preventing traffic accidents and Karoshi (death caused by overwork or job-related exhaustion). This also promotes introducing the work-interval system to stop overwork.

Country	Japan
Document ID	Act No. 90 of July 2, 1992
Document title	労働時間等の設定の改善に関する特別措置法、 労働時間等設定改善指針
	Act on Special Measures for Improvement of Working Hours Arrangements Relevant guidelines for improving working hours
Relevant article	Occupational safety and health Act
Document type	Act
Relevant to	HFE in general
What is specified	The purpose of this Act is to enable workers to effectively exercise their abilities by establishing guidelines on the improvement of working hour arrangements, and by implementing special measures for promoting the independent efforts of businesses toward the improvement of working hour arrangements in consideration of the actual conditions of and trends in working hours in Japan, thereby contributing to a healthy and fulfilling life for workers and solid growth of the national economy. The relevant guideline defines the following work-time control items, for example. - In principle, the upper limit of overtime work is set as 45 hours a month, 360 hours a year. - Promote the introduction of the work-interval system into workplaces (as a new labor-management)
Related document	ILO convention C001 - Hours of Work (Industry), 1919 (No. 1) ILO convention C047 - Forty-Hour Week Convention, 1935 (No. 47)

Country	Japan
Document title	障害者の雇用の促進等に関する法律（障害者雇用促進法）
	Act for Promotion of Employment of Persons with Disabilities
Document type	Act
Relevant to	HFE in general
What is specified	The purpose of this Act is to comprehensively take measures that are designed to promote employment under the obligations to employ persons with disabilities, to ensure equal opportunities and treatment for persons with disabilities and persons without disabilities in employment and ensure that persons with disabilities can make effective use of their abilities, vocational rehabilitation measures, and other measures to encourage persons with disabilities to become independent in their vocational life by obtaining jobs suited for their abilities or otherwise, thereby promoting stability of occupations of persons with disabilities.

Country	Japan
Document title	労働者災害補償保険法
	Industrial Accident Compensation Insurance Act
Document type	Act
Relevant to	HFE in general
What is specified	Industrial accident compensation insurance covers social rehabilitation promotion services in addition to granting insurance benefits to workers for injury, disease, disability or death. Due to the revision of the act in 2020, as for insurance benefits for a parallel worker engaged in more than two enterprises, the total amount of loads (working hours, stress, etc.) accumulated from each workplace is considered for certification of compensation. This applies to the cases of cerebrovascular/cardiovascular disease and mental illness.

MALTA

Country	Malta
Document ID	Occupational safety and health
Type of legislation:	Work Equipment (Minimum Safety and Health Requirements) Regulations, 2004 (L.N. 282 of 2004) (S.L. 424.30).
Adopted on:	Regulation, Decree, Ordinance
Entry into force:	2004-05-14
ISN:	MLT-2004-R-71849
Link:	https://www.ilo.org/dyn/natlex/natlex4.detail?p_isn=71849&p_lang=en
Bibliography:	Legal Notice No. 282 of 2004 Occupational Health and Safety Authority, Malta PDF of Regulations (consulted on 2005-10-27)
Abstract/Citation:	The regulations lay down minimum health and safety requirements for the use of work equipment by workers at the workplace including employers' responsibilities, rules concerning work equipment, inspection of work equipment, ergonomics, informing workers, training of workers, consultation with and participation of workers as well as offences.
Basic text(s):	2001-05-03 (MLT-2001-L-63365)Occupational Health and Safety Authority Act (No. XXVII of 2000) (Cap. 424).

NICARAGUA

Country	**Nicaragua**
Document ID	Ministry of Labour. Law No. 618, Approved on April 19. 2007
Document title	General Law of Hygiene and Work Safety
Document type	Law
Relevant to	Companies and workers
What is specified	**Maximum Weight of the Manual Load** Describes the maximum weight of the manual load to be transported. If the transport operation of a manual load is a distance greater than 25 meters, it must be done via mechanical means. It also describes that the load should be clearly labeled on the outer surface with the exact weight of the load. I**ndustrial Ergonomics. Physical Workload** Specifies the design of all work positions taking into account the worker and the task to be carried out in order for it to be executed comfortably, efficiently, and without problems for the worker´s health during their working life. Specifies adapting the work to the anatomical characteristics of the worker, in the work that is carried out sitting and standing. Chairs and tables should be adjustable to work at the elbow level. It also describes the protection of the worker´s health, reducing risks such as repetitive movements, forced postures, work rhythm, long hours, etc.

PERÚ

Country	Perú
Document ID	Political Constitution of Peru of 1993
Document title	Constitución Política del Perú 1993
	Political Constitution of Peru of 1993
Relevant article	Constitution
Document type	Law
Relevant to	Rights of citizens
What is specified	Article 7.- Everyone has the right to the protection of their health, the family environment and the community, as well as the duty to contribute to its promotion and defence. The person incapable of taking care of himself due to a physical or mental deficiency has the right to respect for his dignity and a legal regime of protection, care, rehabilitation and security.

Country	Perú
Document ID	Law N° 26842
Document title	Ley General de Salud. Ley N° 26842. Ministerio de Salud
	General Health Law. Law No. 26842
Relevant article	Labor standards act
Document type	Law
Relevant to	Injury Prevention
What is specified	Article 100.- Those who conduct or administer extraction, production, transport and trade activities of goods or services, whatever they may be, have the obligation to adopt the necessary measures to guarantee the protection of the health and safety of workers and third parties in their facilities or work environments job. Article 101.- The hygiene and safety conditions that workplaces, equipment, machinery, facilities, materials and any other element related to the performance of activities of extraction, production, transport and trade of goods or services, are subject to the provisions dictated by the Competent Health Authority, which will monitor compliance.

Country	Perú
Document ID	Law No. 29783
Document title	Ley N° 29783, Ley de Seguridad y Salud en el Trabajo. Law No. 29783, Law on Safety and Health at Work
Relevant article	Labor standards act
Document type	Law
Relevant to	Occupational health and safety standards
What is specified	Article 36. Occupational health and safety services Every employer organizes its own or common occupational health and safety service to various employers, whose purpose is essentially preventive... c) Advice on the planning and organization of work, including the design of workplaces, on selection, maintenance and condition of machinery and equipment and of substances used at work... e) Advice on matters of health, safety and hygiene at work and ergonomics, as well as in matters of individual and collective protection equipment...
Related document	Guidelines on Occupational safety and health management systems (ILO-OSH 2001) ISO 45001

Country	Perú
Document ID	Law 29088
Document title	Ley de Seguridad y Salud en el trabajo de los Estibadores terrestres y transportistas Manuales Law 29088 of Safety and Health in the work of the ground stackers and hand carriers
Relevant article	Labor standard
Document type	Guideline
Relevant to	Manual handling, Occupational safety and health
What is specified	This Law regulates the health and safety conditions at work of land stevedores and manual transporters of agricultural products
Related document	ISO 11228-1, Ergonomics – Manual handling – Part 1: Lifting and carrying

Country	Perú
Document ID	Supreme Decree No. 005-2012-TR
Document title	Decreto Supremo N° 005-2012-TR, Reglamento de la Ley N° 29783, Ley de Seguridad y Salud en el Trabajo
	Supreme Decree No. 005 -2012-TR, Regulation of Law No. 29783, Law on Safety and Health at Work
Relevant article	Labor standards act
Document type	Law (Supreme Decree)
Relevant to	Regulation of Law No. 29783, Occupational health and safety standards
What is specified	Article 32.- The documentation of the security management system and occupational health measures that the employer must exhibit is the following... c) Hazard identification, risk assessment and risk safety measures control. Article 33.- The mandatory records of the security management system and occupational health measures are: c) Record of monitoring of physical, chemical, biological agents, psychosocial and non-ergonomic risk factors.
Related document	Guidelines on Occupational safety and health management systems (ILO-OSH 2001) ISO 45001

Country	Perú
Document ID	Decreto Supremo que aprueba el registro único de información sobre accidentes de trabajo, incidentes peligrosos y enfermedades ocupacionales y modifica el art ículo 110 del reglamento de la ley de seguridad y salud en el trabajo.
Document title	Decreto Supremo que aprueba el registro único de información sobre accidentes de trabajo, incidentes peligrosos y enfermedades ocupacionales y modifica el art ículo 110 del reglamento de la Ley de Seguridad y Salud en el Trabajo.
	Supreme Decree approving the single registry of information on work accidents, hazardous incidents and occupational illnesses and modifies article 110 of the safety and health law regulation in the job
Relevant article	Labor standards act
Document type	Law (Supreme Decree)
Relevant to	Single registry of information on work accidents, hazardous incidents and occupational illnesses
What is specified	Registration of occupational diseases or accidents at work
Related document	Guidelines on Occupational safety and health management systems (ILO-OSH 2001)

Country	Perú
Document ID	Law N° 27942
Document title	Ley de Prevención y Sanción del Hostigamiento Sexual LEY N° 27942
	Law on Prevention and Punishment of Sexual Harassment Law No. 27942
Relevant article	Labor standard
Document type	Guideline
Relevant to	Psycho-social
What is specified	The purpose of this law is to prevent and punish sexual harassment produced in authority or dependency relationships, whatever the legal form of this relationship.

Country	Perú
Document ID	Technical Standards for Complementary Work Insurance of Risk. SUPREME DECRET N 003-98-SA
Document title	Aprueban Normas Técnicas del Seguro Complementario de Trabajo de Riesgo DECRETO SUPREMO N 003-98-SA
	Technical Standards for Complementary Work Insurance of Risk. SUPREME DECRET N 003-98-SA
Relevant article	Supplementary risk insurance guidelines
Document type	Guidelines
Relevant to	Occupational safety and health
What is specified	The Complementary Risk Work Insurance grants coverage for work-related accidents and occupational disease to employed workers and workers who have the quality of regular affiliates of the Social Health Insurance and who work in a work center in which the Entity Employer performs the activities described in Annex 5 of Supreme Decree N "009-97 -SA, Regulation of the Law of Modernization of Social Security in Health.

Country	Perú
Document ID	Ministerial Resolution No. 375-2008-TR
Document title	Norma básica de ergonomía y de procedimiento de evaluación de riesgo disergonómico.
Relevant article	Labor standards act
Document type	Law (Ministerial Resolution)
Relevant to	Ergonomic standards for companies in Perú
What is specified	Main objective is to establish the parameters that allow adaptation of working conditions to the physical and mental characteristics of workers in order to provide them well-being, safety and greater efficiency in their performance, taking into account that improved working conditions contribute to greater efficiency and productivity business.
Related document	ISO 26800:2011 Ergonomics — General approach, principles, and concepts

Country	Perú
Document ID	Ministerial Resolution No. 374-2008-TR
Relevant article	Labor standards act
Document type	Law (Ministerial Resolution)
Relevant to	Injury prevention
What is specified	Document approves the list of physical agents, chemical, biological, ergonomic and psychosocial that generate risks for the health of pregnant women and / or normal development of the embryo and fetus, its corresponding intensities, concentrations or levels of presence and the periods in which it affects pregnancy; the list of activities, processes, operations or tasks, high risk equipment or products; and the guidelines for companies to perform the evaluation of their risks.

Country	Perú
Document ID	Ministerial Resolution No. 312-2011-MINSA
Document title	Aprueban documento técnico "Protocolos de exámenes médico ocupacionales y guías de diagnóstico de los exámenes médicos obligatorios por actividad"
	Technical document approved "Occupational medical examination protocols and diagnostic guidelines for mandatory medical examinations by activity"
Relevant article	Labor standards act
Document type	Law (Ministerial Resolution)
Relevant to	Occupational safety and health
What is specified	Protect and promote the safety and health of workers as well as create environments of healthy work; adequate occupational health services for workers.
Related document	Recommendation No. 171 of the International Labor Organization, on the Occupational Health Services.

Country	Perú
Document ID	Ministerial Resolution No. 313-2011-MINSA
Document title	Aprueban Norma Técnica de Salud que establece los Exámenes Médicos Ocupacionales para los Estibadores y Transportistas Manuales
	Approves the Technical Health Regulation that establishes the Occupational Medical Examinations for Manual Stevedores and Transporters.
Relevant article	Labor standards act
Document type	Law (Ministerial Resolution)
Relevant to	Occupational safety and health, Manual handling
What is specified	Approves the technical health regulation that establishes the occupational medical examinations for manual stevedores and transporters.
Related document	Recommendation No. 171 of the International Labour Organization, on the Occupational Health Services.

Country	Perú
Document ID	Ministerial Resolution No. 480-2008-MINSA
Document title	Aprueban Norma Técnica de salud que establece el Listado de Enfermedades Profesionales.
	Approves the Technical Health Standard that establishes the List of Occupational Diseases
Relevant article	Labor standards act
Document type	Law (Ministerial Resolution).
Relevant to	Occupational safety and health
What is specified	Technical health standard that establishes the list of occupational diseases
Related document	ILO- 2010 List of occupational diseases and the registration and notification of occupational accidents and occupational diseases

Country	Perú
Document ID	Ministerial Resolution No. 069-2011-MINSA
Document title	Aprueban Documento Técnico “Evaluación y Calificación de la Invalidez por Accidentes de Trabajo y Enfermedades profesionales”.
	Approval of Technical Document “Evaluation and Qualification of Disability due to Work Accidents and Occupational Diseases”
Relevant article	Labor standards act
Document type	Law (Ministerial Resolution).
Relevant to	Occupational safety and health
What is specified	The aforementioned Technical Document will be applicable in the health establishments of the Health Sector and to other actors that participate in the process of evaluation and qualification of the nature and degree of disability due to work accidents and occupational diseases of workers entitled to insurance coverage Complementary Risk Work.

Country	Perú
Document ID	Supreme Decree No. 024-2016-EM
Document title	Aprueban Reglamento de Seguridad y Salud Ocupacional en Minería
	Mining Occupational Health and Safety Regulations are approved
Relevant article	Labor standards sct
Document type	Law (Supreme Decree)
Relevant to	Occupational safety and health
What is specified	ART. 114.- All health and safety management system occupational should take into account the interaction of the man - machine - environment. You must identify the factors, evaluate and control the disergonomic risks so that the work area is safe, efficient and comfortable, considering the following aspects: design of the workplace, position in the workplace, manual handling of loads, limit load recommended, postural positioning at workstations, repetitive movement, work cycles - rest, perceptual and mental overload, equipment and tools at workstations.
Related document	Safety and health in opencast mines: An ILO Code of Practice (ISBN 92-2-107103-0), Ginebra, 1991.

SERBIA

Country	Serbia
Document ID	ICS:13.180
Document title	SRPS CEN ISO/TR 12296:2014 Ergonomija — Ručno prenošenje pacijenata uzdravstvenom sektoru
	Ergonomics — Manual handling of people in the healthcare sector
Document type	Standard
Relevant to	Healthcare workers
What is specified	This standard provides guidance for approaching problems and risks related to the manual performance of work by people in the health sector, and for identifying and implementing ergonomic strategies and solutions to those problems and risks.
Related document	CEN ISO/TR 12296:2013 – ISO/TR 12296:2012

Country	Serbia
Document ID	ICS:01.120 – 11.180.01
Document title	SRPS CEN ISO/TR 22411:2012 Ergonomski podaci i smernice za primenu ISO/IEC Uputstva 71 za proizvode i usluge potrebne starijim osobama i osobama sa invaliditetom
	Ergonomics data and guidelines for the application of ISO/IEC Guide 71 to products and services to address the needs of older persons and persons with disabilities
Document type	Standard
Relevant to	Older persons and persons with disabilities
What is specified	This technical report presents ergonomic data and instructions for the application of Instruction 71 which refers to the needs of the elderly and persons with disabilities in the development of standards.
Related document	CEN ISO/TR 22411:2011 – ISO/TR 22411:2008

Country	Serbia
Document ID	Sl. glasnik RS", br. 101/2005, 91/2015 i 113/2017
Document title	Zakon o bezbednosti i zdravlju na radu
	Law on occupational safety and health
Document type	Law
Relevant to	Every employer and every employee, H&S professionals, ergonomists
What is specified	This law specifies preventive measures, obligations and responsibilities of the employer, rights and obligations of employees, the manner of organizing safety and health at work, appointing employee representatives for safety and health at work, record keeping, cooperation and reporting, conditions for taking the professional exam in this area and licensing, the responsibilities of the Occupational Safety and Health Administration, including oversight and penalties.

Country	Serbia
Document ID	Службени гласник РС, број 42/09)
Document title	З а к о н о потврђивању конвенције Међународне организације рада број187 о промотивном оквиру безбедности и здравља на раду
	Law on the approval of the convention of the International Labor Organization number 187 on the promotional framework for occupational safety and health
Document type	Law
Relevant to	Directorate for Safety and Health at Work
What is specified	This law specifies objectives, national policy, national system and national program in the area of occupational safety and health.
Related document	C187 – Promotional Framework for Occupational Safety and Health Convention, 2006 (ILO)

Country	Serbia
Document ID	Службени гласник РС, број 42/09
Document title	З а к о н о потврђивању конвенције Међународне организације рада број 167 о безбедности и здрављу у грађевинарству
	Law on approval of the convention of the International Labor Organization number 167 on safety and health in civil engineering
Document type	Law
Relevant to	Directorate for Safety and Health at Work, construction workers, H&S management
What is specified	This law specifies general provisions, preventive and protective measures and implementation, and gives final provisions.
Related document	C167 - Safety and Health in Construction Convention, 1988 (ILO)

Country	Serbia
Document title	З а к о н о потврђивању конвенције која се односи на безбедност и здравље у пољопривреди
	Law on ratification of the convention relating to safety and health in agriculture
Document type	Law
Relevant to	Directorate for Safety and Health at Work, agriculture workers, H&S management
What is specified	This law specifies general provisions, preventive and protective measures, and gives other provisions.
Related document	C184 – Safety and Health in Agriculture Convention, 2001 (ILO)

Country	Serbia
Document ID	Службени гласник РС, број 101/16
Document title	Уредба о превентивним мерама за безбедан и здрав рад при коришћењу оштрих предмета који су медицинска средства у здравственој делатности
	Regulation on preventive measures for safe and healthy work when using sharp objects that are medical devices in the health sector
Document type	Regulation
Relevant to	Health workers
What is specified	This regulation prescribes the requirements that the employer is obliged to meet in ensuring the application of preventive measures in the use of sharp objects that are medical devices in health care.

SINGAPORE

Country	Singapore
Document ID	Workplace Safety and Health Act (CHAPTER 354A, Section 65)
Document title	Workplace Safety and Health (Risk Management) Regulations
Relevant article	Workplace Safety and Health Act
Document type	Legislation
Relevant to	Occupational Safety and Health
What is specified	The regulation enforces the need to carry out a risk assessment by businesses in the country and the requirement of such an assessment as mandated by the state.
Related document	ISO 31000:2018 Risk Management

Country	Singapore
Document ID	CHAPTER 354A
Document title	Workplace Safety and Health Act
Document type	Legislation
Relevant to	Workplace Safety and Health (WSH)
What is specified	It is Singapore's WSH framework. The critical contents of the act are • It places responsibilities on stakeholders who have it within their control to ensure safety at the workplace. • It focuses on workplace safety and health systems and outcomes rather than merely on compliance. • It facilitates effective enforcement through the issuance of remedial orders. • It imposes higher penalties for non-compliance and risky behaviour

SOUTH AFRICA, REPUBLIC OF

Country	**South Africa, Republic of**
Document ID	Government Notice No. R. 1589
Document title	Ergonomics Regulations
Document type	Regulation, promulgated in terms of Section 43 of the OHS Act
Relevant to	All employers in South Africa who fall under the scope of the Occupational Health and Safety Act, 85 of 1993, as amended. Excludes: - Mine and mining area - Shipping vessel - Entities of the Department of Transport
What is specified	Promulgated in December 2019, the Regulations put in place ergonomics requirements for the employer to implement in order to provide a workplace that is safe and without risk to health to persons. It covers all three domains of HFE. The regulation focuses on: - definitions - scope of application - information, instruction and training - duties of those who may be at risk - duties of designers, manufacturers, importers and suppliers - ergonomics risk assessment - risk control - medical surveillance - maintenance of controls - records - ergonomics health and safety technical committee - offences and penalties.

Country	**South Africa, Republic of**
Document ID	Government Notice No. R. 498
Document title	Circular 180: Compensation on WRULDs
Document type	Guideline
Relevant to	Employers and medical practitioners submitting claims for work-related upper limb disorders
What is specified	The guideline focuses on: - definitions - diagnosis - impairment - benefits - reporting - claim processing.

Country	South Africa, Republic of
Document ID	Government Notice No. R. 18491
Document title	Basic Conditions of Employment Act, 75 of 1997, as amended
Document type	Act
Relevant to	Employers and employees who fall under the application of the Act. Excludes: Members of the SANDF, National intelligence agency and South African security service
What is specified	Among other things, the BCEA provides guidance on: - working hours - overtime - night work - leave - contracts.

Country	South Africa, Republic of
Document ID	Government Notice No. R. 19370
Document title	Employment Equity Act, 55 of 1998, as amended
Document type	Act
Relevant to	Employers and employees who fall under the application of the Act.
What is specified	Among other things, the EEA provides guidance on: - reasonable accommodation

SPAIN

Country	Spain
Document title	Royal Decree 39/1997, of January 17, approving the Regulation of Prevention Services
Relevant article	Chapter IV. Prevention services
Document type	Regulation/ EU Guidelines
Relevant to	Recognition of Ergonomics and Psychosociology as a preventive specialty
What is specified	The integration of harm prevention in all the activities of the company
Related document	European Directive 89/391 - OSH "Framework Directive"

Country	Spain
Document title	Royal Decree 487/1997, of April 14 on the minimum health and safety requirements for the manual handling of loads where there is a risk, particularly of back injury to workers
Document type	Regulation/ EU Guidelines
Relevant to	Provisions on workload, ergonomic and psychosocial risks
Related document	Directive 90/269/EEC - manual handling of loads

Country	Spain
Document title	Royal Decree 488/1997, of April 14, on the minimum safety and health requirements for work with display screen equipment
Document type	Regulation/ EU Guidelines
Relevant to	Provisions on workload, ergonomic and psychosocial risks
Related document	Directive 90/270/EEC – display screen equipment

SWITZERLAND

Country	Switzerland
Document ID	SR 822.13
Document title	Federal Act of 13 March 1964 on Work in Industry, Trade and Commerce (Labour Act)
	Health protection
Relevant article	Ordinance 3 to the Labour Code; Art. 2,3, 23, 24, 25
Document type	Regulation of law
Relevant to	General workplace HFE, Manual handling, Injury prevention, Occupational Safety and Health
What is specified	Regulates the rights and obligations of employers and employees with regard to health protection, e.g. general provisions, special health protection requirements, workplaces, loads, supervision of workers, personal protective equipment and work clothing, design and use of the workrooms, maintenance.

Country	Switzerland
Document ID	832.30
Document title	Ordinance on the Prevention of Accidents and Occupational Diseases
Relevant article	Art. 11; 32 a
Document type	Regulation
Relevant to	Ergonomic principles using and maintaining work equipment
What is specified	Obligations of employer: Information and consultation of workers, use of equipment.

Country	Switzerland
Document ID	SR 822.11
Document title	Federal Act of 13 March 1964 on Work in Industry, Trade and Commerce (Labour Act)
	Ordinance 1 to the Labour Code
Document type	Regulation of law
Relevant to	General workplace HSE e.g. working times, training provision
What is specified	Includes definitions and clarifications, e.g. scope, working hours and rest periods, measures for night work, special protection for women, special obligations of employers and employees, duties and responsibilities of the authorities.

Country	Switzerland
Document ID	SR 832.30
Document title	Ordinance on the prevention of accidents and Occupational Diseases
Relevant article	Art. 82
Document type	Regulation
Relevant to	Obligation of employer and employee
What is specified	General prevention of occupational accidents and diseases based on experience required, state of the art of technology and appropriateness of given conditions.

Country	Switzerland
Document ID	SR 220
Document title	Code of obligation
Relevant article	Art. 328
Document type	Law
Relevant to	Protection of employees' personage
What is specified	Obligations of employer: Taking measures to protect life, health and personal integrity of employees by measures necessary to experience, applicable to circumstances, as it is reasonable to do so.

TÜRKIYE

Country	Türkiye
Document ID	No: 6331
Document title	İş Sağlığı ve Güvenliği Kanunu, (Accepted 30/6/2012)
	Occupational Health and Safety Law No. 6331
Relevant article	Occupational Health and Safety Law, 6331
Document type	Law
Relevant to	Occupational Safety and Health
What is specified	The purpose of this Law; To regulate the duties, authorities, responsibilities, rights and obligations of employers and employees in order to ensure occupational health and safety at workplaces and to improve existing health and safety conditions. This Law is applied to all works and workplaces belonging to the public and private sectors, to employers and employer representatives of these workplaces, to all employees, including apprentices and interns, regardless of their field of activity.
Related document	ISO 45000- ISO 45001- ISO 18001; OHSAS ILO Conventions No. 155 and 161 were influential in the enactment of the law

Country	Türkiye
Document title	İş Sağlığı ve Güvenliği Risk Değerlendirmesi Yönetmeliği, 30/12/2012
	Occupational Health and Safety Risk Assessment Regulation
Relevant article	Risk Assessment Regulations
Document type	Regulations
Relevant to	HFE in general, Risk assessment
What is specified	The purpose of this Regulation is to regulate the procedures and principles of risk assessment to be made in terms of occupational health and safety at workplaces. This Regulation covers workplaces within the scope of Occupational Health and Safety Law dated 20/6/2012 and article no 6331.
Related document	ISO 31000 ILO Convention No.155 – No.161

Country	Türkiye
Document ID	Ministry of Industry and Technology, (Turkish Standards Institute-18001)
Document title	İş Sağliği Ve Güvenliği Yönetim Sistemi El kitapcığı (TS 18001)
	Guidelines on Occupational Safety and Health Management Systems
Relevant article	Industrial Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	This gives a guide for organizations to provide safe and healthy workplaces by preventing work-related injury and proactively improving systems performance.
Related document	Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001) ISO 45001, ISO 20646

Country	Türkiye
Document ID	28628
Document title	İş Ekipmanlarinin Kullaniminda Sağlik Ve Güvenlik Şartlari Yönetmeliği
	Health And Safety Regulations for The Use Of Work Equipment
Relevant article	Article No. 28628
Document type	Regulation
Relevant to	HFE in general, Occupational Safety and Health
What is specified	The purpose of this Regulation is to determine the minimum conditions to be complied with in terms of health and safety regarding the use of work equipment in the workplace.
Related document	It has been prepared in parallel with the Council Directive of the European Union dated 9/12/1996 and numbered 96/82/EC. European Union Directive 2009/104/EC dated 3/10/2009

Country	Türkiye
Document ID	Ministry of Family, Labor and Social Services: No. 31419, 10/03/2021
Document title	Uzaktan Çalışma Yönetmeliği, Sayı 31419
	Remote Work Regulation
Relevant article	This Regulation has been prepared based on Article 14 of the Labor Law No. 4857
Document type	Regulation
Relevant to	Labor Law, HFE in general
What is specified	The application of business rules regarding data protection and sharing, and the procedures and principles of remote working. The Ministry of Labour and Social Security ("Ministry") introduced the Remote Working Regulation1 ("the Regulation") on 10 March 2021. While the concept of remote working has been in the Labour Law (Law No: 4857) since 2016, it has gained an increasing attention since March 2020 and enabled many industries to continue their operations during COVID-19. The Regulation addresses several issues related to remote working that were not previously addressed by the Labour Law, which will eliminate uncertainties in addition to repeating various concepts already existing under the Labour Law.
Related document	European Union commission, telework guidelines

Country	Türkiye
Document ID	Council of Ministers of the Republic of Türkiye, No:4857
Document title	İş Kanunu (Accepted 22/5/2003)
	Labour Law
Relevant article	Labour Law, Turkish Constitution
Document type	Law
Relevant to	Labour and Industrial Relation
What is specified	The purpose of this Law is to regulate the rights and responsibilities of employers and workers employed based on an employment contract regarding working conditions and working environment. This Law applies to all workplaces, employers, employer representatives and workers of these workplaces, regardless of their field of activity, except for the exceptions in Article 4. Workplaces, employers, employer representatives and workers are bound by the provisions of this Law regardless of the notification day in Article 3.
Related document	ILO 87-98-100-111-156-45-171-158-175-183 and All ILO conventions ratified by Türkiye Constitution

UNITED STATES

Country	**United States of America**
Document ID	Occupational Safety and Health Administration, Ergonomics Program. Final Rules (29 CFR Part 1910).
Subject(s):	Occupational safety and health
Type of legislation:	Regulation, Decree, Ordinance
Adopted on:	2001-01-16
Published on:	Federal Register, 2000-11-14, Vol. 65, No. 220, pp. 68261-68870
ISN:	USA-2001-R-57954
Link:	https://www.ilo.org/dyn/natlex/natlex4.detail?p_isn=57954&p_lang=en
Bibliography:	Federal Register, 2000-11-14, Vol. 65, No. 220, pp. 68261-68870
Abstract/Citation:	Addresses employee exposure to ergonomic risk factors in jobs in general industry workplaces. Contains "action trigger" which identifies jobs with risk factors of significant magnitude, duration, or intensity to warrant further examination by the employer. If an employee reports a musculoskeletal disorder (MSD) incident and the risk factors of that employee's job meet the action trigger, the employer must establish an ergonomics programme for that job. Specifies the content of this programme.

VENEZUELA

Country	**Venezuela**
Document ID	Official Gazette No. 1,631 Extraordinary dated December 31, 1973
Document title	Reglamento de las condiciones de higiene y seguridad en el trabajo
	Regulation of the conditions of hygiene and safety at work
Relevant article	Labor Standards Act
Document type	Law
Relevant to	General workplace HFE
What is specified	The following standards are established on industrial hygiene and safety conditions, mandatory for employers and workers.
Related document	ILO Conventions

Country	**Venezuela**
Document ID	2273 year 1991
Document title	Principios de ergonomía en los lugares de trabajo
	Principles of ergonomics in the working places
Relevant article	Recommendation
Document type	Guideline (Regulations)
Relevant to	General workplace HFE
What is specified	Establishes the fundamental principles of ergonomics as basic guidelines for the design of work systems and defines relevant basic terms.
Related document	ISO 6385

Country	Venezuela
Document ID	Gaceta Oficial N° 38.236 del 26 de julio de 2005)
Document title	Ley Orgánica de Prevención, Condiciones y Medio Ambiente de Trabajo
	Organic Law of Prevention, Conditions and Work Environment
Relevant article	ART. 59, 60, 63 AND 64
Document type	Law
Relevant to	General workplace HFE
What is specified	Establish the institutions, norms and guidelines of the policies, and the organs and entities that allow to guarantee to the workers conditions of safety, health and well-being in a suitable and conducive work environment for the full exercise of their physical and mental faculties, accomplished through the promotion of safe and healthy work, the prevention of work accidents and occupational diseases, the comprehensive repair of the damage suffered and the promotion and incentive for the development of programs for recreation, use of free time, rest and social tourism.
Related document	ILO Conventions

Country	Venezuela
Document ID	Decret No. 2181 January 6, 2016
Document title	Norma técnica para el control en la manipulación, levantamiento y traslado manual de carga
	Technical standard for controlling the handling, lifting and manual transfer of load
Relevant article	Labor Standards Act
Document type	Law
Relevant to	General workplace HFE
What is specified	Establish criteria, guidelines and procedures, fundamental to regulate the handling, lifting and manual transfer of loads with weights greater than 3 kilograms, taking into account the characteristics of the work process, the conditions of the work environment and the workers who perform these tasks.
Related document	ISO 11228-1 ILO Convention No.127 - Maximum Weight Convention

Appendix 4. IEA survey responses – standards and guidelines

AUSTRALIA

Country	**Australia – Austroads (peak body of Australian and New Zealand Government road transport and traffic departments/agencies)**
Document title	Guide to Road Safety – Parts 1 to 7 (2021)
Document type	Guidance
Relevant to	All Australian and New Zealand jurisdictions responsible for road safety
What is specified	Specifies 4 principles on which the 'Safe System' approach is based: • People make mistakes that can lead to road crashes • The human body has a limited ability to tolerate crash forces • Responsibility for system operation is shared between those who plan, design, build, manage and use roads and vehicles and those who provide post-crash care to prevent crashes resulting in serious injury or death • All parts of the system must be strengthened to multiply their effects; so that if one part fails, road users are still protected. Part 1 outlines key features of Safe roads, Safe speed, Safe vehicles, and Safe people, each of which are covered separately in Parts 2 to 5, plus transport agencies' responsibilities for road safety, its management and measurement (covered by parts 6 and 7).
Related document	Global Plan for the Decade of Action for Road Safety 2021-2030 https://www.who.int/publications/m/item/global-plan-for-the-decade-of-action-for-road-safety-2021-2030 National Road Safety Strategy (Australia) https://www.roadsafety.gov.au/nrss

Country	**Australia – State of Victoria (Worksafe Victoria in collaboration with transport accident commission)**
Document title	Guide to safe work-related driving (2008)
Document type	Guidance
Relevant to	Employers that have light vehicle fleets. (NB: vehicle accidents represent approximately 41% of all compensated work fatalities in Australia)
What is specified	Guidance on complying with duty under the OHS Act to provide and maintain a safety and healthy working environment. Applied to work-related driving, this includes: • Information about vehicles' safety features and instructions on how to use them • Knowledge about causes and effects of fatigue • Information about safe use of the vehicle • Information about vehicle maintenance. Risk management entails: • Planning (safety culture, consultation, policies/procedures, vehicle selection / maintenance, driver competence and supervision, trip planning to minimize risk • Managing risk on road (fatigue, speed, drugs/alcohol, adverse conditions, etc.) • Monitoring and reviewing.
Related document	Victoria's OHS Act, Section 21

Country	**Australia – State of Victoria**
Document title	Preventing and managing work-related stress: A guide for employers (2021)
Document type	Guidance
Relevant to	Employers, managers
What is specified	**Work-related stress** is the physical and psychological response of employees who perceive that the demands of their work or workplace environment exceed their ability or resources to cope. It is recognized globally as a major OHS hazard. **Psychosocial hazards** are factors in the design or management of work that increase the risk of work-related stress and can lead to psychological or physical harm. Employees who are stressed have a higher risk of musculoskeletal disorders (MSDs) and their concentration and decision-making abilities can be affected, increasing the risk of physical injury. **"Common psychosocial hazards":** low job control, high and low job demands, poor support, poor organizational change management, poor organizational justice, low recognition and reward, low role clarity, poor workplace relationships, poor environmental conditions, remote and isolated work, violent or traumatic events. Outlines procedures to prevent/control risk (with employee participation): identify hazards, assess risks, control risks in accord with hierarchy of risk control. **Suggests risk control**s for each of the above common psychosocial hazards.
Related document	Victoria's OHS Act

Country	Australia – State of Victoria
Document title	More information about Preventing work-related stress – examples of risk control measures
Document type	Guidance (2 pages)
Relevant to	Employers, Employees, Health & Safety Representatives (HSRs)
What is specified	Table providing multiple examples of risk controls for each of the following causes: task design, workload/work pace, role in the organization, work context, physical work environment and equipment, degree of control, organizational function and culture, work schedule, management of work, employment status, relationships at work.
Related document	Victoria's OHS Act

Country	Australia
Document ID	Safe work
Document title	Guide for managing the risk of fatigue at work (2013)
Document type	Guidance
Relevant to	Employers, Employees, Health & Safety Representatives (HSRs). *Does not replace information on fatigue management for specific industries, or requirements under specific laws such as heavy vehicle driver fatigue or rail safety.*
What is specified	Specifies risk management requirements: **Identify contributing factors:** e.g. work schedules (shift work, night work, hours of work, breaks), job demands, sleep (duration, quality, time since sleep), environmental conditions, non-work factors … also: workers at high risk of fatigue, safety-critical tasks, workplace fatigue policy **Assess and control risks** – includes suggestions for each factor above **Also:** Fatigue checklist; guidelines for shift design; risk management chart; case studies **Other resources**: links to other resources for: heavy vehicle transport; rail; aviation; medical professionals; taxi drivers; emergency services, mining.

CHILE

Country	**Chile**
Document ID	NCh2632:2020
Document title	Ergonomics principles in the design of work systems
	Principios ergonómicos para el diseño de sistemas de trabajo
Relevant article	Labor standard
Document type	Guideline
Relevant to	Design
What is specified	This standard establishes the basic ergonomic principles that guide the design of work systems and defines the fundamental terms that are relevant. It describes a global approach to the design of these systems, which contemplates the cooperation of ergonomists with other people participating in this activity, attending to human, social and technical requirements in a balanced way, during the design process.
Related document	ISO 26800:2011 Ergonomics — General approach, principles, and concepts

Country	**Chile**
Document ID	NCh3559:2018
Document title	Ergonomics of the thermal environment - Analytical determination and interpretation of thermal comfort by calculating PMV and PPD indices and local thermal comfort criteria
	Ergonomía del ambiente térmico - Determinación analítica e interpretación del bienestar térmico mediante el cálculo de los índices PMV y PPD y los criterios de bienestar térmico local
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal environment
What is specified	This standard presents methods for the prediction of the general wind chill and the degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments.
Related document	ISO/TS 14415:2005 Ergonomics of the thermal environment — Application of International Standards to people with special requirements

Country	Chile
Document ID	NCh2793:2003
Document title	Ergonomic - Calculation for interior lighting - Basic method
	Ergonomía - Cálculo para la iluminación interior - Método básico
Relevant article	Labor standard
Document type	Guideline
Relevant to	Lighting of workplaces
What is specified	This standard specifies lighting requirements for workplaces and for people to perform visual tasks efficiently, in comfort and safety throughout the whole work period.
Related document	ISO 8995-1:2002(en) Lighting of workplaces

Country	Chile
Document ID	NCh2775:2003
Document title	Ergonomics - Assessment of spoken communication - Speech interference level and communication distances for people with normal hearing ability in direct communication (SIL method)
	Ergonomía - Valoración de la comunicación hablada - Nivel de interferencia del habla y distancias de comunicación para personas con capacidad auditiva normal en comunicación directa (método SIL)
Relevant article	Labor standard
Document type	Guideline
Relevant to	Assessment of speech communication
What is specified	Provides a method for prediction of the effectiveness of speech communication in the presence of noise generated by machinery as well as in noisy environments. Parameters are the ambient noise at the speaker's position, ambient noise at the listener's position, distance between the communication partners and a great number of physical and personal conditions.
Related document	ISO 9921-1:1996 Ergonomic assessment of speech communication

Country	Chile
Document ID	NCh2780:2003
Document title	Ergonomics - Thermal environments - Vocabulary and symbols
	Ergonomía - Medioambientes térmicos - Vocabulario y símbolos
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal environments
What is specified	Defines physical quantities in the field of the ergonomics of the thermal environment. The corresponding symbols and units are also listed. give vocabulary and symbols for the quantities used in ergonomics of the thermal environment.
Related document	ISO 13731:2001

Country	Chile
Document ID	NCh2768:2003
Document title	Ergonomics - Evaluation of static working postures
	Ergonomía - Evaluación de las posturas de trabajo estáticas
Relevant article	Labor standard
Document type	Guideline
Relevant to	Static working postures
What is specified	This standard establishes ergonomic recommendations for different work tasks. Provides information to those involved in design, or redesign, of work, jobs and products who are familiar with the basic concepts of ergonomics in general and working postures.
Related document	ISO 11226:2000 Ergonomics — Evaluation of static working postures.

Country	Chile
Document ID	NCh2767:2002
Document title	Evaluation of cold environments – Determination of required clothing insulation (IREQ)
	Ergonomía – Evaluación de los medioambientes fríos – Determinación del aislamiento requerido de la vestimenta (IREQ)
Relevant article	Labor standard
Document type	Guideline
Relevant to	Cold environments
What is specified	This standard Proposes methods and strategies to assess the thermal stress associated with exposure to cold environments. Cold stress is suggested to be evaluated in terms of both general cooling of the body and local cooling of particular parts of the body (e.g. extremities and face).
Related document	ISO/TR 11079:1993 Evaluation of cold environments — Determination of required clothing insulation (IREQ).

Country	Chile
Document ID	NCh2713:2002
Document title	Ergonomics of the thermal environment - Assessment of the influence of the thermal environment using subjective judgement scales
	Ergonomía del medioambiente térmico - Evaluación de la influencia del medioambiente térmico utilizando escalas de juicio subjetivo
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal environment
What is specified	This standard covers the construction and use of judgement scales for use in providing reliable and comparative data on the subjective aspects of thermal comfort or thermal stress.
Related document	ISO 10551:1995 Ergonomics of the thermal environment – Assessment of the influence of the thermal environment using subjective judgement scales.

Country	Chile
Document ID	NCh2684:2002
Document title	Ergonomics - Thermal environments - Instruments for measuring physical quantities
	Ergonomía - Medioambientes térmicos - Instrumentos para medición de las magnitudes físicas
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal environments
What is specified	This standard specifies the minimum characteristics of instruments for measuring physical quantities characterizing an environment as well as the methods for measuring the physical quantities of this environment.
Related document	ISO 7726:1998 Ergonomics of the thermal environment — Instruments for measuring physical quantities.

Country	Chile
Document ID	NCh2691:2002
Document title	Ergonomic – Moderate thermal environments – Determination of the PMV and PPD indices and specification of the conditions for thermal comfort
	Ergonomía - Medioambientes térmicos moderados - Determinación de los índices PMV y PPD y especificación de las condiciones de comodidad térmica
Relevant article	Labor standard
Document type	Guideline
Relevant to	Moderate thermal environments
What is specified	The purpose is to present a method for predicting the thermal sensation and the degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments and to specify acceptable environmental conditions for comfort.
Related document	ISO 7730:1994 Moderate thermal environments — Determination of the PMV and PPD indices and specification of the conditions for thermal comfort.

Country	Chile
Document ID	NCh2698:2002
Document title	Ergonomic – Principles applied at the visual interaction – The lighting of indoor work systems
	Ergonomía - Principios aplicados a la interacción visual – La iluminación en sistemas de trabajo interior
Relevant article	Labor standard
Document type	Guideline
Relevant to	Visual interaction
What is specified	Identifies the parameters that influence visual performance. It also presents the criteria that have to be satisfied in order to achieve an acceptable visual environment. Is applicable to working areas in industrial buildings, offices, and hospitals, but not to those working areas of low luminance used for such activities as projection, viewing of transparencies, and handling of photosensitive materials.
Related document	ISO 8995:1989 Principles of visual ergonomics – The lighting of indoor work systems.

Country	Chile
Document ID	NCh2709:2002
Document title	Ergonomic – Thermal environments – Estimation of the thermal insulation and evaporative resistance of a clothing ensemble
	Ergonomía – Medioambientes térmicos - Estimación del aislamiento térmico y de la resistencia a la evaporación de un conjunto de vestimentas
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal environment
What is specified	NCh2709: 2002 specifies methods for estimating the thermal characteristics (resistance to dry heat loss and evaporative heat loss) in steady-state conditions for a clothing ensemble based on values for known garments, ensembles and textiles. It examines the influence of body movement and air penetration on thermal insulation and water vapour resistance.
Related document	ISO 9920:2007 Ergonomics of the thermal environment – Estimation of thermal insulation and water vapour resistance of a clothing ensemble.

Country	Chile
Document ID	NCh2692:2002
Document title	Ergonomics of thermal environment - Principles and application of relevant standards
	Ergonomía - Medioambientes térmicos - Principios y aplicación de las normas pertinentes
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal environment
What is specified	Purpose is to specify information which will allow the correct, effective and practical use of International Standards concerned with the ergonomics of the thermal environment. Describes the underlying principles concerning the ergonomics of the thermal environment.
Related document	ISO 11399:1995 Ergonomics of the thermal environment – Principles and application of relevant International Standards.

Country	Chile
Document ID	NCh2643/1:2002
Document title	Ergonomic – Requirements for the design of displays and control actuators – Part 1: Human interactions with displays and control actuators
	Ergonomía - Requisitos para el diseño de los dispositivos de señalización y los accionadores de los elementos de control - Parte 1: Interacciones humanas con los dispositivos de señalización y los accionadores de los elementos de control
Relevant article	Labor standard
Document type	Guideline
Relevant to	Design
What is specified	This standard applies to the design of displays and control actuators on machinery. It specifies general principles for human interaction with displays and control actuators, to minimize operator errors and to ensure an efficient interaction between the operator and the equipment. It is particularly important to observe these principles when an operator error may lead to injury or damage to health.
Related document	ISO 9355-1:1999(en) Ergonomic requirements for the design of displays and control actuators – Part 1: Human interactions with displays and control actuators.

Country	Chile
Document ID	NCh2663:2002
Document title	Ergonomic - Hot environments - Analytical determination and interpretation of thermal stress using calculation of required sweat rate
	Ergonomía - Medioambientes calurosos - Determinación analítica e interpretación del estrés calórico usando el cálculo de la tasa requerida de sudor
Relevant article	Labor standard
Document type	Guideline
Relevant to	Hot environments
What is specified	This standard describes a method of calculating the heat balances as well as the sweat rate that the human body should produce to maintain this balance in equilibrium. The various terms used show the influence of the different physical parameters. It does not predict the physiological response of individual subjects, but only considers standard subjects in good health and fit for the work they perform.
Related document	ISO 7933:1989 Hot environments – Analytical determination and interpretation of thermal stress using calculation of required sweat rate.

Country	Chile
Document ID	NCh2643/2:2002
Document title	Ergonomic – Requirements for the design of displays and control actuators – Part 2: Displays
	Ergonomía - Requisitos para el diseño de los dispositivos de señalización y los accionadores de los elementos de control - Parte 2: Dispositivos de señalización
Relevant article	Labor standard
Document type	Guideline
Relevant to	Design
What is specified	This standard gives guidance on the selection, design and location of displays to avoid potential ergonomic hazards associated with their use. It specifies ergonomics requirements and covers visual, audible, and tactile displays. It applies to displays used in machinery (e.g. devices and installations, control panels, operating and monitoring consoles) for occupational and private use.
Related document	ISO 9355-2:1999 Ergonomic requirements for the design of displays and control actuators – Part 2: Displays.

Country	Chile
Document ID	NCh2679:2002
Document title	Ergonomics – Thermal strain – Evaluation by physiological measurements
	Ergonomía – Sobrecarga térmica – Evaluación mediante mediciones fisiológicas
Relevant article	Labor standard
Document type	Guideline
Relevant to	Thermal strain
What is specified	This standard describes methods for measuring and interpreting the following physiological parameters: body core temperature; skin temperatures; heart rate; body-mass loss.
Related document	ISO 9886:2004 Ergonomics – Evaluation of thermal strain by physiological measurements.

Country	Chile
Document ID	NCh2644:2002 ISO 8996
Document title	Ergonomics – Determination of metabolic heat production
	Ergonomía – Determinación de la generación de calor metabólico
Relevant article	Labor standard
Document type	Guideline
Relevant to	Metabolic heat
What is specified	This standard specifies methods for determining the metabolic rate, but can also be used for other applications, e.g. for the assessment of working practices, the cost of specific jobs or sport activities, the total cost of activity, etc. Annexes A to G contain: classification of metabolic rate for kinds of activities, classification of metabolic rate by occupation, data for standard person, metabolic rate for body posture, type of work and body motion related to work speed, metabolic rate for typical activities, example of calculation of the average metabolic rate for a work cycle, examples of calculation of the metabolic rate based on measured data.
Related document	ISO 8996:1990 Ergonomics – Determination of metabolic heat production.

Country	Chile
Document ID	NCh2634:2002
Document title	Ergonomics – Hot environments – Estimation of the heat stress on working man, based on the TGBH-index (wet bulb globe temperature)
	Ergonomía - Medioambientes calurosos - Estimación del estrés calórico sobre el trabajador, basada en el índice TGBH (Temperatura de globo y bulbo húmedo)
Relevant article	Labor standard
Document type	Guideline
Relevant to	Hot environments
What is specified	This standard gives a method that can easily be used in an industrial environment for evaluating the stresses on a individual. It applies to the evaluation of the mean effect of heat on humans during a period representative of their activity but it does not apply to very short periods, nor to zones of comfort.
Related document	ISO 7243:1989 Hot environments – Estimation of the heat stress on working man, based on the WBGT-index (wet bulb globe temperature).

Country	Chile
Document ID	NCh2633:2001
Document title	Ergonomic – Geometrical orientation and directions of movements
	Ergonomía – Orientación geométrica y direcciones de los movimientos
Relevant article	Labor standard
Document type	Guideline
Relevant to	Design
What is specified	This standard sets out design principles, procedures, requirements and recommendations for the spatial orientation and direction of movement of controls and displays used in tool machines, industrial robots, office machines, earth-moving machinery, transportation (automobiles, railway electric cars/rolling stock, aircraft, ships, etc.), information, daily commodities, public utilities and the operational components of building facilities.
Related document	ISO 1503:2008(en) Spatial orientation and direction of movement – Ergonomic requirements.

Country	Chile
Document ID	NCh2521: 2000
Document title	Ergonomics - System of auditory and visual danger and information signals
	Ergonomía - Sistema de señales visuales y auditivas de peligro y de información
Relevant article	Labor standard
Document type	Guideline
Relevant to	Design
What is specified	This standard specifies a system of danger and information signals taking into account the different degrees of urgency. Applicable to all danger and information signals which have to be clearly perceived and differentiated.
Related document	ISO 11429:1996 Ergonomics — System of auditory and visual danger and information signals.

Country	Chile
Document ID	NCh2497:1999
Document title	Ergonomics – Visual danger signals – General requirements, designs and testing
	Ergonomía – Señales visuales de peligro – Requisitos generales, diseño y ensayo
Relevant article	Labor standard
Document type	Guideline
Relevant to	Design
What is specified	This standard describes criteria for the perception of visual danger signals in the area in which people are intended to perceive and to react to such a signal. Specifies the safety and ergonomic requirements and the corresponding physical measurements.
Related document	ISO 11428:1996 Ergonomics – Visual danger signals – General requirements, design, and testing.

Country	Chile
Document title	Circular 3390
	Circular 3390
Relevant article	Labor standard
Document type	Standard
Relevant to	Heavy Jobs
What is specified	Gives instructions on environmental and health surveillance in jobs rated as heavy.

Country	Chile
Document title	Circular 3532
	Circular 3532
Relevant article	Labor standard
Document type	Standard
Relevant to	Teleworking
What is specified	Gives instructions regarding workers who perform work under the modality of remote work or teleworking.

Country	Chile
Document title	Circular 3572
	Circular 3572
Relevant article	Labor standard
Document type	Standard
Relevant to	Teleworking
What is specified	It modifies and complements instructions on workers who perform work under the modality of remote work or teleworking and modifies and complements instructions on workers. It modifies title III, Persons protected or covered from book I. It includes a general description of insurance and title II and rating of work accidents from book II. Complaint, qualification, and evaluation of permanent disabilities are covered, both from the compendium of social security standards for workplace accidents and professional illnesses of law N° 16.744.

Country	Chile
Document title	Criteria guide for the preparation of technical job evaluation reports, related to the risk factors of musculoskeletal disorders
	Guía de criterios para la elaboración de informes técnicos de evaluación de puestos de trabajo, relacionados a los factores riesgos de los trastornos músculo esqueléticos
Relevant article	Technical guide
Document type	Guide
Relevant to	Ergonomist, occupational health professionals and mutual societies (companies that administer occupational accident and occupational disease insurance)
What is specified	Standardizes the technical criteria of musculoskeletal risk assessment reports for the process of study and qualification of an occupational musculoskeletal disease. It proposes a methodology that is relevant to the work of the different actors in the process. to standardize the documentation between companies.

Country	Chile
Document title	Guide to implementing participatory ergonomics in the workplace
	Guía para implementar la ergonomía participativa en el lugar de trabajo
Relevant article	Technical guide
Document type	Guide
Relevant to	Ergonomist and occupational health professionals
What is specified	It proposes the participatory work management methodology for all the actors of the company and integrates primers and supporting documentation for management in the company. Ergonomics is participatory, but this document supports management with other actors.

Country	Chile
Document title	Ergonomics guide for micro and small businesses
	Guía de ergonomía para micro y pequeñas empresas
Relevant article	Technical guide
Document type	Guide
Relevant to	Ergonomist and occupational health professionals
What is specified	Introduces small business ergonomic management, written in an easy-to-understand manner. integrates a risk checklist (matrix for the identification of dangers and risk assessment MIPER) for manual handling of loads and work with computers.

Country	Chile
Document title	Ergonomics and gender training guide for union leaders
	Guía de formación en ergonomía y género para dirigentes sindicales
Relevant article	Technical guide
Document type	Guide
Relevant to	Ergonomist, occupational health professionals, union leaders and workers' representatives
What is specified	Ergonomic analysis of jobs with gender perspectives. Includes testimonies of union leaders, sector analysis feminized and masculinized, and recommendations where the union leader can go.

Country	Chile
Document title	Ergonomics Guide Identification and Control of Risk Factors in Office Work and Computer Use
	Guía de ergonomía Identificación y control de factores de riesgo en el trabajo de oficina y uso de computadoras
Relevant article	Technical guide
Document type	Guide
Relevant to	Workers in general
What is specified	Recommendations to generate an administrative job with special adjustment in the use of a computer, chair adjustment recommendations and environmental variables such as noise and lighting.

Country	Chile
Document title	Protocol for the use of the dynamometer in the workplace version
	Protocolo para el uso del dinamómetro en la versión del puesto de trabajo
Relevant article	Technical guide
Document type	Guide
Relevant to	Ergonomist
What is specified	Standardized procedure to record force with a dynamometer. For pulling and pushing cars.

CHINA

Country	**Hong Kong, China**
Document title	Occupational Safety
Document type	Guides and information (website) Many documents relevant to Occupational Health
Relevant to	General population
What is specified	Part A : Guides to legislation Part B : Codes of Practice Part C : Guidance notes Part D : Other guidebooks 1. An employer's guide to manual handling operation 2. An employee's guide to manual handling operation 3. An employer's guide to work involving repetitive movements or manual work 4. An employee's guide to work involving repetitive movements or manual work 5. A guide on employer's safety policy 6. A practical guide to industrial noise reduction 7. A safety guide for freight container inspection 8. A safety guide on gate work 9. Basic electrical safety measures in the workplace 10. Five steps to information, instruction and training 11. Five steps to risk assessment 12. Guide on rest breaks 13. Guide on safety in lift repair & maintenance 14. Guide on safety at work in times of inclement weather 15. Hazards during chemicals in use and safety guidelines 16. Household chores – safety hints for window cleaning work 17. Housekeeping in office 18. Industrial safety (general duties of persons employed) 19. Keep construction sites clean and hygienic 20. Making reference to "supervision plan" in auditing safety management system 21. Managing occupational safety and health in schools 22. Occupational safety and health guidebook for the banking and finance industry 23. Occupational safety and health management in renovation and maintenance works for the property management industry 24. Occupational safety charter – safety is a shared responsibility 25. Occupational safety charter (leaflet) 26. Overview of work-at-height safety 27. Prevention against fall from height 28. Safe practices in operating fork-lift trucks 29. Safe systems of work 30. Safe use of material hoist – interlocking device on hoistway gate 31. Safe work in confined spaces 32. Safety and health at work in small retail shops 33. Safety and health guide for catering trade 34. Safety at work – a guide to personal protective equipment 35. Safety at work – personal protective clothing 36. Safety committees – a guide to their establishment & operation 37. Safety guide for construction work over / near water 38. Safety guide for bamboo scaffolding work

What is specified	39. Safety guide for interlocking of steel sheet 40. Safety guide for work in manholes 41. Safety handbook for construction site workers 42. Safety hints for demolition of unauthorized building works 43. Safety hints for heavy vehicles tyre demounting and inflation work 44. Safety hints on operation of suspended working platform 45. Safety hints on renovation work 46. Safety in the use of abrasive wheels 47. Safety is a shared responsibility 48. Safety measures for use of truss-out bamboo scaffold 49. Work for a safer, healthier workplace 50. Work safety – electrical safety and you 51. Working with employers 52. Working safely with flammable materials 53. Working safely with hand tools 54. Safety hints for construction workers 55. Occupational safety for repair, maintenance, alteration and addition works – safety hints for owners and tenants of commercial and residential units 56. Occupational safety for repair, maintenance, alteration and addition works – safety hints for owners' corporations 57. Occupational safety for repair, maintenance, alteration and addition works – safety hints for property management companies 58. Occupational safety for repair, maintenance, alteration and addition works – safety hints for contractors and workers Part E : Posters / notices Part F : Audio and visual materials https://www.labour.gov.hk/eng/public/content2_8.htm

Country	**Hong Kong, China**
Document title	Occupational Health
Document type	Guides and information (website) Many documents relevant to Occupational Health
Relevant to	General population
What is specified	Section A : Guides to Legislation and Codes of Practice Section B : General Guides on Occupational Health and Hygiene Section C : Occupational Disease and Work-related Disease Booklets Section D : Occupational Health Guides for Specific Industries a) Accommodation and Catering Service b) Cleansing Service c) Construction d) Education e) Health Care Service f) Retail Trade g) Guidelines on Occupational Safety and Health for Pest Control Operators h) Occupational Health for Meat and Poultry Workers i) A Guide on Noise Control in the Entertainment Industry j) Manual Handling Operation in Furniture Removal Trade k) Hints on Occupational Health for Couriers -- Manual Delivery Operations Section E : Posters Section F : Audio and Visual Materials https://www.labour.gov.hk/eng/public/content2_9.htm

Country	Taiwan, China
Document title	臺灣職業安全衛生管理系統指引
	Taiwan Occupational Safety and Health Management System Guidelines
Relevant article	Guidelines for Human-Hazard Prevention Projects
Document type	Guideline
Relevant to	Occupational Safety and Health
What is specified	This guideline guides employers and workers in organizations to jointly construct occupational safety and health management systems to strengthen independent management, improve occupational safety and health performance, reduce occupational disasters, and protect labor safety and health.
Related document	ILO-OSH 2001, ISO 45001, and ISO 20646

Country	Taiwan, China
Document title	人因性危害預防計畫指引
	Guidelines for Human-Hazard Prevention Projects
Relevant article	Taiwan Occupational Safety and Health Management System Guidelines
Document type	Guideline
Relevant to	Injury prevention
What is specified	The goal of this guide is to promote the prevention of repetitive tasks and other musculoskeletal diseases.
Related document	ISO 28002, ISO 16090, and ISO 17776

Country	Taiwan, China
Document ID	(concealed due to security issues)
Document title	武器系統操控台設計準則
	Guidelines for Console Design in Military Systems
Document type	Guideline
Relevant to	HFE in military systems
What is specified	The guidelines include considerations and specifications for the design of controls, visual/auditory displays, labelling, workspaces and their integration in the development of military systems.
Related document	MIL-STD-1472F

Country	**Taiwan, China**
Document ID	(concealed due to security issues)
Document title	專案計畫人因工程作業規定
	Human Factors Program Plan for Military Projects
Document type	Plans
Relevant to	HFE in military systems
What is specified	The program plan specifies the goals, scope, terminologies, tasks, organization and designation of human factors engineering in the process of the project. A template of Human Factors Program Plan (HFPP) is also provided as an attachment.
Related document	MIL-HDBK-46855A, MIL-HDBK-1908B

Country	**Taiwan, China**
Document title	醫療器材人因/可用性工程評估指引
	Guideline for applying human factors and usability engineering to medical devices
Relevant article	Administrative Procedure Act
Document type	Guideline
Relevant to	Injury prevention, Cognitive HFE, Occupational Safety and Health
What is specified	This guidance is developed to assist industry in following appropriate human factors and usability engineering processes to maximize the likelihood that new medical devices will be safe and effective for the intended users, uses and use environments.
Related document	IEC 62366, ISO 14971, IEC 60601-1-6, ANSI/AAMI HE75

Country	**Taiwan, China**
Document title	核子反應器設施建廠執照申請審核辦法
	Measures for the examination and verification of nuclear reactor facility construction license applications
Relevant to	Cognitive, Psycho-social HFE
What is specified	Nuclear reactor facility construction license application review should include human factors engineering, serious accident analysis, safety assessment and overall reliability assessment.

Country	**Taiwan, China**
Document title	就業保險促進就業實施辦法
	Measures for the examination and verification of nuclear reactor facility construction license applications
Relevant to	Cognitive, Psycho-social HFE
What is specified	Nuclear reactor facility construction license application review should include human factors engineering, serious accident analysis, safety assessment and overall reliability assessment.

COLOMBIA

Country	Colombia
Document ID	GTC-ISO 27500:2019
Document title	Human-centered organizations. Rationale and general principles
Document type	Colombian Technical Guide (GTC)
Relevant to	General workplace HFE
What is specified	This document is intended for board members and policy makers in all types of organizations (whether large or small) in the private, public and not-for-profit sectors. It describes the values and beliefs that make an organization human- centered, the significant business benefits that can be achieved, and explains the risks to the organization of not being human-centered. It provides recommendations for policies that board members need to implement to achieve this and sets out high-level human-centered principles for board members to support performance optimization, minimize risks to organizations and individuals, maximize well-being in their organization, and enhance their relationships with customers. The importance of organizational policy addressing the concept of "human-centeredness" is emphasized.
Related document	ISO 27500:2016

Country	Colombia
Document ID	NTC 3955:2014
Document title	Ergonomics, ergonomics definitions and concepts
Document type	Colombian Technical Standard (NTC)
Relevant to	HFE in general
What is specified	This document presents basic concepts for applying ergonomic terminology; tries to promote the use of a common terminology among experts and users, both in the field of ergonomics and in the general field.

Country	Colombia
Document ID	NTC 5655: 2018
Document title	Ergonomics principles in the design of work systems
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE, occupational safety and health
What is specified	This standard establishes the basic principles that guide the ergonomic design of work systems and defines the fundamental terms that are relevant. It describes an integrated approach to the design of these systems, in which the cooperation of experts in ergonomics with other people participating in this activity is contemplated, attending with equal importance during the design process, the human, social and technical requirements.
Related document	ISO 6385:2016

Country	Colombia
Document ID	NTC 5693-1:2009
Document title	Ergonomics, manual handling, part 1: lifting and carrying
Document type	Colombian Technical Standard (NTC)
Relevant to	Manual handling, injury prevention, occupational safety and health
What is specified	It specifies the recommended limits for manual lifting and transport considering, respectively, the intensity, frequency and duration of the task. It is designed to provide guidance on the assessment of multiple variables.
Related document	ISO 11228-1:2003

Country	Colombia
Document ID	NTC 5693-2:2009
Document title	Ergonomics manual handling. part 2: pushing and pulling
Document type	Colombian Technical Standard (NTC)
Relevant to	Manual handling, injury prevention, occupational safety and health
What is specified	It presents the recommended limits for pushing and pulling with the whole body. It provides guidance on assessing risk factors considered important in hand pushing and pulling, including the assessment of health risks.
Related document	ISO 11228-2:2007

Country	Colombia
Document ID	NTC 5693-3:2009
Document title	Ergonomics manual handling. part 3: handling of low loads at high frequency
Document type	Colombian Technical Standard (NTC)
Relevant to	Manual handling, injury prevention, occupational safety and health
What is specified	Establishes ergonomic recommendations for repetitive work tasks involving manual handling of light loads at high frequency.
Related document	ISO 11228-3:2007

Country	Colombia
Document ID	GTC 256:2015
Document title	Ergonomics guidelines for the optimization of musculoskeletal workloads
Document type	Colombian Technical Guide (GTC)
Relevant to	Injury prevention, general workplace HFE
What is specified	This guide provides information and guidelines for the appropriate use of different ergonomics standards on factors related to musculoskeletal workloads (MSWLs) and helps to effectively and efficiently reduce or optimize MSWLs in the workplace and in non-work activities.
Related document	ISO/TS 20646:2014

Country	Colombia
Document ID	GTC 290:2018
Document title	Ergonomics. Application document of national standards on manual handling (NTC 5693-1, NTC 5693-2 and NTC 5693-3) and assessment of static working postures (NTC 5723)
Document type	Colombian Technical Guide (GTC)
Relevant to	Manual handling
What is specified	This guide is an application document that provides guidance to users of the series of national standards NTC 5693, which deals with manual handling, and NTC 5723, which deals with static working postures. Specifically, it provides guidance to users and provides additional information for the selection and use of the appropriate standards.
Related document	ISO/TR 12295: 2014

Country	Colombia
Document ID	NTC 5723:2009
Document title	Ergonomics. assessment of static working postures
Document type	Colombian Technical Standard (NTC)
Relevant to	Injury Prevention, general workplace HFE
What is specified	It establishes ergonomic recommendations for different tasks in the workplace for those involved in the design or redesign of the workplace, tasks and work products, who are familiar with the basic concepts of ergonomics in general, and work postures in particular.
Related document	ISO 11226:2000/COR.1:2006

Country	Colombia
Document ID	NTC 5649:2019
Document title	Basic measurements of the human body for technological design. Part 1: Important definitions and indications for body measurements.
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE
What is specified	This standard provides a description of the anthropometric measurements that can be used as a basis for the comparison of population groups and for the creation of anthropometric databases (see NTC 5654). The fundamental list of measurements specified in this standard is intended to serve as a guide for ergonomists, who have required it to define population groups and apply their knowledge to the geometric design of places where people live and work.
Related document	ISO 7250-1:2017

Country	Colombia
Document ID	NTC 5654:2016
Document title	General requirements for the establishment of an anthropometric database
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE
What is specified	It specifies the general requirements for anthropometric databases and associated reports, formed by measurements made in accordance with NTC 5649.
Related document	ISO 15535: 2012

Country	Colombia
Document ID	NTC 6073-1:2015
Document title	Ergonomics of human-system interaction. Part 1: principles and requirements for physical input devices
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE, Occupational Safety and Health, cognitive or psycho-social HFE
What is specified	It provides guidelines for physical input devices for interactive systems.
Related document	ISO 9241-400:2007

Country	Colombia
Document ID	NTC 6073-2:2015
Document title	Ergonomics of human – system interaction. Part 2: Design criteria for physical input devices
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE, Cognitive or Psycho-social HFE)
What is specified	It specifies criteria based on ergonomic factors for the design of physical input devices for interactive systems including keyboards, mice, pucks, joysticks, trackballs, touchpads, tables, etc.
Related document	ISO 9241-410:2008; ISO 9241-410:2008/Amd. 1:2012

Country	Colombia
Document ID	NTC 6073-3:2015
Document title	Ergonomics of human-system interaction. Part 3: evaluation methods for the design of physical input devices
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE, Occupational Safety and Health, cognitive or psycho-social HFE
What is specified	It specifies evaluation methods for the design of physical input devices for interactive systems.
Related document	ISO/TS 9241-411:2012

Country	Colombia
Document ID	NTC 5748:2019
Document title	Ergonomic principles relating to mental workload. Part 1: Concepts and general aspects, terms, and definitions.
Document type	Colombian Technical Standard (NTC)
Relevant to	Cognitive or psycho-social HFE
What is specified	This document defines terms in the field of mental workload, covering mental stress and mental strain, and the short- and long-term positive and negative consequences of mental strain. It also specifies the relationships between these concepts. In this document, mental workload is considered a generic or umbrella term, which refers to all the concepts and constructs mentioned in it and has no specific or standardized meaning of its own within the document. This is consistent with the use of the term in ergonomics and its applications, where it can refer to mental stress, mental strain and its effects, i.e., both causes and effects. In this document, the term mental workload is not treated as a technical term, but only as a reference to the domain of mental workload.
Related document	ISO 10075-1:2017

Country	Colombia
Document ID	NTC 5748-2:2015
Document title	Ergonomic principles related to mental workload. Part 2: Principles and requirements concerning methods for measuring and assessing mental workload
Document type	Colombian Technical Standard (NTC)
Relevant to	Cognitive or psycho-social HFE
What is specified	It establishes the principles and requirements for the measurement and evaluation of mental workload and specifies the requirements for customized instruments.
Related document	ISO 10075-3: 2004 (R 2012)

Country	Colombia
Document ID	GTC 252:2015
Document title	Ergonomic principles related to mental workload design principles
Document type	Colombian Technical Guide (GTC)
Relevant to	General workplace HFE, Occupational Safety and Health, cognitive or psycho-social HFE)
What is specified	Provides guidance for the design of work systems, including task, equipment, and workstation. It also includes working conditions and, in particular, mental workload and its effects.
Related document	ISO 10075-2:1996 (R 2012)

Country	Colombia
Document ID	NTC 5831:2010
Document title	Ergonomic requirements for office work with visual display terminals (VDTS). Part 5: Workstation layout and postural requirements.
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE
What is specified	It specifies the fundamental ergonomic principles that apply to user requirements, design and provision of equipment for workstations intended for office tasks that employ display screen terminals.
Related document	ISO 9241-5:1998

Country	Colombia
Document ID	GTC 237:2012
Document title	Ergonomic requirements for office work with visual display terminals (VDTS). Guidance on task requirements.
Document type	Colombian Technical Guide (GTC)
Relevant to	General workplace HFE
What is specified	Provides guidelines for users of information processing systems using VDTS with regards to office tasks.
Related document	ISO 9241-2:1992

Country	Colombia
Document ID	GTC 244:2013
Document title	Ergonomic requirements for office work with VDTs. Guidance for the work environment
Document type	Colombian Technical Guide (GTC)
Relevant to	General workplace HFE, occupational Safety and Health
What is specified	Provides guidelines on the basic principles for the ergonomic design of the work environment and workstation where VDTs are used, taking into account lighting, the effects of noise and mechanical vibration.
Related document	ISO 9241-6:1993

Country	Colombia
Document ID	NTC 6301:2018
Document title	Machine safety. Anthropometric requirements for the design of workstations associated with machines.
Document type	Colombian Technical Standard (NTC)
Relevant to	General workplace HFE
What is specified	This national standard establishes principles for obtaining dimensions from anthropometric measurements and applying them to the design of workstations associated with non-mobile machines. The standard is based on current ergonomic knowledge and anthropometric measurements.
Related document	ISO 14738:2002

INDIA

Country	India
Document ID	IS 6665: 1972 (Reaffirmed 2005)
Document title	Code of Practice for Industrial Lighting
Document type	Standard
Relevant to	Illumination in factories
What is specified	Table 2: Recommended values of illumination
Related document	ILO Encyclopaedia of Occupational Health & Safety, 46. Lighting, Table 8. Recommended levels of maintained illuminance for locations/tasks

Country	India
Document ID	IS 15257: 2018
Document title	Spatial orientation and direction of movement – Ergonomics requirements (First revision)
Document type	Standard
Relevant to	Safety and usability
What is specified	Design of controls
Related document	ISO 1503: 2008 Spatial orientation and direction of movement - Ergonomics requirements

Country	India
Document ID	IS 15836: Part 1: 2008
Document title	Ergonomic design for the safety of machinery: Part 1 principles for determining the dimensions required for openings for whole - Body access into machinery
Document type	Standard
Related document	ISO 15534-1: 2000 Ergonomic design for the safety of machinery: Part 1 principles for determining the dimensions required for openings for whole - Body access into machinery

Country	India
Document ID	IS 15836: Part 2: 2008
Document title	Ergonomic design for the safety of machinery: Part 2 principles for determining the dimensions required for access openings
Document type	Standard
Related document	ISO 15534-2: 2000 Ergonomic design for the safety of machinery: Part 2 principles for determining the dimensions required for access openings

Country	India
Document ID	IS 15836: Part 3 : 2008
Document title	Ergonomic design for the safety of machinery: Part 3 anthropometric data
Document type	Standard
Related document	ISO 15534-3: 2000 Ergonomic design for the safety of machinery: Part 3 anthropometric data

Country	India
Document ID	IS 16559: 2019
Document title	Ergonomics of the thermal environment — Assessment of heat stress using the wbgt (wet bulb globe temperature) index (first revision)
Document type	Standard
Related document	ISO 7243: 2017 Ergonomics of the thermal environment — Assessment of heat stress using the wbgt (wet bulb globe temperature) index

Country	India
Document ID	IS 16560: 2017
Document title	Ergonomics of the thermal environment - instruments for measuring physical quantities
Document type	Standard
Relevant to	Assessment of the thermal environment
What is specified	Measuring physical quantities
Related document	ISO 7726: 1998 Ergonomics of the thermal environment - Instruments for measuring physical quantities

Country	India
Document ID	IS 16561: Part 1: 2017
Document title	Ergonomic design of control centres: Part 1 principles for the design of control centres
Document type	Standard
Relevant to	Ergonomic design of control centres
What is specified	Principles for design
Related document	ISO 11064-1: 2000 Ergonomic design of control centres: Part 1 principles for the design of control centres

Country	India
Document ID	IS 16561: Part 2: 2017
Document title	Ergonomic design of control centres Part 2 principles for the arrangement of control suites
Document type	Standard
Relevant to	Ergonomic design of control centres
What is specified	Principles for arrangement
Related document	ISO 11064-2: 2000 Ergonomic design of control centres part 2 principles for the arrangement of control suites

Country	India
Document ID	IS 16561: Part 4 : 2017
Document title	Ergonomic design of control centres: Part 4 layout and dimensions of workstations
Document type	Standard
Relevant to	Ergonomic design of control centres
What is specified	Layout and dimensions of workstations
Related document	ISO 11064-4: 2013 Ergonomic design of control centres: Part 4 layout and dimensions of workstations

Country	India
Document ID	IS 16561: Part 5 : 2018
Document title	Ergonomic design of control centres: Part 5 displays and controls
Document type	Standard
Relevant to	Ergonomic design of control centres
What is specified	Displays and controls
Related document	ISO 11604-5: 2008 Ergonomic design of control centres: Part 5 displays and controls

Country	India
Document ID	IS 16563: Part 1 : 2017
Document title	Ergonomic requirements for the design of displays and control actuators - Part 1: Human interactions with displays and control actuators
Document type	Standard
Relevant to	Design of displays and control actuators
What is specified	Human Interactions with displays and control actuators
Related document	ISO 9355-1: 1999 Ergonomic requirements for the design of displays and control actuators - part 1: human interactions with displays and control actuators

Country	India
Document ID	IS 16563: Part 2 : 2017
Document title	Ergonomic requirements for the design of displays and control actuators: Part 2 displays
Document type	Standard
Relevant to	Design of displays and control actuators
What is specified	Ergonomic requirements for displays
Related document	ISO 9355-2: 1999 Ergonomic requirements for the design of displays and control actuators: Part 2 displays

Country	India
Document ID	IS 16563: Part 3 : 2017
Document title	Ergonomic requirements for the design of displays and control actuators: Part 3 control actuators
Document type	Standard
Relevant to	Design of displays and control actuators
What is specified	Ergonomic requirements for control actuators
Related document	ISO 9355-3: 2006 Ergonomic requirements for the design of displays and control actuators: Part 3 control actuators

Country	India
Document ID	IS 16566: 2017
Document title	Ergonomics-accessible design-specification of age-related luminance contrast for coloured light
Document type	Standard
Relevant to	Accessible design
What is specified	Age related luminance contrast for coloured light
Related document	ISO 24502: 2010 Ergonomics-accessible design-specification of age related luminance contrast for coloured light

Country	India
Document ID	IS 16569: 2018
Document title	Ergonomics - System of auditory and visual danger and information signals
Document type	Standard
Relevant to	Danger and information signals
What is specified	Auditory and visual danger and information signals
Related document	ISO 11429: 1996 Ergonomics - System of auditory and visual danger and information signals

Country	India
Document ID	IS 16570: 2017
Document title	Ergonomics - Visual danger signals - General requirements, design and testing
Document type	Standard
Relevant to	Visual danger signals
What is specified	General requirements, design and testing
Related document	ISO 11428: 1996 Ergonomics - visual danger signals - general requirements, design and testing

Country	India
Document ID	IS 16572: 2017
Document title	Safety of machinery - Anthropometric requirements for the design of workstations at machinery
Document type	Standard
Relevant to	Safety of machinery
What is specified	Anthropometric requirements
Related document	ISO 14738: 2002 Safety of machinery - Anthropometric requirements for the design of workstations at machinery

Country	India
Document ID	IS 16595: Part 5: 2018
Document title	Ergonomic requirements for office work with visual display terminals (vdts) part 5 workstation layout and postural requirements
Document type	Standard
Relevant to	Office Work with Visual Display Terminals (VDTs)
What is specified	Workstation layout and postural requirements
Related document	ISO 9241-5: 1998 ISO 9241-5 : 1998 Ergonomic requirements for office work with visual display terminals (vdts) part 5 workstation layout and postural requirements

Country	India
Document ID	IS 16595: Part 11 : 2020
Document title	Ergonomics of Human-System Interaction Part 11 Usability: Definitions and concepts (first revision)
Document type	Standard
Relevant to	Human-System Interaction
What is specified	Usability: Definitions and Concepts
Related document	ISO 9241-11: 2018 Ergonomics of Human-System Interaction Part 11 Usability: Definitions and Concepts

Country	India
Document ID	IS 16595: Part 20 : 2018
Document title	Ergonomics of human - system interaction part 20 accessibility guidelines for information/communication technology (ict) equipment and services
Document type	Standard
Relevant to	Human-system interaction
What is specified	Accessibility guidelines for information/ communication technology (ICT)
Related document	ISO 9241-20: 2008 Ergonomics of Human - System Interaction Part 20 Accessibility Guidelines for Information/ Communication Technology (ICT) equipment and services

Country	India
Document ID	IS 16595: Part 154 : 2018
Document title	Ergonomics of human - System interaction: Part 154 interactive voice response (IVR) applications
Document type	Standard
Relevant to	Human-system interaction
What is specified	Interactive voice response (IVR) applications
Related document	ISO 9241-154: 2013 Ergonomics of human - System interaction: Part 154 interactive voice response (IVR) applications

Country	India
Document ID	IS 17009: 2018
Document title	Ergonomics - Evaluation of static working postures
Document type	Standard
Relevant to	Evaluation of postures
What is specified	Static working postures
Related document	ISO 11226: 2000 Ergonomics - Evaluation of static working postures

Country	India
Document ID	IS 17031: Part 1 : 2018
Document title	Ergonomics - Manual Handling Part 1 Lifting and Carrying
Document type	Standard
Relevant to	Manual material handling
What is specified	Lifting and carrying
Related document	ISO 11228-1:2003 Ergonomics - Manual handling Part 1 Lifting and carrying

Country	India
Document ID	IS 17031: Part 2 : 2019
Document title	Ergonomics - manual handling part 2 pushing and pulling
Document type	Standard
Relevant to	Manual material handling
What is specified	Pushing and pulling
Related document	ISO 11228-2:2007 Ergonomics - Manual handling part 2 pushing and pulling

Country	India
Document ID	IS 17031: Part 3 : 2018
Document title	Ergonomics - Manual handling part 3 handling of low loads at high frequency
Document type	Standard
Relevant to	Manual material handling
What is specified	Handling of low loads at high frequency
Related document	ISO 11228-3:2007 Ergonomics - Manual Handling Part 3 Handling of Low Loads at High Frequency

Country	India
Document ID	IS 17032: 2018
Document title	Ergonomics guidelines for the optimization of musculoskeletal workload
Document type	Standard
Relevant to	Musculoskeletal workload
What is specified	Guidelines for the optimization
Related document	ISO/TS 20646: 2014 Ergonomics guidelines for the optimization of musculoskeletal workload

Country	India
Document ID	IS 17033: 2018
Document title	Ergonomics - Manual handling of people in the healthcare sector
Document type	Standard
Relevant to	Manual material handling
What is specified	Healthcare sector
Related document	ISO/TR 12296:2012 Ergonomics - Manual handling of people in the healthcare sector

Country	India
Document ID	IS 17102: 2019
Document title	Ergonomics - Danger signals for public and work areas - Auditory danger signals
Document type	Standard
Relevant to	Danger signals for public and work areas
What is specified	Auditory danger signals
Related document	ISO 7731: 2003 Ergonomics - Danger signals for public and work areas - Auditory danger signals

Country	India
Document ID	IS 17103: 2019
Document title	Ergonomics - Evaluation of thermal strain by physiological measurements
Document type	Standard
Relevant to	Evaluation of thermal strain
What is specified	Physiological measurements
Related document	ISO 9886: 2004 Ergonomics - Evaluation of thermal strain by physiological measurements

Country	India
Document ID	IS 17104: 2019
Document title	Ergonomics of the thermal environment - Assessment of the influence of the thermal environment using subjective judgement scales
Document type	Standard
Relevant to	Assessment of the thermal environment
What is specified	Using subjective judgement scales
Related document	ISO 10551: 1995 Ergonomics of the thermal environment - Assessment of the influence of the thermal environment using subjective judgement scales

Country	India
Document ID	IS 17105: 2019
Document title	Ergonomics of the physical environment - Assessment of environments by means of an environmental survey involving physical measurements of the environment and subjective responses of people
Document type	Standard
Relevant to	Assessment of the thermal environment
What is specified	Environmental survey involving physical measurements and subjective responses
Related document	ISO 28802: 2012 Ergonomics of the physical environment - Assessment of environments by means of an environmental survey involving physical measurements of the environment and subjective responses of people.

Country	India
Document ID	IS 18001: 2007
Document title	Occupational Health and Safety Management Systems - Requirements with Guidance for Use (First Revision)
	Reaffirmed 2018
Document type	Systems Standard
Relevant to	Occupational Health and Safety
What is specified	Hazard identification, risk assessment, risk mitigation and control
Related document	BS 8800: 1996 Guide to occupational health and safety management systems AS/NZS 4804: Occupational Health and safety management systems - General guidance and principles, assessment and supporting techniques.

Country	India
Document ID	IS/ISO 27500: 2016
Document title	The Human - Centered Organization - Rationale and General Principles
Document type	Standard
Relevant to	The human - Centered organization
What is specified	Rationale and general principles
Related document	ISO 27500: 2016 The Human - Centered organization - Rationale and general principles

INDONESIA

Country	Indonesia
Document ID	Decree of the Minister of Manpower and Transmigration KEP.234 /MEN/2003
Document title	Working and Rest Time in the Energy and Mineral Resources Business Sector in Certain Areas
Document type	Ministerial Decree
What is specified	The contents of the article explain the details of working and rest time in the sector.

Country	Indonesia
Document ID	Decree of the Minister of Health No 432/MENKES/SK/IV/2007
Document title	Guidelines for Management of Occupational Health and Safety (K3) in Hospitals
Relevant to	Ministerial Decree
What is specified	This ministerial decree regulates the potential hazards in hospital work. For example, ergonomic hazards associated with manual work, poor working positions, and repetitive work. In addition, there are also psychosocial hazards such as frequent contact with patients, shift work, overwork, and physical threats.

Country	Indonesia
Document ID	Decree of the Minister of Manpower and Transmigration Kep.325/MEN/XII/2011
Document title	Determination of the draft of Indonesian national work competency standards in the manpower sector in the occupational safety and health sector sub-sector working at heights to become the Indonesian national work competency standards.
Document type	Ministerial Decree
What is specified	This regulation explains Indonesia's national work competency standards in the employment sector in the field of working at height.

Country	Indonesia
Document ID	Decree of the Minister of Manpower and Transmigration No 609 2012
Document title	Guidelines for the Settlement of Cases of Work Accidents and Occupational Diseases
Document type	Ministerial Decree
What is specified	As a consideration in analyzing and determining whether PAK (Occupational Disease) or occupational disease (Work Related Disease) is required supporting data, including: 1) Data on the results of the initial medical examination (before workers are employed in the company concerned). 2) Data on the results of periodic health checks (checks carried out periodically as long as the workforce is working in the company concerned). 3) Data on the results of special examinations (examination of the doctor who treats the workforce about the history of the disease he is suffering from). 4) Data on the results of work environment testing by the Center for Occupational Safety and Health and its centers, or other institutions appointed by the Minister of Manpower and Transmigration. 5) Data on the results of the general health examination of workers in that section. 6) Work history of the workforce. 7) Worker's health history. 8) Medical data/medical records of workers. 9) Analysis of the results of field inspections by the supervisor employment. 10) Medical considerations of advisory doctors.

ITALY

Country	Italy
Document ID	Piano Nazionale della Prevenzione 2020-2025
Document title	National guidelines for the prevention of musculoskeletal diseases
	Linee guida nazionali per la prevenzione delle patologie muscolo scheletriche
Relevant article	Ministry of Health - National Directorate of Health Prevention Ministero della salute – Direzione Nazionale della Prevenzione Sanitaria
Document type	National guidelines
Relevant to	Health and safety in workplaces
What is specified	The programming, monitoring, and evaluation system that represents one of the tools to implement and concretize the Essential Levels of Assistance (LEA) for "Collective prevention and public health," contextualizing in the Macro Objectives programs and related processes and actions that contribute to achieving the objectives of health.
Related document	UNI EN 1005 part 1 UNI EN 1005 part 2 UNI EN 1005 part 3 UNI EN 1005 part 4 UNI EN ISO 11228 part 1 UNI EN ISO 11228 part 2 UNI EN ISO 11228 part 3 UNI EN ISO 11226 UNI EN ISO 14738 ISO TR 12295 ISO TR 12296

Country	Italy
Document title	Noise risk assessment
	Metodologie e interventi tecnico per la riduzione del rumore negli ambienti di lavoro (2013) https://www.portaleagentifisici.it/filemanager/userfiles/DOCUMENTAZIONE/rumore_documentazione/Manuale%20operativo%20bonifiche%20rumore%20INAIL-Regioni.pdf?lg=IT
Document type	Manual
Relevant to	Noise risk assessment
What is specified	Noise evaluation and reduction

Country	Italy
Document title	Methods and technical interventions for the reduction of noise in the workplace
	La Valutazione del Rischio rumore https://www.inail.it/cs/internet/comunicazione/pubblicazioni/catalogo-generale/la-valutazione-del-rischio-rumore.html
Document type	Guideline
Relevant to	Noise risk assessment
What is specified	Reference for the correct assessment of the noise risk

Country	Italy
Document title	The evaluation of the microclimate
	La Valutazione del Microclima https://www.inail.it/cs/internet/comunicazione/pubblicazioni/catalogo-generale/pubbl-valutazione-del-microclima.html
Document type	Manual
Relevant to	The evaluation of the microclimate
What is specified	Reference for the correct assessment of the microclimate risk

Country	Italy
Document title	Microclimate, aeration and lighting in the workplace Requirements and standards - Operational and design indications - Guidelines
	Microclima, aerazione e illuminazione nei luoghi di lavoro Requisiti e standard - Indicazioni operative e progettuali - Linee Guida file:///C:/Users/niu/Downloads/00_LG_MAI2006_ABn2013.pdf
Document type	Guidelines
Relevant to	The evaluation of the microclimate
What is specified	Reference for the correct assessment of the microclimate and lighting risk

Country	Italy
Document title	Vibration risk assessment
	La Valutazione del rischio vibrazioni. https://www.inail.it/cs/internet/comunicazione/pubblicazioni/catalogo-generale/pubbl-valutazione-del-rischio-vibrazioni.html
Document type	Manual
Relevant to	The evaluation of vibration
What is specified	Reference for the correct assessment of the vibration risk

Country	Italy
Document title	The methodology for the assessment and management of work-related stress risk
	La metodologia per la valutazione e gestione del rischio stress lavoro-correlato https://www.inail.it/cs/internet/comunicazione/pubblicazioni/catalogo-generale/pubbl-la-metodologia-per-la-valutazione-e-gestione.html
Document type	Manual
Relevant to	The evaluation of work-related stress
What is specified	Reference for the correct assessment of the work-related stress

JAPAN

Country	Japan
Document ID	Ministry of Labour Notification No. 53, April 30, 1999 Amendment: Ministry of Health, Labour and Welfare Notification No. 113, March 10, 2006
Document title	Guidelines on Occupational Safety and Health Management Systems
Relevant article	Industrial Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	This gives a guide for organizations to provide safe and healthy workplaces by preventing work-related injury and proactively improving systems performance.
Related document	Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001) ISO 45001, ISO 20646

Country	Japan
Document title	Usability guidelines for the e-Government Services
Document type	Guideline (Recommendation)
Relevant to	HFE in general
What is specified	In order to effectively and continuously improve the usability and accessibility of online application systems provided by ministries, this guideline specifies how to implement the usability-assured design procedures during the planning, design, development, operation, and evaluation stages of the online application systems.
Related document	Section 508 of the Rehabilitation Act, USA

Country	**Japan**
Document ID	Labor Standards Bureau Notification (Kihatsu) No.712
Document title	情報機器作業における労働衛生管理のためのガイドライン Guideline for occupational health management under the work using human-computer interactive devices
Relevant article	Occupational Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	General ergonomic guidelines for VDT work using PC, laptop, smartphone, tablet devices etc.

Country	**Japan**
Document title	テレワークの適切な導入及び実施の推進のためのガイドライン Guidelines for promoting the proper introduction and implementation of teleworking
Document type	Guideline
Relevant to	HFE in general
What is specified	Guidelines for promoting teleworking. This guideline explains points on how effectively to introduce teleworking from the view of human resource development, working hours management, measures for long working hours to ensure work-life balance, mental health measures, and homework environment.
Related document	ILO, Teleworking during the COVID-19 pandemic and beyond - A Practical Guide-, 2020

Country	**Japan**
Document title	テレワークセキュリティガイドライン(第5版) Security Guideline for teleworking, 5th edition
Document type	Guideline
Relevant to	HFE in general
What is specified	Guidelines for security considerations when teleworking. This guideline indicates how to establish teleworking security management and organize balanced measures of “rules,” “people” and “technology.”

Country	**Japan**
Document ID	Labor Standards Bureau Notification (Kihatsu) No. 0331001
Document title	労働者の心の健康の保持増進のための指針 Guidelines for maintaining and promoting the mental health of workers
Relevant article	- 13th Industrial Accident Prevention Plan (from 2018 to 2022) - Occupational Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	This explains the basic method of mental health care for workers that the employer should implement at the workplace appropriately and effectively.

Country	Japan
Document ID	Labor Standards Bureau Notification (Kihatsu) No.546
Document title	騒音障害防止のためのガイドライン
	Guidelines for managing noise hazards
Relevant article	Occupational Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	Guidelines for systematizing noise hazard prevention measures, based on the Occupational Safety and Health Act. The method of measuring noise in the working environment and its hazard classification for management are defined.

Country	Japan
Document ID	Labor Standards Bureau Notification (Kihatsu) No.325
Document title	陸上貨物運送事業における荷役作業の安全対策ガイドライン
	Guidelines for safety measures for cargo handling work in the land freight transport business
Relevant article	Guidelines on the Prevention of low back pain in the Workplace
Document type	Guideline
Relevant to	HFE in general and Manual Handling
What is specified	Guidelines for preventing occupational accidents in cargo handling work performed by workers engaged in the land freight transport business. In order to prevent occupational accidents due to awkward postures and unreasonable movements, this guideline recommends referring to the Guidelines on the Prevention of low back pain in the Workplace.
Related document	ILO convention C067 - Hours of Work and Rest Periods (Road Transport), 1939 (No. 67)

Country	Japan
Document ID	Labor Standards Bureau Notification (Kihatsu) No.520
Document title	足場からの墜落・転落災害防止総合対策推進要綱
	Guidelines for promoting comprehensive measures to prevent falls from scaffolding
Relevant article	Ordinance on Industrial Safety and Health
Document type	Other
Relevant to	HFE in general
What is specified	In order to prevent falls, the standards for using safety belts and the construction method of handrails are specified.

Country	Japan
Document ID	Labor Standards Bureau Notification (Kihatsu) No.622
Document title	墜落制止用器具の安全な使用に関するガイドライン Guidelines for the Safe Use of Fall Prevention Equipment
Relevant article	Ordinance on Industrial Safety and Health
Document type	Guideline
Relevant to	HFE in general
What is specified	This guideline refers to the recommendation of the use of a full harness type safety belt because there is a risk of internal organ damage and chest compression when falling in case of using the traditional torso belt type safety belt.

Country	Japan
Document ID	Ministry of Labour Notification No. 53, April 30, 1999 Amendment: Ministry of Health, Labour and Welfare Notification No. 113, March 10, 2006
Document title	労働安全衛生マネジメントシステムに関する指針 Guidelines on Occupational Safety and Health Management Systems
Relevant article	Occupational Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	This gives a guide for organizations to provide safe and healthy workplaces by preventing work-related injury and proactively improving systems performance.
Related document	Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001) ISO 45001, ISO 20646

Country	Japan
Document title	事業場における治療と仕事の両立支援のためのガイドライン Guidelines for supporting the balance between treatment and work in the workplace
Document type	Guideline
Relevant to	HFE in general
What is specified	This guideline requires employers to consider appropriate employment measures for workers under treatment with illnesses such as cancer and stroke. This guideline provides information on how to improve the working environment and conditions so that people can work while going to the hospital and receiving medical treatment.
Related document	WHO Healthy Workplace Framework and Model

Country	Japan
Document ID	Labor Standards Bureau Notification (Kihatsu) 2018, No.601
Document title	交通労働災害防止のためのガイドライン
	Guidelines for prevention of occupational accidents for professional drivers
Relevant article	Guidelines for safety measures for cargo handling work in the land freight transport business Guidelines on the Prevention of low back pain in the Workplace Occupational Safety and Health Act
Document type	Guideline
Relevant to	HFE in general
What is specified	This guideline requires employers to manage as following points; 1) to check the weight of the handling object when a driver performs cargo handling work, and 2) to secure a sufficient rest time for considering driver's fatigue.

Country	Japan
Document ID	Labor Standards Bureau Notification (Kihatsu) 2020, No.316
Document title	高年齢労働者の安全と健康確保のためのガイドライン
	Guidelines for occupational safety and health of aged workers (so called Age-free guideline in Japanese)
Document type	Guideline
Relevant to	HFE in general
What is specified	This guideline provides information on how to improve the working conditions and work environments for aged workers.

Country	Japan
Document title	エイジアクション100
	Age Action 100
Document type	Other
Relevant to	HFE in general
What is specified	"Age Action 100" provides action checklists for work improvement that consist of 100 items to promote the safety and health of aged workers.

Country	**Japan**
Document title	電子政府ユーザビリティガイドライン
	Usability guidelines for the e-Government Services
Document type	Guideline
Relevant to	HFE in general
What is specified	In order to effectively and continuously improve the usability and accessibility of online application systems provided by ministries, this guideline specifies how to implement the usability-assured design procedures during the planning, design, development, operation, and evaluation stages of the online application systems.
Related document	Section 508 of the Rehabilitation Act, USA

Country	**Japan**
Document ID	Labor Standards Bureau Notification (Kihatsu) No.618
Document title	職場における腰痛予防対策指針
	Guidelines on the Prevention of low back pain in the Workplace
Relevant article	Occupational Safety and Health Act
Document type	Guideline
Relevant to	Manual handling
What is specified	This regulation was established in 1994, most recently revised in 2013. - Male workers (>=18 years): the weight of objects to be handled only by manual labor should be generally no more than 40% of their body weight. - Female workers (>=18 years): no more than 60% of the weight that can be handled by men - If the workers are required to handle heavy objects that exceed those weights, handle objects in the proper posture with at least two workers of similar height.
Related document	ISO 11228-1 ILO Convention No.127 - Maximum Weight Convention

Country	**Japan**
Document title	女性労働基準規則
	Ordinance on labor standards for female workers
Relevant article	Labor Standards Act
Document type	Other
Relevant to	Manual handling
What is specified	This regulation was established in 1986, most recently revised in 2017. - 15kg for females under 16 years old on intermittent work, and 10kg on continuous work. - For females aged 16-18, weight limits define as 25kg on intermittent work, and 15kg on continuous work. More than 18 y/o, 30kg and 20kg, respectively.
Related document	ISO 11228-1 ILO Convention No.127 - Maximum Weight Convention

MEXICO

Country	Mexico
Document ID	NOM-009-STPS-2011
Document title	Work at Height
Relevant article	Industrial Safety and Health work normative. HFE in general.
Document type	Normative guideline
Relevant to	Work at Height
What is specified	This gives a guide for organizations to provide safe and healthy performance in work at height.
Related document	International Window Cleaning Association. ANSI IWCA I-14.1-2001. Window cleaning safety

Country	Mexico
Document ID	NOM-025-STPS-2008
Document title	Lighting conditions in work
Relevant article	Industrial Safety and Health work normative. HFE in general
Document type	Normative guideline for improvement of the lighting in work
Relevant to	HFE in general. Good lighting environment guide
What is specified	This gives a guide for organizations to provide safe and healthy environment to disability workers.
Related document	ISO 8995-1:2002

Country	Mexico
Document ID	NOM-014-STPS-2000
Document title	Environment High or Low pressures
Relevant article	Safety standards and HFE in general
Document type	Guideline (Regulations) for workers, and managers involved
Relevant to	People working in high or low pressures
What is specified	This regulation establishes guides for workers in abnormal pressures exposure
Related document	Oficina Internacional del Trabajo. Enciclopedia de Salud y Seguridad en el Trabajo. Vol. 1. Ginebra, Suiza

Country	Mexico
Document ID	NOM-006-STPS-2014
Document title	Materials management and storage and general conditions to use special material handling devices
Relevant article	Safety Standards and HFE in general
Document type	Guideline (Regulations) for workers, supervisors and managers
Relevant to	Manual material handling and devices to help manual material handling
What is specified	This regulation established devices helping material handling devices to decrease the risk of material management.
Related document	ISO 11228-1:2003

Country	Mexico
Document ID	NOM-015-STPS-2000
Document title	Work Environment with High or Low temperatures
Relevant article	Safety Standards and HFE in general
Document type	Guideline (Regulations) for workers, and managers involved
Relevant to	People working in high or low temperatures
What is specified	This regulation establishes guides for workers in abnormal temperature exposure
Related document	ISO 7243 Hot environments-estimation of the heat stress on working man, based on the wbgt-index (wet bulb globe temperature 1992).

Country	Mexico
Document ID	NOM-034-STPS-2016
Document title	Safety and Health access and activities for disability workers
Relevant article	Industrial Safety and Health work normative. HFE in general.
Document type	Normative Guideline for disability people in work
Relevant to	Disability people in work
What is specified	This gives a guide for organizations to provide safe and healthy environment to disabled workers. HFE in general.
Related document	ISO/IEC GUIDE 71:2001

Country	Mexico
Document ID	NOM-035-STPS-2018
Document title	Psychosocial factors in work
Relevant article	HFE in general
Document type	Guideline (Regulations) for workers, and managers involved
Relevant to	People working with stress
What is specified	This regulation establishes guides for workers in distress
Related document	Oficina Internacional del Trabajo, OIT. (2012). Paquete de formación SOLVE. Integrando la promoción de la salud a las políticas de SST en el lugar de trabajo.

Country	Mexico
Document ID	NOM-011-STPS-2001
Document title	Noise at work
Relevant article	Industrial Safety and Health work normative. HFE in general.
Document type	National normative guideline
Relevant to	Hearing control and noise control
What is specified	This gives a guide for organizations to provide safe and healthy performance in work with noise at high amplitude levels
Related document	International Window Cleaning Association. ANSI IWCA I-14.1-2001. Window cleaning safety

Country	Mexico
Document ID	NOM-027-STPS-2008
Document title	Welding activities with Safety and Health Conditions
Relevant article	Safety Standards
Document type	National normative (Regulations)
Relevant to	Prevention in welding risks
What is specified	This gives a guide for organizations to provide safe and healthy performance in welding works
Related document	ANSI/ASC Z49.1-1988. Safety in Welding and Cutting American National Standard

Country	Mexico
Document ID	NOM-033-STPS-2015
Document title	Confined Spaces Safety and Health conditions
Relevant article	Safety Standards and HFE in general
Document type	National guideline (normative)
Relevant to	Works performed in confined spaces
What is specified	This regulation established guide for a Safety and Health confined spaces work
Related document	Confined Spaces Guideline, Health and Safety Guidelines. Ministry of Labor, July 2011. Ontario, Canada.

Country	Mexico
Document ID	NOM-024-STPS-2001
Document title	Vibrations at work
Relevant article	Safety Standards and HFE in general
Document type	National guideline (normative)
Relevant to	Works performed in vibration environment
What is specified	This regulation established guide for a safety place in vibration workplaces.
Related document	ISO 5349-1986 Mechanical vibration of human exposure to hand-transmitted vibration

Country	Mexico
Document ID	NOM-024-STPS-2001
Document title	Welding activities with Safety and Health Conditions
Relevant article	Safety Standards
Document type	National Normative (Regulations)
Relevant to	Prevention in welding risks
What is specified	This gives a guide for organizations to provide safe and healthy performance in welding works
Related document	ANSI/ASC Z49.1-1988. Safety in welding and cutting American national standard

Country	Mexico
Document ID	NOM-036-STPS-2018
Document title	Ergonomic risk factors (part 1)
Relevant article	HFE in general and manual handling
Document type	Guideline for workers, and managers involved in manual material management
Relevant to	People working lifting, carrying, or pulling or pushing material carts
What is specified	This regulation establishes guides for workers with manual material processes.
Related document	ISO 11228-1:2003

PERÚ

Country	Perú
Document ID	Supreme decree N° 011-2019-TR
Document title	Decreto supremo que aprueba el reglamento de seguridad y salud en el trabajo para el sector construcción.
	Supreme decree that approves the regulation of safety and health at work for the construction sector
Relevant article	Labor standard
Document type	Guideline
Relevant to	Occupational Safety and Health
What is specified	The purpose of this regulation is to establish minimum provisions on safety and health at work for the construction sector, at the national level.

Country	Perú
Document ID	Ministerial Resolution N° 111-2013-MEM-DM
Document title	Aprueban reglamento de seguridad y salud en el trabajo con electricidad - 2013
	Safety and Health Regulations at Work with Electricity are approved - 2013
Relevant article	Labor standard
Document type	Guideline
Relevant to	Occupational Safety and Health
What is specified	Article 51.- Ergonomics The Entity must carry out an Ergonomic Study, in order to locate the workers in the jobs according to their skills and abilities, providing them with a suitable environment. Ergonomics verification should be oriented to the following human tasks: design of controls, indicator design, task design, dimension and factor design environmental.

Country	Perú
Document ID	Basic Self-Diagnostic Guide in Office Ergonomics. 2015
Document title	Guía básica de autodiagnóstico en ergonomía para oficinas. Ministerio de Trabajo
	Basic Self-Diagnostic Guide in Office Ergonomics
Relevant article	Labor standard
Document type	Guideline
Relevant to	Guide in Office Ergonomics
What is specified	Makes it easier for employers and workers to identify the most ergonomic risks frequent to which workers are exposed in the offices and the proposals of corrective or preventive measures to be implemented to eliminate, reduce and / or control risks present.

Country	Perú
Document ID	Guía de buenas prácticas ergonómicas para el trabajo remoto durante el confinamiento por la COVID-19. Ministerio de Trabajo 2020
Document title	Guía de buenas prácticas ergonómicas para el trabajo remoto durante el confinamiento por la COVID-19
	Ergonomic good practice guide for remote work during COVID-19 lockdown
Relevant article	Labor standard
Document type	Guideline
Relevant to	Guide for remote work during COVID-19 lockdown
What is specified	Provide preventive measures aimed at avoiding or minimizing possible damage to the health of workers who perform remote work from home by using a data display screen.

Country	Perú
Document ID	Peruvian technical standard NTP ISO 9612: 2010 - INDECOPI
Document title	Acústica. Determinación de la exposición al ruido laboral. Método de Ingeniería
	Acoustics. Determination of occupational noise exposure. Engineering method
Relevant article	Labor standard
Document type	Recommendation, Guideline
Relevant to	Occupational Safety and Health, Injury Prevention
What is specified	Guide to measuring occupational noise exposure over a full day using a noise dosimeter

Country	Perú
Document ID	Ergonomics Guide for remote work. Peruvian Ergonomics Society 2020
Document title	Ergonomics Guide for remote work. Peruvian Ergonomics Society 2020
	Guía de Ergonomía para el trabajo remoto. Sociedad Peruana de Ergonomía 2020
Relevant article	Recommendation
Document type	Recommendation, guideline
Relevant to	General workplace HFE, Psycho-social HFE
What is specified	Ergonomic recommendations for remote work during the COVID-19 pandemic

Country	Perú
Document ID	Ergotips for remote work. Peruvian Ergonomics Society 2020
Document title	Ergotips for remote work. Peruvian Ergonomics Society 2020
	Ergotips para el trabajo remoto. Sociedad Peruana de Ergonomía 2020
Relevant article	Recommendation
Document type	Recommendation, guideline
Relevant to	General workplace HFE, Psycho-social HFE
What is specified	Ergonomic recommendations for remote work during the COVID-19 pandemic

Country	Perú
Document ID	PRTP-ISO/TR 12295:2021 (For approval, in public consultation) Ergonomía. Documento para la aplicación de las normas internacionales en manipulación manual (ISO 11228-1, ISO 11228-2 e ISO 11228-3) y la evaluación de las posturas estáticas de trabajo (ISO 11226)
Document title	Ergonomía. Documento para la aplicación de las normas internacionales en manipulación manual (ISO 11228-1, ISO 11228-2 e ISO 11228-3) y la evaluación de las posturas estáticas de trabajo (ISO 11226)
	Ergonomics. Application document for international standards on manual handling (ISO 11228-1, ISO 11228-2 and ISO 11228-3) and evaluation of static working postures (ISO 11226))
Relevant article	Recommendation
Document type	Recommendation, guideline
Relevant to	Manual handling
What is specified	This Draft Peruvian Technical Report is an application document that guides users of the series of International Standards ISO 11228, which address manual handling and the ISO 11226 Standard, which deals with static work postures. User and provides additional information on the selection and use of the appropriate standards. Depending on whether specific risks are present, it is intended to help the user decide which standards should apply
Related document	ISO 12295:2014

Country	Perú
Document ID	Supreme Decret No. 005-2017-TR
Document title	Decreto Supremo que aprueba el Plan Nacional de Seguridad y Salud en el Trabajo 2017 - 2021
	Supreme Decree that approves the Plan National Occupational Safety and Health 2017 - 2021
Relevant article	Labor Standards Act
Document type	Policy
Relevant to	Occupational Safety and Health
What is specified	The importance given to protection of the life and health of workers. In effect, the State through the LSST has created a System National Occupational Safety and Health (SNSST) made up of the National Security Council and Occupational Health (CONSSAT) and the regional councils health and safety at work (CORSSAT), whose competencies allow addressing risk prevention national and regional level; thus, one of the functions attributed to CONSSAT as part of the SNSST is to formulate and approve a National Policy on Security and health at work.
Related document	Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001)

Country	Perú
Document ID	Peruvian technical standard NTP ISO 9612: 2010 - INDECOPI
Document title	Norma Técnica Em.010 Instalaciones Eléctricas Interiores del Reglamento Nacional de Edificaciones
	Technical Standard Em.010 Indoor electrical installations of the national building regulation
Relevant article	Labor standard
Document type	Recommendation, Guideline
Relevant to	General workplace HFE
What is specified	Provide adequate levels of electrical safety in buildings that guarantee the health of people and the continuous supply of electrical energy
Related document	ISO 8995-1:2002(en) Lighting of workplaces

SERBIA

Country	Serbia
Document ID	Службени гласник РС, број 42/16)
Document title	Упутство о радним местима на којима се обављају послови при којима је излагање запослених прашини која потиче од азбеста или материјала који садрже азбест повремено и ниског интензитета
	Guideline on workplaces where employees are exposed to dust originating from asbestos or materials containing asbestos occasionally and of low intensity
Document type	Guideline
Relevant to	Employers and employees who work in asbestos dust
What is specified	This instruction specifies in more detail the work performed in workplaces where the exposure of employees to dust originating from asbestos or materials containing occasionally asbestos of low intensity.

Country	Serbia
Document ID	Службени гласник РС, бр. 72/06, 84/06-исправка, 30/10 и 102/15
Document title	Правилник о начину и поступку процене ризика на радном месту и у радној околини
	Rulebook on the manner and procedure of risk assessment at the workplace and in the work environment
Document type	Rulebook
Relevant to	All workers
What is specified	This Rulebook determines the manner and procedure for assessing the risk of injuries at work or damage to health, i.e. illness of an employee at the workplace and in the work environment, as well as the manner and measures for their elimination, which the employer regulates by applying a risk assessment act.

Country	Serbia
Document ID	Службени гласник РС", број 106/09
Document title	Правилник о превентивним мерама за безбедан и здрав рад при ручном преношењу терета
	Rulebook on preventive measures for safe and healthy work during manual handling of cargo
Document type	Rulebook
Relevant to	Employers and employees performing MMH tasks
What is specified	This Rulebook prescribes the minimum requirements that the employer is obliged to meet in ensuring the application of preventive measures in the manual handling of cargo, in which there is a particular risk of injury or disease of the spine.

Country	Serbia
Document ID	Службени гласник РС, бр. 96/11, 78/15 и 93/19
Document title	Правилник о превентивним мерама за безбедан и здрав рад при излагању буци
	Rulebook on preventive measures for safe and healthy work during noise exposure
Document type	Rulebook
Relevant to	All people who work in noise
What is specified	This Rulebook prescribes the minimum requirements that the employer is obliged to meet in ensuring the application of preventive measures with the aim of eliminating or reducing to the least possible risk of injury or damage to the health of employees that occur or may occur during exposure to noise, and in particular the risk of hearing loss.

Country	Serbia
Document ID	Службени гласник РС, бр. 96/11, 78/15 и 93/19
Document title	Правилник о превентивним мерама за безбедан и здрав рад при излагању буци
	Rulebook on preventive measures for safe and healthy work during noise exposure
Document type	Rulebook
Relevant to	All people who work in noise
What is specified	This Rulebook prescribes the minimum requirements that the employer is obliged to meet in ensuring the application of preventive measures with the aim of eliminating or reducing to the least possible risk of injury or damage to the health of employees that occur or may occur during exposure to noise, and in particular the risk of hearing loss.

Country	Serbia
Document ID	Службени гласник РС бр. 106 од 17. децембра 2009, 93 од 25. октобра 2013, 86 од 6. децембра 2019
Document title	Правилник о превентивним мерама за безбедан и здрав рад при коришћењу опреме за рад са екраном
	Rulebook on preventive measures for safe and healthy work when using screen equipment
Document type	Rulebook
Relevant to	Designers and users of screens
What is specified	This rulebook prescribes the minimum requirements that the employer is obliged to meet in ensuring the application of preventive measures when using equipment for working with the screen. It refers to driving or control cabins in vehicles or machinery, computer systems that are primarily intended for public use, cash registers and other work equipment that has small screens for displaying data, etc.

SINGAPORE

Country	Singapore
Document ID	SS 569 : 2011
Document title	Code of practice for manual handling
Relevant article	Workplace Safety and Health Act
Document type	Guideline
Relevant to	Manual Material Handling
What is specified	Provides information and guidance for the identification, assessment and control of risks arising from manual handling activities in workplaces and on the planning and implementation of an ergonomics programme for manual handling operations.
Related document	ISO 11228-1:2003 Ergonomics — Manual handling

Country	Singapore
Document ID	SS 514: 2016
Document title	Code of practice for office ergonomics
Relevant article	Workplace Safety and Health Act
Document type	Guideline
Relevant to	General workplace HFE
What is specified	Provides guidelines on the designs and improvements of working situations to make the workplace safer, more comfortable and more productive. Covers the fundamentals of office ergonomics including physical, environmental and psychosocial elements. Includes also the ergonomics for mobile devices, smartphones and tablets as well as considerations for older workers.
Related document	ISO 9241-210:2019 Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems

VENEZUELA

Country	**Venezuela**
Document ID	2742 YEAR 1998
Document title	Condiciones ergonómicas en terminales con pantallas catódicas
	Ergonomic conditions in terminals with cathode screens
Relevant article	Recommendation
Document type	Guideline
Relevant to	HFE in general
What is specified	Aims to help designers measure screen reflections that might affect user comfort and task performance when using display screen equipment. It specifies requirements and methods to measure image quality in lighting environments that can cause specular and diffuse reflections from the screen.
Related document	ISO 9241-7 1988

Appendix 5.
HFE legislation in selected countries and regions

Adapted with permission from Paul Schwab and Gary Orr, 2020.

Ergonomics regulations in the United States and abroad

Argentina	Work contract regime (ordered text of 1976; approved by law no. 20744, of 1974, modified by law no. 21297, 1976, § 75).
Australia	Website: www.legislation.nsw.gov.au/#/view/regulation/2011/674/chap4/part4.2. Website: www.commerce.wa.gov.au. Commonwealth: Work Health and Safety Act 2011 No 10. (§ 19(1)). New South Wales: Work Health and Safety Regulation 2017, Chapter 4 Part 4.2. Queensland Part 4.2 Hazardous manual tasks 2011, Chapter 4 Part 4.2. Work Health and Safety Regulation 2011 (2011-674) (§§ 60-61). Australia, Southern Part 4.2 Hazardous manual tasks 2012, Chapter 4 Part 4.2. Tasmania Part 4.2 Hazardous man ual tasks 2012, Chapter 4 Part 4.2. Victoria Part 3.1—Hazardous manual handling, Occupational Health and Safety Regulations, 2017. S.R. No. 22/2017, Chapter 3—Physical hazards. Western Australia: 3.4. Manual handling, duties of employer etc. as to manual handling, Occupational Safety and Health Regulations, 1996 Workplace safety requirements Part 3.
Austria	Act of 1994 concerning occupational safety and health, 1994, CIS 98-358. Federal Law on Health and Safety at Work Employee Protection Act, BGBl. I No. 118/2012). Regulation on Display Screen Work (BGBl. II. No. 124/1998). Federal law on Health and Safety at Work §12(4), §14(2), § 33(6), § 37(5), Regulation on Work Equipment § 5(2), VO § 6ff, §11. Federal Law on Health and Safety at Work. 1995 Regulation on Protection of Workforce from Noise and Vibrations VOLV, BGBl. II No. 22/2006). General Regulation on Protection of Workforce AAV § 71, § 72, § 73 (in compliance with Council Directive 89/656/EEC).
Belgium	Act of 4 August 1996 on well-being of workers in the performance of their work, Belgian Official Gazette, 18 Sept. 1996. Royal Decree of 12 August 1993 on the manual handling of loads, B.S. 29.09.1993. Royal Decree of 27 August 1993 on work on display screen equipment, B.S. 07.09.1993. Royal Decree of 12 August 1993 on the use of work equipment, B.S. 28.09.1993. Royal Decree of 7 July 2005 on protection of health and safety of workers against the risks from mechanical vibrations at work, B.S. 14.07.2005).

Canada	Website: www.ccohs.ca/oshanswers/ergonomics. Canada Labour Code (R.S.C., 1985, c. L-2). Canada Labour Code II, parts 19.1-6. Alberta: Occupational Health and Safety Code, Alberta Regulation 87/2009, Part 14, Sec 211. British Columbia: Occupational Health and Safety Regulation, Ergonomics (MSI) Regulations 4.46 to 4.53. Manitoba: The Workplace Safety & Health Act (C.C.S.M. c. W210), Workplace Safety & Health Regulation, Sec. 8, 2019. New Brunswick: Act & Regulations, Occupational Health and Safety Act (S.N.B. 1983, c. O-0.2). Newfoundland & Labrador: Occupational Health & Safety Regulations Part V1, Sec. 50 to 56. Northwest Territories & Nunavut: Northwest Territories Lands Act, Mining Regulations R-015-2014, April 1, 2014. Nova Scotia: Occupational Health and Safety Act, 1096, Chapter 7. Ontario: Ministry of Labour, Occupational Health and Safety Act, R.S.O. 1990, c. O.1. Prince Edward Island: Occupational Health and Safety Act, General Regulations, 1988. Quebec: Regulation Respecting Occupational Health and Safety Act Respecting Occupational Health and Safety 2019, Chapter S-2.1, S. 223, Div. XX, Sections 166-171. Saskatchewan: The Occupational Health and Safety Regulations, 1996, Part VI, Section 81. Yukon: Occupational Health and Safety Act, RSY 2002, c.159.
Chile	Labor Code last update 20.09.2014 (Art.184). Decree No. 804 of September 26, 2012 approving the Technical Standard for the Identification and Evaluation of Risk Factors for Work-Related Musculoskeletal Disorders (TMERT) (Art. 1). Labor Code (last update 20.09.2014) (Arts. 211 [F], [G]).
China	China GB/T documents (in Simplified Chinese): https://www.saac.gov.cn/daj/gjbz/dabz_list.shtml. Law of the People's Republic of China on Work Safety, Presidential Order No.70 of 2002 (Arts. 4-5). GB 50034-2004 Standard for lighting design of buildings. Taiwan Website: www.osha.gov.tw (in Traditional Chinese). Occupational Safety and Health Act, June 14,1974 (amended on May15, 2019).
Colombia (overview)	Decrees 2663 and 3743 of 1950, adopted by Law 141 of 1961 as permanent legislation, which dictates the Substantive Labor Code. (§348).
Cuba	Law no. 49 whereby the Labor Code is promulgated (§§196 - 197). Resolution no. 39/2007 on General Bases of Occupational Health and Safety (§1, Annex II §8 [1] [2]).

Denmark	Working Environment Act (No. 1072 of 7 September 2010) (§ 15). Executive order on manual handling (Executive Order # 1164, 16/12/1992). Order on manual handling of loads on offshore installations (Executive Order # 395, 15/05/2008). Technical regulation on occupational health and safety in ships – as amended (Executive Order # 1246, 11/12/2009). Working Environment Conditions for Crew Members Performing Duty on board Aircraft and for their Employers (Executive Order # 918, 18/11/2003). Executive order on work at display screen equipment (Executive Order # 1108 af 15/12/1992). Order on work at display screen equipment on offshore installations (Executive Order # 397, 15/05/2008. Executive Order on the Use of Technical Equipment - as amended (Executive Order # 1109, 15/12/1992). Executive Order on mobile offshore installations etc. (Executive Order #830, 27/06/2013). Executive order on the use of personal protection (Executive Order # 1706, 15/12/2010). Executive Order on the use of personal protective equipment on offshore installations (Executive Order # 398, 15/05/2008). Technical regulation on occupational health and safety in ships – as amended (Executive Order # 1246, 11/12/2009). Working Environment Conditions for Crew Members Performing Duty on board Aircraft and for their Employers (Executive Order # 918, 18/11/2003). Executive order on protection against exposure to vibration at work (Executive Order # 682, 30/06/2005). Order on protection against exposure to vibration at offshore installations (Executive Order # 394, 15/15/2008). Technical regulation on occupational health and safety in ships (Executive Order # 1246, 11/12/2009). Order on crew members' exposure to vibrations (Executive Order # 617, 23/06/2005).
Finland	Occupational Safety and Health Act, section 8(1,3). Government Decision 1409/1993 of 22 December 1993 on manual handling. Government Decision 1405/1993 of 22 December 1993 on display screen work. Government Statute 403/2008 of 12 June 2008 on "Safe Use and Inspection of Work." Protection of employees towards hazards caused by vibration, January 2005. Government Decision 1407/1993 of on selection and use of personal protective equipment, 22 December 1993.
France	Ordinance n°2007-329 of March 12, 2007 relating to the Labor Code (legislative part). (Art. L4121-1/3-1, Art. L4121-3-1, Art. L4622-1/3) Government Decision 1409/1993 of 22 December 1993 on manual handling Government Decision 1405/1993 of 22 December 1993 on display screen work Government Statute 403/2008 of 12 June 2008 about the safe use and inspection of work equipment Decree n° 2005-746 of 4 July 2005 on health and safety requirements regarding the exposure of workers to the risks arising from mechanical vibration and amending the Labour Code Decree n° 2005-748 of 4 July 2005 on health and safety requirements regarding the exposure of workers on board vessels to the risks arising from mechanical vibration Labour Code Art. R 4321-1 and R 4321-57

Germany	Law on the implementation of occupational health and safety measures to improve the safety and health protection of employees at work, Federal Law Gazette, 7 August 1996, Part 2, Section 3.1 Load handling Ordinance, 1996 and Mining Ordinance for Health Protection, 1991 Law on the implementation of occupational health and safety measures to improve the safety and health protection of employees at work, Federal Law Gazette, 7 August 1996, Part 2, Section 3.1 Load handling Ordinance, 1996 and Mining Ordinance for Health Protection, 1991. Ordinance for work with visual display units, 1996. Regulation on safety and health in the use of work equipment (safety regulations - BetrSichV), 2015. Noise and Vibrations Occupational Safety and Health Ordinance, 2007. Mining Ordinance for Health Protection, 1991 (§11, §12). Ordinance on the safety and health protection in the use of personal protective equipment at the workplace, 1996.
Greece	Law No. 3850 of 2010 ratifying the Code of Laws related to Occupational Safety and Health. PD 397/1994 Minimum health and safety requirements for manual handling of loads where there is a particular risk of back injury to workers. PD 398/1994 Minimum safety and health requirements for work with display screens. PD 395/1994 on the minimum health and safety requirements for the use of work equipment at work. PD 89/1999 Modification of PD 395/94 on the minimum health and safety requirements for the use of work equipment at work. PD 155/2004 Modification of PD 395/94 on the minimum health and safety requirements for the use of work equipment at work. PD 176/2005 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration). PD 396/1994 on the minimum health and safety requirements for the use of personal protective equipment.
India	Website: www.dgfasli.nic.in/about1.htm. The [Act No. 63 of 1948] as amended by the Factories (Amendment) Act, 1987. The Factories Act of 1948.
Ireland	Safety, Health and Welfare at Work Act, 2005 (No. 10 of 2005). (§8). Safety, Health and Welfare at Work (General Application) Regulations 2007. Chapter 4. Manual handling. Safety, Health and Welfare at Work (General Application) Regulations 2007. Chapter 5. Display Screen Equipment. Part 2 Chapter 2 Section 28(a-q) SHWW General App (2007). Safety, Health and Welfare at Work (General Application) Regulations 2007. Part 5: Physical Agents. Chapter 2. Control of vibration at work. Safety, Health and Welfare at Work (General Application) Regulations 2007, Chapter 3, PPE.
Italy	Royal Decree No. 262 of March 16, 1942 approving the text of the Italian Civil Code. (Art. 2987). Legislative Decree No. 81/2008 Art. 17, 168, 169. Legislative Decree No. 81/2008 Art. 29. Legislative Decree No. 81/2008 Art.73. Legislative Decree 81/2008 Transposing Directive 2002/44/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration). Legislative Decree 475/199217 on transposition of Directive 89/686/EEC on personal protective equipment, 1992.
Japan	Website: www.mhlw.go.jp (in Japanese). Labor Contracts Act (Article 5). Industrial Safety and Health Act, Article 3 (1).
Korea	Occupational Safety and Health Act (Art. 5 1). Ordinance of the Occupational Safety and Health Standards (Art. 656 ~ 666).

Malaysia	Website: https://www.dosh.gov.my/index.php. Occupational Safety and Health Act 1994 [No. 514]. (S 15 [1, 2b]). Factory and Machinery Act 1967 (No. 139(, Factories and Machinery (Safety, Health and Welfare) Regulations 1970, sec 24, 29, 30.
Mexico	Website: http://dof.gob.mx/nota_to_doc.php?codnota=5544579. Federal Regulation of safety, hygiene and work environment (Art. 3, Art. 132, XVIII). Ergonomic risk factors at work-Identification, analysis, prevention and control, NOM-036-1-STPS-2018. Conditions of Illumination in the Workplace, NOM-025-STPS-2008.
Netherlands	Working Conditions Act (Art. 3), Working Conditions Decree. (Art. 4.1b). Rules to protect workers against the dangers of workloads (Physical Tax Decree, Bulletin of Acts and Decrees 68 of 1993), chapter 5, part 1 Decree of 27. Decree on Display Screen Equipment of 10 December 1992 (Display Screening Decree, Official Gazette number 677 of 1992), AB - chapter 5, part 2 AR. Decree on Work Equipment of 14 October 1993. Order of 5/7/2005 to amend the Working Conditions Decree, chapter 3, part A. Decree on Personal Protection Equipment of 15 July 1993, chapter 8, part 1.
New Zealand	Employment Act 1992 (1992 No. 96). (§§2, 7-10).
Norway	Working Environment Act (Ch. 2 Art. 2-1, Ch. 3 Art. 3-5). Ordinance (No. 1356 of 2011) concerning the design and facilities of workplaces and work premises (Workplace Ordinance) (Ch. 1 Art. 1).
Philippines	Occupational Safety and Health Standards 1989 (S 1005[a]). Sanitation Code, Rule V, Section 2.D.
Poland	Act of 26 June 1974 - the Labour Code 20141104 (art.207§2). LC Act Ordinance of the Minister of Labor and Social Affairs concerning work safety and hygiene whilst performing manual handling of loads. Regulation of the Minister of Labor and Social Policy of December 1, 1998, DSE Ordinance 27. Ordinance of the Minister of Economy concerning work safety and hygiene when operating machinery and other technical equipment for earth, construction and road works, 20 September 2001. PME Ordinance of the Minister of Economy and Labour concerning work safety and hygiene at works related to the exposition to noise or vibration, 2005. Ordinance of the Minister of Economy concerning essential requirements for personal protective equipment, 2005.
Portugal	Decree-Law 102/2009 on the legal framework for the promotion of security and health at work. (Art. 15 (1), (2) (f) (g)). Decree-Law 330/93 safety and health requirements in the manual handling of loads, Official Gazette, I Series-A, no. 226. Decree-Law 349/93 minimum safety and health requirements for work with display screen equipment, Official Gazette, I Series-A, no. 231. Order 989/93 of 6 October 1993 establishing the minimum safety and health requirements for work with display screen equipment, Official Gazette, I Series-B, no. 234. Decree-Law 331/93 of 25 September 1993 minimum safety and health requirements for the use by workers of work equipment, Official Gazette, I Series-A, at the. 226. Decree-Law 46/2006 protection of the health and safety of workers in case of exposure to risks from physical agents (vibration), Official Gazette, I Series-A, no. 40. Main legislation Decree-Law 348/93 minimum safety and health requirements for the use by workers of personal protective equipment at work, Official Gazette, I Series-A, no. 231 Order 988/93 of 6 October 1993 establishing minimum safety and health requirements of workers in the use of personal protective equipment, Official Gazette, I Series-B, no. 234.

Russia Federation	Labour Code of the Russian Federation of 30 December 2001, as amended. (art. 212). Sanitary-epidemiological rules and norms (SanPin) "Hygienic requirements for enterprises manufacturing construction materials and structures. SanPin 2.2.3.1385-03", 11 June 2003.
Saudi Arabia	Labour Law (Royal Decree No. M/51) (Part VIII, Chapter One, Article 122).
Singapore	Workplace Safety and Health Act (2009 Ed.) (Art. 11, 12). Workplace Safety and Health Act (Chapter 354a, Section 65) Workplace Safety and Health (Risk Management) Regulations G.N. No. S 141/2006.
South Africa, Republic of	Occupational Health and Safety Act 85 of 1993, §§ 8,12. Department of Employment and Labour Occupational Health and Safety Act, 1993 Ergonomics Regulations, 2019.
Spain	Law no. 31/1995, of November 8, on Occupational Risk Prevention (Art. 14). Royal Decree 487/1997 of 14 April 1997 establishing minimum health and safety requirements for manual handling of loads in the workplace. Royal Decree 488/1997 of 14 April 1997 on minimum safety and health-related requirements for working with display screens equipment. Royal Decree 1215/1997 of 18 July 1997 establishing minimum safety requirements for use of work equipment by workers, Art. 3. Royal Decree 1311/2005 of 4 November 2005 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration). Royal Decree 773/1997 of 30 May 1997 providing minimum health and safety requirements relating to the use of personal protective equipment by workers.
Sweden	Work Environment Act (1977:1160) (Ch. 3 §§ 2 and 2a). Provisions on Musculoskeletal Ergonomics, AFS 2012:2. Provisions on work with display screens, AFS 1998:5, entry into force on 1.4.1999 and amended in AFS 2014:2 (entry in force 1.7.2014). Provisions on the use of work equipment (entry into force on 1.7.2007), as amended in AFS 2010: 14 (entry into force on 1.1.2011). Swedish Work Environment Authority (2005) AFS 2005:15 "Vibrations." Use of Personal Protective. Equipment, AFS 2001:3 (2001).
Switzerland	Labour Law, § 6 (1) - (2). Ordinance No. 3 of August 18, 1993 relating to the Labor Law (Hygiene, OLT 3) (§ 23).
Thailand	Workplace Environment Act B.E. 2554, 2011. Ministerial Regulation of the Ministry of Labour, on Maximum Allowable Weight of Lifting, B.E. 2547, 2004.

United Kingdom	Website: www.hse.gov.uk/guidance/index.htm. Management of Health and Safety at Work Regulations (1999). The Management of Health and Safety at Work Regulations (Northern Ireland) 1992 ref: Statutory Rules of Northern Ireland n°459 of 1992. The Lifting Operations and Lifting Equipment Regulations 1998 (1998 No. 2307). Manual Handling Operations Regulations (MHOR) (992). The Manual Handling Operations Regulations (Northern Ireland) 1992 ref: Statutory Rules of Northern Ireland n°535 of 1992. Health and Safety (Display Screen Equipment) Regulations 1992 (S.I. No. 2792 of 1992). Health and Safety (Display Screen Equipment) Regulations 1992. (DSE 2002) as amended by the Health and Safety (Miscellaneous Amendments) Regulations 2002. The Health and Safety (Display Screen Equipment) Regulations (Northern Ireland) 1992 ref: S.R. Northern Ireland n°513 of 1992. The Health and Safety at Work Order (Northern Ireland) 1978 ref: S.R. Northern Ireland n°1039 of 1978. The General Ophthalmic Services Regulations (Northern Ireland) 1986 ref: S.R. Northern Ireland n° 163 of 1986. Provision and Use of Work Equipment Regulations (PUWER) (1998). Personal Protective Equipment at Work Regulations 1992.4 (PPE 1992). Control of Vibration at Work (2005).
United States	OSHA website: www.osha.gov. Occupational Safety and Health Act of 1970, Public Law 91-596 [S. 2193] (29 USC, Chapter 15). (§ 654(a)(1),(2)). USA Federal OSHA eTools www.osha.gov/dts/osta/oshasoft/index.html. Americans with Disabilities Act www.ada.gov. USA, California www.dir.ca.gov/dosh/puborder.asp. USA, Maine www.safetyworksmaine.gov/training/online_classes/vdt/VDT-Main.htm. USA, Minnesota www.mn.gov/admin/government. USA, New Hampshire Safety and Health of Employees, Statutory Authority: RSA 281-A 60 I. (o) and RSA 277:16, sec Lab 1403.18 Ergonomics (a, b). USA, Ohio www.bwc.ohio.gov/employer/forms/publications. USA, Washington https://www.lni.wa.gov/safety/SprainsStrains/guidelines/default.asp.
Vietnam	Labour Code, Art.138(1)(b)(c).

Despite the acknowledged importance of human factor/ergonomics (HFE) in the workplace, most countries and regions lack comprehensive regulations and requirements for HFE design and implementation. An effective HFE systems approach is indispensable to support our life and work in the 21st century; without sufficient attention to HFE, system design will not support the sustainability of work, organizations, or societies.

This review report describes principles, concepts, and approaches critical to HFE and manual handling in the workplace and reviews HFE-related legislation, standards, and guidance documents from selected countries and regions across the globe as well as from relevant international organizations. A primary goal of the document is to serve as a resource for HFE elements to be considered for inclusion in laws, regulations, standards, and/or guidelines on HFE and manual handling in the workplace.

This publication will not only provide an important technical basis for the ILO in its standard-setting activities on workplace HFE, but also a useful tool for the world experts, practitioners, employers and workers and their organizations, national institutions and all those who have a role in ensuring safe and healthy work environments.

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