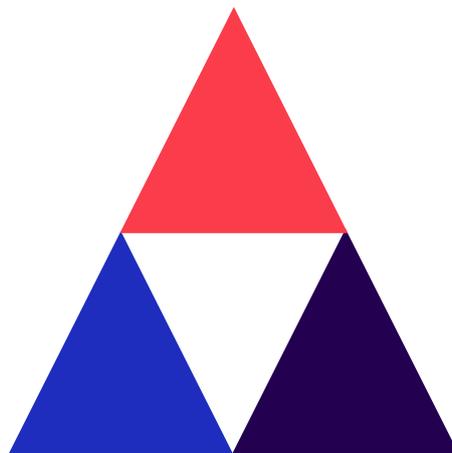




# ► Technical guidelines on biological hazards in the working environment

Meeting of Experts for the tripartite validation of the technical guidelines on biological hazards  
(Geneva, 20–24 June 2022)



## ▶ Contents

	<b>Page</b>
Introduction .....	5
Purpose and scope.....	6
Chapter 1. General obligations responsibilities, duties and rights .....	7
1.1. The competent authority .....	7
1.2. Employers.....	8
1.3. Occupational health services.....	10
1.4. Workers.....	11
1.5. Social dialogue, collaboration and cooperation .....	13
Chapter 2. Risk management at the workplace level .....	14
2.1. Biological hazard identification and risk assessment.....	14
2.2. Control measures .....	17
2.3. Risk communication.....	18
Chapter 3. Workers' health surveillance .....	19
Chapter 4. Information, instruction and training .....	20
Chapter 5. Investigation of dangerous occurrences, occupational accidents and diseases....	21
Chapter 6. National system for recording and notification of occupational accidents and diseases .....	23
Chapter 7. Preparedness and response to emergencies.....	24
Chapter 8. Inspection and compliance with legal provisions.....	27
 Appendices	
I. Risk assessments using a numerical weighting system to determine priorities for action .....	29
II. Applying the hierarchy of controls.....	31
III. Main ILO and WHO references for the management of biological hazards in specific sectors .....	32

## ► Introduction

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Biological hazards, both contagious and non-contagious, can be a significant health threat in numerous sectors and workplaces worldwide, and can cause occupational and work-related diseases.<sup>1</sup>

Since the International Labour Organization (ILO) adopted the Anthrax Prevention Recommendation, 1919 (No. 3),<sup>2</sup> there have been significant advances in the knowledge of biological hazards, their prevention and the treatment of the diseases they cause. The importance of non-infectious biological hazards is becoming increasingly apparent in both workplaces and communities and it is recognized that workplaces can help prevent and control global health threats such as tuberculosis, HIV/AIDS, malaria and influenza, as well as pandemics such as the COVID-19 pandemic.

The Global Strategy on Occupational Safety and Health, which was adopted by the International Labour Conference at its 91st Session in 2003, underscored that the development of new instruments in the area of biological hazards should be given the highest priority.<sup>3</sup>

In November 2011, the ILO's Governing Body agreed to the establishment of a Standards Review Mechanism (SRM) to contribute to the implementation of the ILO standards policy and to consolidate tripartite consensus on the role of international labour standards in achieving the ILO's objectives. In 2015, a tripartite working group (TWG) was established as one component of the SRM.<sup>4</sup> At its third meeting in September 2017, the SRM TWG reviewed 19 instruments related to occupational safety and health (OSH) and recommended to the Governing Body that: (a) follow-up action should be taken to revise Recommendation No. 3 through an instrument addressing all biological hazards; and (b) technical guidelines on biological hazards should be published. The COVID-19 pandemic has heightened the urgency of those recommendations.

The Governing Body decided to place on the agenda of the 112th and 113th Sessions (2024–25) of the International Labour Conference an item related to OSH protection against biological hazards. The establishment of technical guidelines on the control of workplace biological hazards will provide the technical basis for that discussion.

At the 110th Session (2022), the International Labour Conference decided to include a safe and healthy working environment in the ILO's framework of fundamental principles and rights at work and declared that the [Occupational Safety and Health Convention, 1981 \(No. 155\)](#) and the [Promotional Framework for Occupational Safety and Health Convention, 2006 \(No. 187\)](#) shall be considered as fundamental Conventions within the meaning of the [ILO Declaration of Fundamental Principles and Rights at Work, 1998, as amended in 2022](#).

Guidelines are not legally binding. These guidelines are based on the full principles, rights and obligations set out in the international labour standards and nothing set out in these guidelines should be understood as altering the obligations of the Member States that ratified those standards.

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<sup>1</sup> See ILO, [List of Occupational Diseases Recommendation, 2002 \(No. 194\)](#).

<sup>2</sup> ILO, [Recommendation No. 3](#).

<sup>3</sup> ILO, [Global Strategy on Occupational Safety and Health: Conclusions Adopted by the International Labour Conference at its 91st Session, 2003](#), para. 8, 2004. See also [GB.331/LILS/2](#), para. 5(f)(i).

<sup>4</sup> See [GB.323/INS/5](#), para. 25.

## ▶ Purpose and scope

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The technical guidelines on biological hazards in the working environment apply to all workers in all branches of economic activity.<sup>5</sup> The aim of the guidelines shall be to provide advice to governments, employers, workers and their representatives on what should be done to prevent and control work-related injuries, ill health, diseases, and dangerous occurrences and deaths related to exposure to biological hazards in the working environment.

For the purposes of these guidelines, a biological hazard refers to any microorganism, cell or other organic material that may be of plant, animal or human origin, including any which have been genetically modified, and which can cause harm to human health.

This may include but is not limited to bacteria, viruses, parasites, fungi, prions, DNA materials, bodily fluids, and any other microorganisms and their associated allergens and toxins. Health impacts could include infectious and non-infectious diseases and injuries.

Biological hazards in the working environment can also be considered to include biological vectors or transmitters of disease.

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<sup>5</sup> ILO, Convention No. 155, Arts 1 and 2.

## ► Chapter 1. General obligations, responsibilities, duties and rights

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Recognizing the inseparable, interrelated and mutually supportive nature of all fundamental principles and rights at work is critical to effectively prevent and mitigate biological risks in the working environment. The prevention of accidents or injury to health arising out of, linked with, or occurring in the course of work due to exposure to biological hazards should be the concern of all those involved in the design, organization and performance of any work involving biological hazards and all those involved in manufacturing, importing, exporting, handling and treating wastes, as well as all those concerned with the protection of the occupational safety and health of workers.

The control of biological hazards at the workplace should be organized in accordance with the general principles described in ILO Conventions, Recommendations and Protocols relating to OSH <sup>6</sup> and in ILO guidelines <sup>7</sup> and codes of practice.

### 1.1. The competent authority

1.1.1. The competent authority should, in consultation with the most representative organizations of employers and workers, formulate a comprehensive national policy on occupational health in general, including on biological hazards, as respectively required or recommended by Convention No. 155 and the [Occupational Safety and Health Recommendation, 1981 \(No. 164\)](#); [Convention No. 161](#) and the [Occupational Health Services Recommendation, 1985 \(No. 171\)](#); and Convention No. 187 and the [Promotional Framework for Occupational Safety and Health Recommendation, 2006 \(No. 197\)](#). <sup>8</sup>

1.1.2. Such a policy should:

- (a) be supported by laws and regulations and any other relevant instruments on OSH;
- (b) be supported by mechanisms for ensuring compliance with national laws and regulations, including systems of inspection;
- (c) indicate the goal of covering all workers and providing for a progressive extension of occupational health services;
- (d) make provisions for coordination so that national health and labour infrastructures, expertise and resources are used efficiently to provide occupational healthcare to workers;
- (e) include provisions for workers' health surveillance that would be an integral part of the programme of prevention, protection and promotion at national, community and enterprise levels; <sup>9</sup> and
- (f) promote a healthy working environment.

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<sup>6</sup> In particular Convention No. 155; the [Protocol of 2002 to the Occupational Safety and Health Convention, 1981](#); the Occupational Health Services Convention, 1985 (No. 161); and Convention No. 187.

<sup>7</sup> Including ILO, [Guidelines on Occupational Safety and Health Management Systems, ILO-OSH 2001](#), 2001; and ILO, [Technical and Ethical Guidelines for Workers' Health Surveillance](#), 1998.

<sup>8</sup> Based on ILO, [Technical and Ethical Guidelines for Workers' Health Surveillance](#), para. 6.1.

<sup>9</sup> Based on ILO, [Technical and Ethical Guidelines for Workers' Health Surveillance](#), para. 6.2.

1.1.3. The competent authority should establish requirements for the protection of workers against occupational exposure to biological hazards. Such requirements should be based on sound scientific criteria and accepted international practice.<sup>10</sup> Where sufficient information is not available, the competent authority should elaborate guidelines, procedures and precautionary measures, when indicated and applicable.

1.1.4. The competent authority should make available information on the prevention of biological hazards and provide appropriate support with regard to public health and occupational health measures.<sup>11</sup>

1.1.5. The competent authority should establish, implement and review regularly, in the light of national conditions and in consultation with the most representative organizations of employers and workers, procedures for:

- (a) the recording, notification and investigation of occupational diseases, accidents and, as appropriate, dangerous occurrences caused by workplace biological hazards;
- (b) the production and publication of annual statistics on occupational diseases, accidents and dangerous occurrences arising from biological hazards in the workplace;
- (c) the holding of inquiries for cases of occupational disease or any other accident that arises from occupational exposure to biological hazards in the course of (or in connection with) work that appears to reflect situations which are serious; and
- (d) the publication, annually, of information on measures taken in pursuance of the national OSH policy, which arise from exposure to biological hazards in the workplace.

1.1.6. The competent authority should establish a list of occupational diseases, including those caused by biological hazards, which should be periodically reviewed,<sup>12</sup> as provided for by the Recommendation No. 194).<sup>13</sup>

1.1.7. Workers who have been injured or contracted illnesses, or diseases caused, impacted or exacerbated by biological hazards due to their work, where they are considered to be an occupational disease or injury in line with Recommendation No. 194 and national law, should be entitled to employment injury benefits as prescribed in the Employment Injury Benefits Convention, 1964 [Schedule I amended in 1980] (No. 121)<sup>14</sup> and the Employment Injury Benefits Recommendation, 1964 (No. 121).<sup>15</sup>

1.1.8. Governments, employers' and workers' organizations and all enterprises should observe the principles of the [Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy](#) (MNE Declaration). As required, cooperation between national competent authorities should be encouraged to improve the protection of workers against biological hazards.

## 1.2. Employers

1.2.1. Employers have a duty to protect and should promote the safety and health of all workers.

<sup>10</sup> Based on ILO, *ILO Code of Practice on Safety and Health in Textiles, Clothing, Leather and Footwear*, MESHT/2021/8, section 8.2, para. 1.

<sup>11</sup> Based on ILO, *ILO Code of Practice on Safety and Health in Textiles, Clothing, Leather and Footwear*, section 8.3.

<sup>12</sup> Based on ILO, *Technical and Ethical Guidelines for Workers' Health Surveillance*, para. 6.7.

<sup>13</sup> [Recommendation No. 194](#).

<sup>14</sup> [Convention No. 121](#).

<sup>15</sup> [Recommendation No. 121](#).

1.2.2. In consultation with workers and their representatives, employers should make appropriate arrangements for the establishment of OSH management systems, in line with the *Guidelines on occupational safety and health management systems, ILO-OSH 2001*, and should comply with the measures to be taken regarding risks to safety and health in general and to biological hazards in particular, including nationally and internationally recognized instruments, codes and guidelines, and collective agreements, where appropriate, as prescribed, approved or recognized by the competent authority.<sup>16</sup>

1.2.3. Employers, in consultation with workers and their representatives, should:

- (a) have systems in place to identify hazards and make a risk assessment with regard to the safety and health of workers arising from biological hazards, while making effective use of the information provided by the supplier of equipment or materials and from other reasonably available sources, and while ensuring that workers and their representatives are fully informed and encouraged to participate actively in the OSH management system. Risk assessments should be reviewed and updated, where necessary. Risk assessments should address specific vulnerabilities, including gender, age and disability;
- (b) take all reasonable and practicable measures to eliminate or, if this is not possible, control the risks to safety and health identified in the above-mentioned risk assessment in order to reduce exposure.<sup>17</sup> In taking preventive and protective measures, the employer should address biological hazards and associated risks, in accordance with the hierarchy of control as defined by the ILO-OSH 2001 guidelines, to eliminate, control and minimize such hazards/risks, with the use of personal protective equipment (PPE) where a residual hazard/risk cannot be controlled (see Appendix II).

1.2.4. Employers should make the necessary arrangements to provide and integrate prevention activities as follows:

- (a) ensure regular surveillance of the working environment and appropriate health surveillance;
- (b) ensure adequate and competent supervision of work and work practices;
- (c) ensure the application and use of appropriate control measures and the periodic review of their effectiveness and efficiency;
- (d) provide information, instruction and training to managers, supervisors and workers, as well as to workers' safety and health representatives, on safety and health issues in general and biological hazards in particular;
- (e) where necessary, establish measures to deal with emergencies and accidents, including first-aid arrangements; and
- (f) investigate occupational accidents, diseases and dangerous occurrences, in cooperation with safety and health committees and/or workers' representatives, in order to identify all causes and take the necessary measures to prevent recurrences of similar occupational accidents, and/or diseases.

1.2.5. Employers should be required to provide, where necessary, adequate PPE in order to reduce the risks of accidents or adverse effects on safety and health. OSH measures shall not involve any expenditure for workers.

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<sup>16</sup> Based on ILO, *ILO Code of Practice on Safety and Health in Textiles, Clothing, Leather and Footwear*, section 2.3, para. 1.

<sup>17</sup> Based on ILO, *ILO Code of Practice on Safety and Health in Textiles, Clothing, Leather and Footwear*, section 2.3, para. 4.

1.2.6. The employer must ensure that the PPE provided is:

- (a) appropriate, having regard to the nature of the work and any hazard associated with the work, and a suitable size and fit and comfortable for the worker who is to use it. Appropriate consideration should be given to gender;
- (b) maintained, repaired or replaced so that it is clean and hygienic, and in good working order.

Workers requiring use of respiratory protective equipment (RPE) must be fit-tested to ensure the RPE is providing suitable protection according to the instructions provided by the manufacturer. The employer must provide the worker with information, training and instruction in the proper use, wearing, storage and maintenance of PPE.

1.2.7. Employers should ensure that all workers are suitably and periodically informed about the biological risks associated with the tasks assigned to them, and about the measures to be taken to prevent damage to their health. This information should also be transmitted to subcontractors, who should ensure that such information is transmitted to their workers. Training should be provided before the start of any work involving exposure to biological hazards, and when there are changes in working methods and materials or when new risks appear, and such training should be repeated periodically, as necessary. Such information and training should be translated into languages that all workers can understand and should be conveyed using an approach that is meaningful, participatory and easy to understand and that is tailored to each category of workers. Employers should apply these provisions to all workers. These provisions should also apply to risks associated with commuting between worksites, as appropriate.

### 1.3. Occupational health services

1.3.1. Consistent with Convention No. 161 and Recommendation No. 171, the competent authority should develop progressively occupational health services for all workers, including those in the public sector and the members and cooperators of production cooperatives, in all branches of economic activity and all undertakings. If occupational health services cannot be immediately established for all undertakings, each Member concerned should draw up plans for the establishment of such services in consultation with the most representative organizations of employers and workers, where they exist.

1.3.2. The employer should ensure the provision of occupational health services to his or her workers, as requested by Convention No. 161. Provisions should be made for the establishment of occupational safety and health services for the exercise of the functions and under the conditions of operation identified in Convention No. 161. Provision should also be made for the availability of these services in all undertakings, as necessary, in line with Recommendation No. 164.

1.3.3. The occupational health services should have the following functions, in accordance with Convention No. 161:<sup>18</sup>

- (a) identification and assessment of the risks from biological hazards at the workplace;
- (b) surveillance of the biological hazards in the working environment and working practices which may affect workers' health, including sanitary installations, canteens, welfare facilities and housing where these facilities are provided by the employer;

<sup>18</sup> Based on ILO Convention No. 161, Art. 5.

- (c) advice on planning and organization of work, including the design of workplaces, on the choice, maintenance and condition of machinery and other equipment and on substances used at work;
- (d) participation in the development of programmes for the improvement of workplace biological hazards control;
- (e) advice on occupational health, safety and hygiene and individual and collective protective equipment;
- (f) surveillance of workers' health in relation to biological hazards at work;
- (g) promotion of the adaptation of work to the worker;
- (h) contribution to measures of vocational rehabilitation;
- (i) collaboration in providing information, training and education on the control of biological hazards at the workplace;
- (j) organization of first-aid and emergency treatment;
- (k) any reasonable adjustments to accommodate workers with disabilities;
- (l) participation in analysis of occupational accidents and occupational diseases; and
- (m) preparedness for major outbreaks or incidents, including stocks of necessary PPE and arrangements for its procurement according to emergency action plans.

1.3.4. Occupational health services should encourage workers to notify workers' health advisers/primary care physicians of the risks that the occupational conditions can present in order to facilitate early interventions and treatment, and should ensure that details are recorded, where appropriate, on health records and communicated to at-risk workers.

1.3.5. Where the continued employment of a worker in a particular job is contraindicated for health reasons due to exposure to biological hazards, the occupational health service should collaborate in efforts to find alternative employment for that worker in the undertaking, or another appropriate solution.<sup>19</sup>

## 1.4. Workers

1.4.1. In accordance with Convention No. 155 and Recommendation No. 164 and in light of national conditions and practice, workers and their representatives have the right to:

- (a) be consulted on measures taken to control any workplace hazards or risks to OSH in general and biological hazards in particular;
- (b) receive information on the identity, properties, and health effects related to the biological hazards to which they are exposed at work, as well as on preventive and protective measures and their application. Such information, should be provided in a manner and in language that is easily understood by all workers, including pathogen safety data sheets where they exist.
- (c) take adequate precautions, in cooperation with their employer, to protect themselves and other workers against hazards or risks to safety;

<sup>19</sup> Based on ILO Recommendation No. 171, Para. 17.

- (d) be consulted and be involved in the identification of hazards and the assessment of risks to OSH that are conducted by the employer and/or by the competent authority. They should also have the right to be involved and participate in investigations of accidents, dangerous occurrences and occupational diseases; and
- (e) receive, subject to the confidentiality rules for personal and medical data, reports on health surveillance and medical examinations. Where issues of confidentiality arise, anonymized findings should be provided, where applicable.

1.4.2. In accordance with Convention No. 155 and in light of national conditions and practice, workers have the right to:

- (a) bring to the attention of their representatives, the employer or the competent authority hazards or risks to safety and health;
- (b) request an assessment of health (that is, namely a medical examination or other tests, as appropriate) if a disorder occurs which the worker believes is due to or related to work;
- (c) appeal to the competent authority if they consider that the measures taken and the means used by the employer are inadequate for the purpose of ensuring OSH at work;
- (d) remove themselves and their co-workers in the vicinity from danger when they have reasonable justification to believe that there is an imminent and serious danger to their safety and health, without any adverse consequences; and in this case, they should inform without due delay their immediate supervisor and the workers' representatives;
- (e) ask for a full investigation and request that remedial actions are taken before commencing or continuing work when, based on their training and job experience, they have reasonable justification to believe that a work situation presents an imminent and serious danger to their lives or health due to exposure to biological hazards;
- (f) access their own personal health and medical files. This right should preferably be exercised through a medical professional of their choice. Special attention should be devoted to the need to maintain accurate and up-to-date records. Measures should be taken to facilitate the exercise of the right of each worker to have any erroneous data corrected;
- (g) be provided with adequate medical treatment and compensation for occupational accidents and occupational and work-related diseases resulting from the exposure to biological hazards at the workplace, including compensation to dependent family members in case of death of the worker due to a work-related injury or disease, in accordance with national laws and regulations;
- (h) where continued employment of a worker in a particular job is contraindicated for health reasons and under the advice of the occupational health services, be transferred to alternative work, if such work is available and if the workers concerned have the qualifications or can reasonably be trained for such alternative work; and
- (i) receive rehabilitation.

1.4.3. Training programmes to improve knowledge on biological hazards should be provided at no cost and if possible during working hours by the employer, the competent authority or other qualified institution. The outcomes of training should be assessed taking into account inputs from trained workers. The training programme should be reviewed periodically in consultation with workers' representatives and as the case may be, their representative organizations in the undertaking.

1.4.4. Where continued assignment to work involving exposure to biological hazards is found to be medically inadvisable, every effort should be made, consistent with national practice and conditions,

to provide the worker concerned with suitable alternative employment. Where an employment injury entails unemployability or disability and this is not taken fully into account in the evaluation of the loss sustained by the injured person, supplementary or special benefits should be provided by the social security system.

1.4.5. Workers have the responsibility, in accordance with their training and the instructions and means given by their employers, to:

- (a) comply with prescribed OSH measures on the elimination or control of hazards or risks to themselves and others, including through the proper care and use of the protective clothing, facilities and equipment placed at their disposal for this purpose;
- (b) report promptly to their immediate supervisor or safety and health representative any unusual conditions at work which they believe could present a hazard or risk to their safety or health or that of other people; and
- (c) cooperate with the employer and other workers in order to ensure compliance with OSH requirements and participate in the development and implementation of the OSH management system at the workplace.

## 1.5. Social dialogue, collaboration and cooperation

1.5.1. The competent authority should promote and establish reliable systems for communication and cooperation on workplace biological hazards control with relevant institutions and jurisdictions at the national level and all other appropriate levels, up to and including at the level of the workplace. Where appropriate, there should be full cooperation at all levels between the competent authority, employers, workers and their representatives, scientific research institutions, occupational health services, designers, manufacturers, suppliers and quality control institutions in order to ensure the optimal control of biological hazards at the workplace.

1.5.2. There should be consultations at the workplace level between the employer and the workers' representatives. These consultations should include exchanges of information on: the nature of the biological hazards to which workers are exposed and the risks which such exposure entails; the results of risk assessments; the results of any health surveillance, relevant injury or disease reports, or other relevant health data; and on preventive and protective actions or measures to be taken.

1.5.3. OSH committees should include biological hazards in their scope, along with other hazards existing in the workplaces, in accordance with national legislation. These committees should also endeavour to ensure the application of regulations on the prevention of contamination by biological hazards and should acquaint themselves regularly with the results of the monitoring and assessment of the working environment.

1.5.4. Whenever two or more undertakings engage in activities simultaneously at one workplace, they should collaborate in applying the provisions regarding OSH and the working environment, including with respect to the prevention of biological hazards, without prejudice to the responsibility of each undertaking for the health and safety of its workers. In appropriate cases, the competent authority should prescribe general procedures for this collaboration

## ► Chapter 2. Risk management at the workplace level

The management of biological hazards enables organizations to effectively identify the hazards and assess the biological risks inherent in their activities, and to develop prevention and mitigation strategies to eliminate, substitute, control, or reduce the risk so far as is reasonably practicable. Where there are extremely serious risks all practicable measures should be employed to eliminate or, where this is not possible, to minimize the risk. The risk management system should be built upon the concept of continual improvement through a cycle of planning, implementing, reviewing and improving the processes and actions that an organization undertakes to meet its goals.<sup>20</sup>

Cooperation between management, workers and their representatives within the undertaking is an essential element of all measures related to the prevention of biological hazards. Workplace cooperation should cover all forms provided by Paragraph 12 of Recommendation No. 164, as appropriate, and should cover all aspects identified under Articles 19 and 20 of Convention No. 155.

### 2.1. Biological hazard identification and risk assessment

Exposure to biological hazards can occur in any work activities involving contact with humans or human-related products, animals or animal products and biological waste, plants and food.

#### ► Non-exhaustive list of biological hazards associated with work activities<sup>21</sup>

List of activities	Possible hazards and risks
Work in food production plants	<ul style="list-style-type: none"> <li>• allergies and other diseases caused by moulds/yeasts, bacteria and mites;</li> <li>• organic dusts of grain, milk powder or flour contaminated with biological agents;</li> <li>• toxins such as botulinus toxins or aflatoxins; and</li> <li>• antimicrobial-resistant pathogens</li> </ul>
Work in agriculture, forestry, horticulture, animal food and fodder production	<ul style="list-style-type: none"> <li>• bacteria, fungi, mites and viruses transmitted from animals, parasites and ticks;</li> <li>• respiratory problems due to microorganisms and mites in organic dusts of grain, milk powder, flour and spices;</li> <li>• specific allergic diseases, such as farmer's lung and bird breeder's lung;</li> <li>• diseases caused by specific risks, such as green tobacco sickness, monkey fever, bites, stings, venom and vector-borne diseases; and</li> <li>• antimicrobial-resistant pathogens</li> </ul>
Work in healthcare and community services	<ul style="list-style-type: none"> <li>• viral and bacterial infections, including but not limited to HIV, hepatitis or tuberculosis, as well as antimicrobial-resistant pathogens;</li> <li>• diseases and accidents caused by sharps and needlestick injuries;</li> <li>• direct contact with contaminated surfaces or persons; and</li> </ul>

<sup>20</sup> For more information, see ILO, *Guidelines on Occupational Safety and Health Management Systems*, 2001.

<sup>21</sup> Recommendation No. 194.

List of activities	Possible hazards and risks
	<ul style="list-style-type: none"> <li>• airborne transmission of viral bacteria and fungal pathogens as well as substances and structures produced by them.</li> </ul>
Work in laboratory	<ul style="list-style-type: none"> <li>• viral and bacterial infections, including but not limited to HIV, hepatitis or tuberculosis, as well as antimicrobial-resistant pathogens;</li> <li>• diseases and accidents caused by sharps and needlestick injuries;</li> <li>• direct contact with contaminated surfaces or persons;</li> <li>• airborne transmission of viral bacteria and fungal pathogens as well as substances and structures produced by them;</li> <li>• infections and allergies caused by handling microorganisms and cell cultures, especially of organic tissues; and</li> <li>• accidental spills.</li> </ul>
Work in metal-processing industry, wood-processing industry, mining industry	<ul style="list-style-type: none"> <li>• skin problems due to bacteria and bronchial asthma due to gram-negative bacteria and their endotoxins, moulds/yeasts in circulating fluids used in industrial processes such as grinding, fluids used in pulp factories, and metal- and stone-cutting fluids; and</li> <li>• bacteria and enzymes in manufacturing.</li> </ul>
Work in refuse-disposal plants, sewage purification installations	<ul style="list-style-type: none"> <li>• infections and allergies caused by organic components of biowastes, including bacteria and their fragments, fungi and their spores and mycotoxins, viruses and prions, parasites and vector-borne diseases;</li> <li>• airborne transmission of viral bacteria and fungal pathogens and the substances and structures produced by them;</li> <li>• antimicrobial-resistant pathogens;</li> <li>• infections caused by wounds due to contact with contaminated sharp objects;</li> <li>• respiratory diseases such as tuberculosis, COVID-19 and influenza; and</li> <li>• direct contact with contaminated objects or persons.</li> </ul>
Working areas with air conditioning systems and high humidity (for example, textile industry, print industry and paper production)	<ul style="list-style-type: none"> <li>• allergies and respiratory disorders due to moulds/yeasts, legionella.</li> </ul>
Work in archives, museums, libraries	<ul style="list-style-type: none"> <li>• moulds/yeasts and bacteria causing allergies and respiratory disorders; and</li> <li>• non-specific adverse health outcomes.</li> </ul>
Work in building and construction industry; processing of natural materials such as clay, straw, and reed; building redevelopment	<ul style="list-style-type: none"> <li>• airborne transmission of viral, bacteria and fungal pathogens and the substances and structures produced by them;</li> <li>• infections caused by wounds due to contact with contaminated sharp objects, such as HIV;</li> <li>• respiratory diseases such as tuberculosis, COVID-19 and influenza;</li> <li>• direct contact with contaminated objects;</li> <li>• moulds (allergenic, pathogenic, toxigenic), bacteria and fungi due to deterioration of building materials; and</li> <li>• exposure to animal waste, leptospirosis and Weil's disease.</li> </ul>

2.1.1. Hazard identification should consider the pathological mechanisms, modes of transmission (direct or indirect contact, aerosols, droplet spread, fomites, water, vectors, food, zoonotic) and routes of exposure (for example, inhalation, ingestion, dermal, percutaneous, mucous membranes, parenteral).

2.1.2. The identification of biological hazards at the workplace should also take into account:<sup>22</sup>

- (a) the situation or events or combination of circumstances that have the potential to give rise to injury or illness;
- (b) the nature of potential injury or illness relevant to the activity, product or service;
- (c) those likely to be contaminated or harmed, including but not limited to temporary workers, young workers, older workers, migrant workers and those with specific health susceptibility such as pregnant or breastfeeding workers, immunosuppressed workers and workers with predisposing pathologies); and
- (d) past injuries and illness, any tendency to develop allergic reactions, any incidents and early evidence of health effects through a sentinel health events approach.

2.1.3. Risk assessment is a process used to determine the level of risk of injury or illness associated with each identified hazard for the purpose of control. In determining the level of risk, special attention should be given to factors such as sex, age, disability,<sup>23</sup> ethnicity, and the health status and comorbidities of workers.

2.1.4. Carrying out a biological risk assessment involves five steps:<sup>24</sup>

- (1) the identification of biological hazards;
- (2) the identification of who might be harmed and how;
- (3) an evaluation of the biological risks, consisting of assessing the likelihood and the severity of harm and how to eliminate and if that is not possible how to control such risks;
- (4) recording the results of the biological risk assessment and setting priorities for improvement; and
- (5) reviewing and updating the biological risk assessment, as necessary.

2.1.5. The assessment of biological risks should categorize each hazard based on: its potential to cause immediate, short- and long-term harm (infection, allergy, toxicity, disease or accident); the severity of its potential harm; the reservoir of the agent; its stability in the environment; its possible aerosol generation or splatter; the mode of its transmission; its communicability within a population; the availability and effectiveness of preventive measures; the availability of effective control measures; the availability and effectiveness of medical treatments; whether or not a pathogen is rare, partially or fully eradicated to account for the risk of re-emergence.

2.1.6. Risk assessment should include other categories of risks generated or exacerbated by exposure to biological hazards.

2.1.7. The identification of workers who might be harmed when exposed to biological hazards should take into consideration: the health status of workers, including their medical history; vaccination

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<sup>22</sup> Based on ILO, *Code of Practice on Safety and Health in Agriculture*, MESH/2010/10, para. 4.2.2.

<sup>23</sup> Based on ILO, *Code of Practice on Safety and Health in Textiles, Clothing, Leather and Footwear*, para. 3.4.2.

<sup>24</sup> Based on ILO, *Code of Practice on Safety and Health in Agriculture*, para. 4.2.5; and ILO, *ILO Code of Practice on Safety and Health in Textiles, Clothing, Leather and Footwear*, section 3.4, para. 2.

status; antigen or antibody test results; baseline antibody titre information for particular agents of interest, when appropriate; the use and availability of prophylactic treatments; and any underlying conditions.

2.1.8. Methods and techniques for risk assessment should be selected based on a characterization of the hazards concerned and adapted to the actual conditions of work. Priorities for action should be determined based on the likelihood and severity of harm that the biological hazards can cause.<sup>25</sup>

## 2.2. Control measures

2.2.1 Preventive and protective measures should be implemented, in consultation with workers and their representatives, according to the following principles and in line with the hierarchy of controls:

- (a) In line with the [Hygiene \(Commerce and Offices\) Convention, 1964 \(No. 120\)](#), all premises used by workers, and the equipment of such premises, should be properly maintained and kept clean, and should have sufficient and suitable ventilation, natural or artificial or both, supplying fresh or purified air. A sufficient supply of wholesome drinking water or of some other wholesome drink shall be made available to workers. Sufficient and suitable washing facilities and sanitary conveniences shall be provided and properly maintained.
- (b) Biological containment: prevent and reduce exposure potentials and their consequences, and identify the chain of transmission, by using attenuated, substitute organisms or procedures that can inactivate the biological agent, resulting in reduced replicability, infectivity, transmissibility and virulence. Where the accidental release of biological agents could pose a significant risk to workers' health or the environment, a plan should be drawn up detailing the emergency actions to be taken to minimize these risks. Emergency plans are required only for higher-risk worksites.
- (c) Physical containment: provide additional protection by means of primary and secondary physical barriers that prevent the escape of biological agents from the containment area, including doors, biological safety cabinets, air-filtration systems, waste-water management systems and so on. Primary barriers minimize occupational exposure by limiting transmission. Secondary barriers provide supplementary containment, mainly to prevent the escape of biological agents when primary barriers fail.
- (d) Work restrictions: keep as low as possible the number of workers exposed or likely to be exposed; limit the workload and restrict work to as few worksites as possible, according to sector or type of activity, so that there are few risk areas.
- (e) Operational protection: minimize exposure by enforcing safe working techniques (for example, preventing aerosol generation, and applying good laboratory practices, among others).
- (f) Hazard minimization: carry out a combination of measures to reduce the consequences of exposure should it occur (for example, emergency procedures, contingency plans, health and medical surveillance or vaccinations to reduce the consequence of inadvertent exposure).

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<sup>25</sup> Examples of risk assessments, using a numerical weighting system to determine priorities for action, are given in Appendix I.

## **2.3. Risk communication**

2.3.1. Risk communication should be carried out in an open and transparent manner in order to convey credible information in ways that avoid misinterpretation. The information to be communicated should be understandable by the interested parties, including employers, workers and subcontractors.

2.3.2. Risk communication should use appropriate means and language at the literacy level of relevant workers to ensure good comprehension, and should be conducive to implementing an effective system for the management of risks, in consultation with workers and their representatives and with their fully-informed participation.

## ► Chapter 3. Workers' health surveillance

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3.1. Workers' health surveillance should be carried out with the central purpose of the primary prevention of occupational and work-related injuries, ill health and diseases, and under controlled conditions within an organized framework, in accordance with Convention No. 161, Recommendation No. 171 and the ILO's *Technical and ethical guidelines for workers' health surveillance*.

3.2. The surveillance of workers' health should be appropriate to the occupational risks posed by biological hazards in the enterprise and should combine in a suitable manner both individual and collective health assessments. The surveillance of workers' health should be accompanied by a number of safeguards concerning its purpose; its quality; the protection of workers' interests; and the collection, transmission, use and protection of health and medical data.

3.3. Such surveillance should include the active surveillance of workers' occupational health through direct medical examination that includes the collection of data on the signs and symptoms of health problems related to occupational risks.

3.4. The surveillance of workers' health in relation to biological hazards at work should involve no loss of earnings, be free of charge and take place as far as possible during working hours.

3.5. Workers' personal medical data should be collected in conformity with medical confidentiality. Workers' personal health data covered by medical confidentiality should be stored only by personnel bound by the rules of medical confidentiality. Such data should be maintained separately from all other health data. Access to medical files and data should be restricted to medical professionals.<sup>26</sup>

3.6. Measures should be taken, in accordance with national law and practice, to ensure adequate cooperation and coordination between occupational health services and, as appropriate, other bodies concerned with the provision of health services.

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<sup>26</sup> Based on ILO, *Technical and Ethical Guidelines for Workers' Health Surveillance*.

## ► Chapter 4. Information, instruction and training

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4.1. Information, instruction and training should be organized and provided for all workers to understand the potential exposure and health impacts of biological hazards at the workplace, including how they are transmitted, their symptoms, their treatment, how to prevent and control exposure and how to be informed about activities related to health promotion, where appropriate. Workers and their representatives should be kept up to date with any changes that may take place that could affect their exposure to biological hazards.

4.2 Employers should determine the requirements for each competency of the task to be performed in order to minimize risks from biological hazards, keeping in mind that the level of competency required will depend on the complexity of the situation or task.

4.3 Worker training should be provided in accordance with the guidance or standards prescribed by the competent authority with regard to biological hazards. Where no such guidance or standards exist, other national or internationally recognized standards should be applied, while always taking into account the specific needs of the particular workplace, including emergency procedures.

4.4 Where appropriate, a special training programme for migrant workers – and for other workers, as relevant – should be provided in their own language by the employer and supported by the competent authority.

4.5. Workers' safety and health delegates, workers' safety and health committees, and joint safety and health committees or, as appropriate, other workers' representatives should have the necessary resources and reasonable time during paid working hours to receive training on the prevention of and protection against biological hazards.

4.6. Training and information requirements and procedures should be kept under review. The review should include workers' representatives, where they exist, and the training programmes should be modified as necessary to ensure their relevance and effectiveness in relation to protection against biological hazards.

4.7. Records of the training and dates of training should be available for each worker undertaking training and records of the trainers/evaluators should be maintained, as prescribed by the competent authority. Where there are no such requirements, other national or internationally recognized procedures should be applied.

4.8. Training should be provided to all participants at no cost and should take place during working hours. If this is not possible, the timing and other arrangements should be agreed upon between the employer and workers' representatives.

## ► Chapter 5. Investigation of dangerous occurrences, occupational accidents and diseases

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5.1. Following the incidence of a dangerous occurrence, occupational accident or occupational disease due to biological hazards, an investigation of its origin and underlying causes should be organized and carried out to identify any failures in existing prevention and control measures against the biological risks at the workplace and the investigation should be documented.

5.2. The competent authority should arrange for investigations to be carried out by labour inspectorates, OSH services other than those set up by the company, or other authorized agencies. Representatives of the employers and of the workers of the undertaking should have the opportunity to accompany investigators, unless the latter consider, in the light of the general instructions of the competent authority, that this may be prejudicial to the performance of their duties. In all circumstances, they should be kept fully informed in a timely manner of the progress and findings of the investigation, in light of national conditions and practice.

5.3. The competent authority should hold inquiries (and publish reports on those inquiries) into cases of dangerous occurrences, occupational accidents and occupational diseases due to workplace biological hazards that appear to reflect serious situations in terms of the actual or potential risk to workers or the public.

5.4. Where the investigation is not entrusted to an institution authorized by the competent authority or to a government department that is responsible to the legislature, national laws or regulations should specify arrangements for the participation of the most representative organizations of employers and workers, as well as public authorities, in the planning of the investigation, and for the participation in the investigations of the representatives of the employers and of the workers affected.

5.5. The competent authority should require employers to report on the results of their investigations of dangerous occurrences, occupational accidents and occupational diseases due to workplace biological hazards and on the action taken to prevent a recurrence.

5.6. The employer should ensure that arrangements are in place at the undertaking for an immediate investigation of all reported dangerous occurrences, occupational accidents and occupational diseases due to biological hazards. The employer should ensure that a competent person, as specified by the competent authority, is identified within the undertaking to carry out such investigations, with the appropriate participation of workers and their representatives.

5.7. Where the employer lacks the necessary expertise within the undertaking to carry out such investigations, he or she should call upon the assistance of an external competent institution.

5.8. According to national laws and regulations, the result of such investigations should be communicated to the concerned workers, the workers' representatives and the safety and health committee, who should make appropriate recommendations. The results of investigations, in addition to any recommendations made by the safety and health committee, should be communicated to the employer and the competent authority for corrective action.

5.9. As a result of such investigations the employer should implement effective and efficient corrective action in order to avoid any repetition of similar dangerous occurrences, occupational accidents or occupational diseases due to biological hazards.

5.10. The employer should arrange for the site of an occupational accident or a dangerous occurrence to be left undisturbed before the start of the investigation, apart from any requirements for first aid or to prevent further risk to any other persons.

5.11. Where, for reasons of first aid or to prevent further risk to any other persons, it is necessary to disturb the site before the start of the investigation, the employer should record the site, so far as is practicable, including where necessary by taking photographs, making drawings or recording the identities of eyewitnesses prior to any intervention.

5.12. The employer should ensure that the investigations of dangerous occurrences, occupational accidents and occupational diseases should, as far as possible:

- (a) establish what happened;
- (b) determine the causes of what happened;
- (c) identify measures necessary to prevent a recurrence; and
- (d) devise a plan and time frame for implementation of these measures and a review process, with the participation of workers and their representatives.

5.13. Employers should promptly inform the competent authority of any dangerous occurrence or accident which may have resulted in the release of a biological agent and could cause severe human infection and diseases. The employer should ensure that the report is sent to the competent authority by the quickest practicable means, in accordance with the requirements of the competent authority.

5.14. The employer should make the results of investigations available to workers and their representatives with a view to preventing similar occurrences and so that they may assist the employer in the more effective implementation of the workplace OSH policy.

5.15. According to national laws and regulations, workers and their representatives should have the right, the facilities and the necessary time, without loss of pay, to request and participate in an investigation by the employer or the competent authority of possible risks resulting from the use of biological agents at work. This should include the assessment of risks arising from the use of biological agents and investigations of dangerous occurrences, occupational accidents and occupational diseases.

5.16. Workers and their representatives should cooperate with management in the investigation of any exposures, dangerous occurrences and accidents at the workplace.

5.17. Records of occupational accidents, occupational diseases and, as appropriate, dangerous occurrences should include:

- (a) the causal biological agents and hazards;
- (b) the source and location of the exposure;
- (c) the mode(s) of spread or transmission of the biological or toxic agent;
- (d) sex- and age-disaggregated information on the workers who might have been exposed;
- (e) safety and health problems arising from exposure to biological hazards in the work environment.
- (f) measures for dealing with dangerous occurrences, occupational accidents and diseases and the action taken in order to prevent a recurrence; and
- (g) effectiveness of the measures taken to secure satisfactory levels of safety and health.

## ► Chapter 6. National system for recording and notification of occupational accidents and diseases

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6.1. The competent authority should establish a national system of information on occupational accidents, injuries and diseases. Where possible, the competent authority should promote digital notification systems in order to reduce the administrative burden. In the establishment, review and application of systems for the reporting, recording and notification of occupational accidents, occupational diseases, and, as appropriate, dangerous occurrences and suspected cases of occupational diseases, the competent authority should take account of Convention No. 121, the Protocol of 2002 to the Occupational Safety and Health Convention, 1981,<sup>27</sup> Recommendation No. 194, the ILO List of Occupational Diseases<sup>28</sup> and the ILO code of practice on the recording and notification of occupational accidents and diseases.<sup>29</sup>

6.2. The reporting, recording, notification and investigation of occupational accidents, occupational diseases and, as appropriate, dangerous occurrences and suspected cases of occupational diseases are essential for the prevention of exposure to biological hazards and should be undertaken to:

- (a) provide reliable sex- and age-disaggregated information on occupational accidents, occupational diseases and, as appropriate, dangerous occurrences and suspected cases of occupational diseases at the enterprise, sectoral and national levels;
- (b) identify safety and health problems for both women and men and young workers arising from exposure to biological agents at the workplace;
- (c) define priorities for taking action;
- (d) develop effective and inclusive methods for dealing with occupational accidents and diseases;
- (e) identify possible gaps in OSH legislation and regulations;
- (f) monitor the effectiveness of any measures taken to secure satisfactory levels of safety and health; and
- (g) monitor improvements over time and reveal new developments and issues.

6.3. In line with international and national regulations and procedures and when required, exposure to specific biological hazards and their effects on health should be notified to relevant statutory agencies.

6.4. Epidemiological surveillance and record-keeping (especially of accidents involving biological hazards and agents), for example with respect to confirmed cases, suspected cases and close contacts, among others, should always be in place. The capacity of epidemiologic surveillance should be increased through networking or dedicated websites for collecting and analysing accidents, injuries, infections or adverse events experienced by workers in research and development laboratories.

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<sup>27</sup> ILO, *Protocol of 2002 to the Occupational Safety and Health Convention*, 1981.

<sup>28</sup> ILO, *ILO List of Occupational Diseases (Revised 2010)*, 2010.

<sup>29</sup> ILO, *Recording and Notification of Occupational Accidents and Diseases: An ILO Code of Practice*, 1996.

## ► Chapter 7. Preparedness and response to emergencies

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7.1. In recent decades, the world of work has witnessed a wide range of emergencies related to biological hazards, in particular outbreaks of infectious diseases, such as severe acute respiratory syndrome (SARS), H1N1 influenza, Ebola virus disease, Zika virus disease and COVID-19. Moreover, pandemics can lead to secondary incidents and emergencies in workplaces, as evidenced by the microbial contamination of workplace water networks and Legionnaire's disease outbreaks during reopenings after COVID-19 lockdowns.<sup>30, 31</sup> Climate change, rapid urbanization and changing land-use patterns may increase the risk of biological hazards and infectious disease emergence in the world of work. Temperature rise has increased the transmission and spread of vector-borne diseases such as Lyme disease, dengue, Chikungunya virus disease and Zika virus disease, among others, putting outdoor workers across numerous sectors at heightened risk.<sup>32, 33, 34, 35, 36</sup>

7.2. Situations of epidemics, outbreaks and pandemics affect all sectors of society, including work and workplaces. Public health authorities should define policies and actions to be taken, in consultation with the most representative employers' and workers' organizations. These jointly developed policies and actions should then be referred to when employers develop, implement and evaluate outbreak response and management plans at the workplace. It would be appropriate to establish mechanisms of coordination and information with public health authorities in order to be able to manage any possible biological risks that may arise.

7.3. Collaboration between public health, water and waste authorities, occupational health, veterinary health and other partners is key to contingency preparedness and response to emergencies involving biological hazards, including outbreaks, epidemics and pandemics, as well as to establishing an early warning system.

7.4. Occupational health service providers need to be trained in potential biological hazards in both workplaces and communities, and to be supported by laboratory or clinically-based surveillance, rapid public health response systems and real-time communication for expert advice to prepare for and manage outbreaks.

7.5. National OSH policies and programmes should include measures to be taken at the workplace and in the working environment in case of outbreaks of biological agent pandemics or epidemics, taking into account the epidemiological specificities of the geographical situation, the branches of activities and the specificities of workers. Outbreak preparedness and response at the workplace should be aligned and coordinated with public health preparedness and response.

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<sup>30</sup> Chartered Institute of Environmental Health, "[Legionnaires' Disease: Lockdown Risks and Reopening Safely](#)".

<sup>31</sup> Osvalda De Giglio et al., "[Impact of Lockdown on the Microbiological Status of the Hospital Water Network during COVID-19 Pandemic](#)", *Environmental Research*, 191, 2020.

<sup>32</sup> World Health Organization (WHO), "[Infectious Diseases in a Changing Climate: Information for Public Health Officials in the WHO European Region](#)", 2013.

<sup>33</sup> European Centre for Disease Prevention and Control (ECDC) Meeting Report, "[Environmental Change and Infectious Disease Workshop, Meeting Report, Stockholm, 29-30 March 2007](#)".

<sup>34</sup> United States Environmental Protection Agency, "[Climate Change Indicators: Lyme Disease](#)", 2021.

<sup>35</sup> Elisabet Lindgren and Thomas G.T. Jaenson, "[Lyme Borreliosis in Europe: Influences of Climate and Climate Change, Epidemiology, Ecology and Adaptation Measures](#)" (WHO, 2006).

<sup>36</sup> Shlomit Paz, "[Climate Change Impacts on Vector-Borne Diseases in Europe: Risks, Predictions and Actions](#)", *The Lancet Regional Health - Europe*, 1, 2021.

7.6. When developing, implementing and evaluating outbreak response and management plans at the workplace, the competent authority should consult and involve the most representative employers' and workers' organizations.<sup>37</sup>

7.7. Emergency preparedness and response arrangements should be established, periodically updated and maintained in workplaces. These arrangements should identify incidents, emergencies and outbreaks due to biological hazards that could affect workplaces. Arrangements should be made according to the location and environment of the workplace, as well as the size and nature of its activities.

7.8. In coordination with public health and other competent authorities, employers should develop an emergency action or response plan that considers the nature of incidents, emergencies and outbreaks, the key responders and their responsibilities, and should:

- (a) ensure that the necessary information, internal communication and coordination are provided to protect all workers and other interested parties in the event of an incident, emergency or outbreak;
- (b) provide information to and communication with the relevant competent authorities, as well as the community and emergency response services; and
- (c) provide relevant information, instruction and training to all workers at the workplace and any person who may be involved in an emergency within the premises of the undertaking, at all levels and according to their competence, including regular exercises in emergency prevention, preparedness and response procedures.

7.9. Emergency preparedness and response arrangements should be established by the employer in cooperation with other employers, workers and their representatives, external emergency services and other bodies, where applicable. The emergency response plan should be developed locally for each workplace and should be sufficiently comprehensive to deal with all types of emergencies.

7.10. The steps to prepare for and manage emergencies in workplaces are the following:

- (a) the identification of potential situations in which biological hazards may lead to an emergency and the action to be taken;
- (b) the provision of mechanisms for the early detection of cases of infectious or non-infectious diseases caused by biohazards;
- (c) rapid reporting of cases through public health and occupational disease reporting systems through consistent and effective communication;
- (d) an organization with a clear chain of command should be established to ensure that workers have no doubt about who has the authority to make decisions. Emergency response teams should be established and responsible individuals should be selected to coordinate their work;
- (e) obtaining expert advice and assistance, as necessary;
- (f) implementing a locally and nationally coordinated support system with public health authorities and, where appropriate, with external emergency services; and

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<sup>37</sup> ILO, *Anticipate, Prepare and Respond to Crises: Invest Now in Resilient OSH Systems*, 2021, which details the basis of and steps for elaborating and implementing outbreak preparedness and response at the workplace. The World Health Organization has developed a number of guidelines to help Member States develop integrated strategies for outbreak preparedness and response for specific agents, including SARS-CoV-2-2019, [Ebola virus](#) and [Influenza virus](#).

- (g) collaborating on and benefiting from research into methods of prevention, treatment and hazard containment of biological hazards.

7.11. Biological agent outbreak preparedness and response plans should be conducted within the framework of analysis focusing on gender considerations, equity and inclusion, in line with existing human rights frameworks.

## ► Chapter 8. Inspection and compliance with legal provisions

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8.1. The competent authority should ensure adequate control and supervision, in particular by establishing the effective enforcement of national laws and regulations concerning biological hazards through an appropriate system of labour inspection.

8.2. In accordance with the provisions of the [Labour Inspection Convention, 1947 \(No. 81\)](#), and the [Labour Inspection \(Agriculture\) Convention, 1969 \(No. 129\)](#), the functions of labour inspection should be:

- (a) to secure the enforcement of, among other things, the legal provisions relating to the protection of workers against biological hazards, insofar as such provisions are enforceable by labour inspectors;
- (b) to supply technical information and advice to employers and workers concerning the most effective means of complying with the legal provisions; and
- (c) to bring to the notice of the competent authority any defects or abuses that are not specifically covered by existing legal provisions.

8.3. Labour inspectors and officials of other competent authorities, as appropriate, should undergo specific training with a view to identifying and addressing biological risks at the workplace.

8.4. Labour inspectors should be empowered with those faculties stated in Convention No. 81<sup>38</sup> and Convention No. 129.<sup>39</sup> In particular, labour inspectors should, in a manner prescribed by national laws and regulations:

- (a) have the right to enter freely and without previous notice at any hour of the day or night any workplace liable to inspection;
- (b) have the authority to investigate occupational accidents and diseases due to workplace biological hazards;
- (c) have the authority to carry out any examination, test or enquiry which they may consider necessary in order to satisfy themselves that legal provisions regarding biological hazards are being strictly observed;
- (d) take or remove for purposes of analysis samples of materials and substances used or handled, subject to the employer or his representative being notified of any samples or substances taken or removed for such purpose;
- (e) have the authority to take steps with a view to remedying any defects observed in a plant, layout or working methods which they may have reasonable cause to believe constitute a threat to the health and/or safety of the workers, including measures with immediate executory force in the event of imminent danger; and
- (f) periodically determine whether an existing OSH management system or OSH elements, including management of biological hazards, are in place, adequate and effective.

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<sup>38</sup> Art. 12.

<sup>39</sup> Art. 14.

8.5. The system of enforcement should provide for corrective measures and adequate penalties for violations of national laws and regulations concerning biological hazards.

8.6. The competent authority should make appropriate arrangements to promote effective cooperation between the inspection services and other public or private services engaged in similar activities, as well as collaboration between these institutions and employers and workers and their representatives on the control of biological hazards at the workplace.

8.7. Compliance with sanitary legal provisions: Sanitary conditions may be a source of contamination if they are not properly addressed at the workplace. The consequences of this contamination may also be a source of biological hazards not related to the nature of the activity but arising from non-hygienic conditions. Thus, proper hygienic conditions should be maintained at the workplace, including the provision of a safe water supply; the proper disposal of human and animal waste; the sanitation of buildings, workspaces and housing; and the disinfection of potential sources (for example by biocides, ultraviolet light).

## ► Appendix I

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### Risk assessments using a numerical weighting system to determine priorities for action

There are many established methods and techniques for carrying out risk assessments. Some of them use a numerical weighting system to determine priorities for action. For each hazard identified, a numerical value is assigned to the likelihood of the hazard causing harm, as well as to the severity of the consequences. This can be expressed on a rising scale from low to high, as follows:

#### 1. Likelihood

- (1) Rare: has rarely if ever happened.
- (2) Unlikely: is possible but is not expected to happen.
- (3) Possible: could be expected to happen once a year.
- (4) Likely: will probably occur but is not persistent.
- (5) Almost certain: occurs regularly.

#### 2. Severity of consequences

- (1) Insignificant: no injury or ill health.
- (2) Minor: short-term impact.
- (3) Moderate: semi-permanent injury or ill health.
- (4) Major: disabling injury or ill health.
- (5) Catastrophic: potentially fatal.

The level of risk can be represented in the following manner:

Risk = likelihood x severity

By determining the level of risk associated with each hazard identified in the working environment, employers and workers and their representatives can identify areas for priority action. For example, a risk that rarely arises (1) and has insignificant consequences (1) would have the lowest priority (1) (that is,  $1 \times 1 = 1$ ), whereas a hazardous event that occurs regularly (5) and has potentially fatal consequences (5) would have the highest priority for action (25) (that is,  $5 \times 5 = 25$ ). The higher the level of risk, the more important it is to apply controls that eliminate, reduce or minimize exposure to the hazard.

A sample matrix that illustrates this numerical approach to the determination of level of risk is found below.

Likelihood/severity	Almost certain (5)	Likely (4)	Moderate (3)	Unlikely (2)	Rare (1)
Catastrophic (5)	25	20	15	10	5
Major (4)	20	16	12	8	4
Moderate (3)	15	12	9	6	3
Minor (2)	10	8	6	4	2
Insignificant (1)	5	4	3	2	1

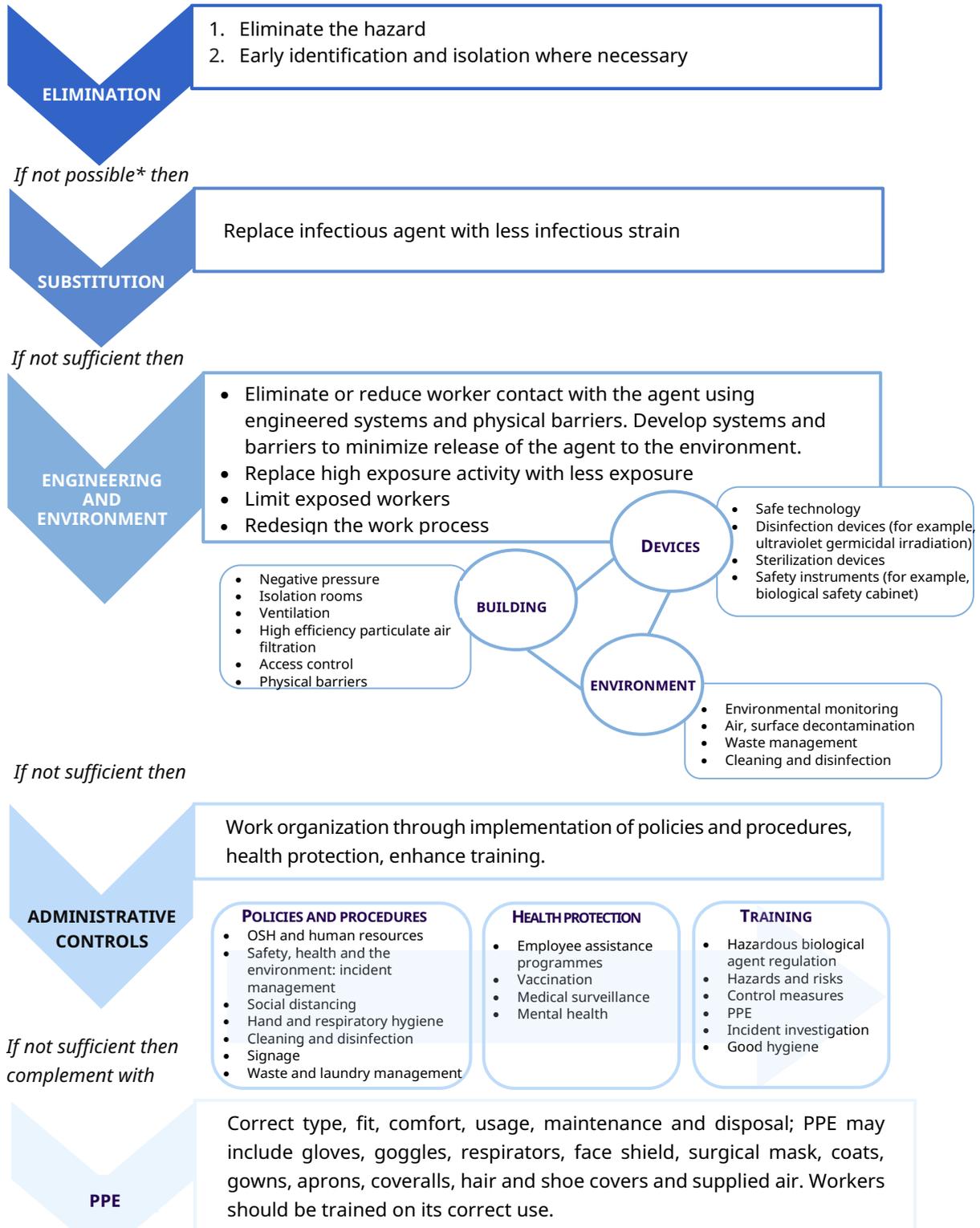
Priority areas of action can also be determined by evaluating particular hazards at the workplace against the following priority action table set out below. Two questions need to be considered for each hazard: “How often is a person exposed to the hazard?” and “What is the likely outcome?” In the following table, the likelihood of an event occurring is expressed as daily, weekly, monthly or rarely, while the severity of consequences varies from the most severe (death or permanent disability) to the least severe (minor injury requiring only first aid). The areas on the matrix with the darkest shading represent the highest priorities for action.

What is the likely outcome	How often am I, or other people exposed to the hazard?			
	Daily	Weekly	Monthly	Rarely
Death or permanent disability	High	High	High	High
Temporary disability	High	High	Moderate	Moderate
Minor injury (first aid)	High	Moderate	Low	Low

Those carrying out risk assessments may find it useful to record the results of the assessment in a narrative form, specifying: (a) the activity or workplace being assessed; (b) the main hazards and those at risk; (c) the level of risk; and (d) the measures to be put in place to eliminate, reduce or minimize exposure.

## ► Appendix II

### Applying the hierarchy of controls



\* Sometimes it is possible but not feasible.

## ► Appendix III

### Main ILO and WHO references for the management of biological hazards in specific sectors

#### Relevant ILO international labour standards, Protocols and Recommendations included in the text

C081 – Labour Inspection Convention, 1947 (No. 81)

R081 – Labour Inspection Recommendation, 1947 (No. 81)

C120 – Hygiene (Commerce and Offices) Convention, 1964 (No. 120)

R120 – Hygiene (Commerce and Offices) Recommendation, 1964 (No. 120)

C155 – Occupational Safety and Health Convention, 1981 (No. 155)

P155 – Protocol of 2002 to the Occupational Safety and Health Convention, 1981

R164 – Occupational Safety and Health Recommendation, 1981 (No. 164)

C161 – Occupational Health Services Convention, 1985 (No. 161)

R171 – Occupational Health Services Recommendation, 1985 (No. 171)

C187 – Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)

R197 – Promotional Framework for Occupational Safety and Health Recommendation, 2006 (No. 197)

R194 – List of Occupational Diseases Recommendation, 2002 (No. 194)

R003 – Anthrax Prevention Recommendation, 1919 (No. 3)

C121 – Employment Injury Benefits Convention, 1964 [Schedule I amended in 1980] (No. 121)

R121 – Employment Injury Benefits Recommendation, 1964 (No. 121)

#### ILO codes of practice

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

*ILO code of practice on Safety and Health in Construction (2022)*

*ILO code of practice on Safety and Health in Textiles, Clothing, Leather and Footwear (2022)*

*ILO code of practice on Recording and Notification of Occupational Injuries and Diseases (1996)*

*ILO code of practice on Safety and Health in Agriculture (2011)*

*Technical and ethical guidelines for workers' health surveillance (1998)*

#### ILO, WHO and FAO publications

Sector	Organization	Publication
Food industry	ILO	<i>ILO Working Paper on Occupational Safety and Health in the Food and Drink Industries (1993)</i>
Food industry	FAO and WHO	<i>Report of Joint FAO-WHO Consultation on Risk Management and Food Safety (1997)</i>
Health	WHO and ILO	<i>Caring for Those who Care: Guide for the Development and Implementation of Occupational Health and Safety Programmes for Health Workers (2022)</i>
Laboratory	WHO	<i>Laboratory Biosafety Manual, Third Edition (2004)</i>