

WORKSHOP TO PRESENT THE FINDINGS OF THE EU-OSHA PROJECT ON THE PREVENTION OF WORK- RELATED DISEASES DUE TO BIOLOGICAL AGENTS

1.1 Introduction

Between 2015 and 2017, the European Agency for Safety and Health at Work (EU-OSHA) carried out a project to address the lack of knowledge and awareness of exposures to biological agents in the workplace and the health problems related to such exposures, as well as the lack of a systematic approach to prevention in terms of these risk factors at work. The aims of the project were to identify professions at risk of exposure, especially those in which the unintentional use of biological agents is likely; to increase the availability of information on related health problems, including infectious diseases, acute toxic effects and allergies; and to support efforts to prioritise and structure prevention.

The preliminary findings of the project were presented and discussed at a workshop on 10 October 2017 in Amsterdam, the Netherlands. The findings included the results of a literature review and the exploration of a selection of monitoring systems. Information on the policies in place had been collected through expert interviews and focus groups with workplace practitioners in five Member States. Five selected sectors/occupations were addressed in more depth: (1) animal-related occupations, (2) waste and wastewater treatment, (3) healthcare, (4) arable farming and (5) occupations that involve travelling for work or contacts with travellers).

The purpose of the workshop was to present the main findings of the project and to enable discussion among relevant experts and stakeholders from individual Member States and from the EU on their experiences and on what should or could be done at both the European and the national levels to prevent work-related diseases (WRDs) and ensure better and more systematic prevention of the risks associated with exposure to biological agents in the workplace.

In total, 37 people attended the workshop (from Austria, Belgium, Bulgaria, Croatia, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Portugal, Romania, Slovenia and the United Kingdom). The group included national experts, who were nominated by the Agency's national focal points, with good knowledge of the risks associated with exposure to biological agents in the workplace, the policies in place for workplace prevention, and the development and implementation of policies at the national level. The group also included a representative of the European Commission and the team of researchers who prepared, lead and summarised presentations and discussions (see the list of participants). The participants represented various types of organisations, namely governments/ministries (8 participants), government/public service bodies (6), research institutes (16), EU institutions (3), labour inspectorates (2), a medical institute (1) and a register of occupational diseases (ODs) (1).

The workshop consisted of two parts:

- The morning session, made up of six presentations, included an introduction, a presentation by a representative of the European Commission, a presentation of the preliminary project results and presentations on three national examples (on a national policy framework on biological agents (Germany), a national monitoring approach addressing emerging diseases (France) and a national prevention policy approach in a sector with particular challenges with regard to risks associated with biological agents (Finland)).
- The afternoon session provided the opportunity for the participants to discuss the preliminary results of the research project in four discussion groups. This was followed by a plenary discussion, during which the output from the different discussion groups was also summarised. The draft final report had been sent to participants before the workshop, together with a draft list of questions for the afternoon discussions.

2 Presentations

Below is a summary of each presentation, as well as a description of the discussion that followed each presentation. The biographies of the speakers are available in a separate document.

2.1.1 Welcome and short overview of the project — Elke Schneider, Senior Project Manager, Prevention and Research Unit, EU-OSHA

Elke Schneider introduced the scope and activities of EU-OSHA, and the rationale for commissioning the research. The project is part of a broader activity on WRDs and is dedicated to a group of diseases for which little systematically reviewed information exists. It aims to address one of the three priorities identified in the EU Strategic Framework on Safety and Health at Work 2014-2020¹: to improve the prevention of WRDs. The background and objectives of the project were explained. A total of 320,000 workers die every year worldwide as a result of communicable diseases caused by biological agents — 5,000 of these fatalities are in the EU². At least 15% of all new cases of cancer worldwide are caused by viruses, bacteria or parasites (for example hepatitis B)³ and a considerable number of workers are exposed (for example in France (in 2003), 2.6 million workers (15%) were exposed to biological agents, most of which in healthcare/social work (> 50% workers are exposed in this sector), agriculture (33%), food (31%), domestic work (27%) and research and development (24%)). Waste management and healthcare are among the sectors that are expanding the most in the EU.

The project should complement and update existing EU-OSHA research on, for example, emerging biological risks⁴, pandemics⁵, antibiotic-resistant microorganisms, health and safety in laboratories, green jobs⁶ and the management of legionella at work⁷, and feed into the ongoing revision of Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (seventh individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

The results will serve as input to allow EU-OSHA to improve knowledge and increase awareness of exposures to biological agents and the related health problems and will contribute to the design of a systematic approach to the prevention of these risk factors in the workplace.

The overall objectives of this project were to:

- raise awareness of the issue of exposure to biological agents in exposed professions, especially those in which the unintentional use of biological agents, referenced as unintentional activity in the Biological Agents Directive, is likely;
- increase information on health problems related to exposure to biological agents;
- support efforts to prioritise and structure the prevention of work-related health problems linked to biological agents;
- feed into European and national workshops on the topics covered.

Furthermore, beneficiaries and intermediaries of the project were mentioned. The beneficiaries include policy-makers at national and EU levels, including social partners; legislators; researchers; actors in OD recognition and statistical data collection (for example national social security organisations); and actors

¹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions on an EU Strategic Framework on Health and Safety at Work 2014-2020, COM (2014) 332 final (available at <http://ec.europa.eu/social/main.jsp?catId=151>).

² Driscoll, T., & al. 'Review of estimates of the global burden of injury and illness due to occupational exposures', American Journal of Industrial Medicine, 2005

³ Approximately 15% of cancers diagnosed in 2012 were attributed to carcinogenic infections, including *Helicobacter pylori*, Human papillomavirus (HPV), Hepatitis B virus, Hepatitis C virus, and Epstein-Barr virus, Plummer M, de Martel C, Vignat J, Ferlay J, Bray F, Franceschi S. Global burden of cancers attributable to infections in 2012: a synthetic analysis. *Lancet Glob Health*. 2016 Sep;4(9):e609-16. doi: 10.1016/S2214-109X(16)30143-7..

⁴ <https://osha.europa.eu/en/tools-and-publications/publications/reports/7606488/view>

⁵ https://osha.europa.eu/en/tools-and-publications/publications/literature_reviews/lit_review_biological-agents/view

⁶ <https://osha.europa.eu/en/emerging-risks/green-jobs>

⁷ https://osha.europa.eu/en/tools-and-publications/publications/literature_reviews/legionella-policy-overview.pdf/view

at enterprise level (for example managers, occupational physicians and safety engineers, health and safety representatives, and trade union representatives). Intermediaries include those involved in setting up company policies; sectoral organisations; and policy-makers in other related areas, for example at sectoral level, or in employment, public health and environmental policies. Many of these may act as intermediaries for other groups while benefiting from the information.

The aim of the workshop was to discuss the preliminary results of the project and to share information across the Member States about how policies are implemented, and to provide feedback on which experiences should be included and addressed in the current project.

2.1.2 Communication from the Commission: Safer and Healthier Work for All — Modernisation of the EU Occupational Safety and Health Legislation and Policy

Valeria d'Agostini presented the results of an evaluation of EU occupational safety and health (OSH) legislation and policy and proposals for amending the current Biological Agents Directive⁸.

The 'Safer and Healthier Work for All' initiative was launched in January 2017 to modernise legislation and policy. The EU OSH acquis was evaluated from 2014 to 2016, and it was concluded that:

- the burden of occupational cancer remains high;
- coverage of some groups of workers could be improved;
- some provisions are outdated and/or could be simplified;
- businesses, especially small and medium-sized enterprises (SMEs), need support to better apply OSH rules;
- there is a need to strengthen inspection and monitoring.

To overcome the abovementioned challenges, three priority areas were identified:

1. stepping up the fight against occupational cancer and exposure to chemicals;
2. helping businesses, in particular microenterprises and SMEs, comply with OSH rules;
3. cooperating with Member States and social partners to remove or update outdated rules in several directives and to refocus efforts to ensure better and broader protection, compliance and enforcement on the ground; a 2-year programme has been set out in close cooperation with the government representatives and social partners of the Advisory Committee for Safety and Health at Work, and one of the directives identified to be in need of updating is the Biological Agents Directive.

On 5 July 2017, the first meeting of an expert group dedicated to discussing potential changes to Directive 2000/54/EC (Biological Agents Directive) took place in Luxembourg. At this meeting, experts concluded that:

- Annex III of the directive needs to be updated. Annex III provides a list of biological agents (bacteria, viruses, parasites), and their classification is mainly based on the risk of infection and the potential to prevent health outcomes. The first step would be to review this list based on scientific progress, add new agents to the list and revise the taxonomy.
- Annex V needs a technical update. Annex V provides indications regarding containment measures and containment levels.
- Some experts thought that Annex I and Annex VI should be reviewed. Annex I provides an indicative list of activities (sectors) with risk of exposure to biological agents. Annex VI provides containment measures for industrial processes.
- SMEs need better support to implement and comply with OSH rules.

A workshop participant asked about the differences between the lists of biological agents used in different countries, and whether or not this issue has been considered. For example, the lists of biological agents in Austria and Germany are more extensive than the list in Directive 2000/54/EC. Germany also includes risk group 1 which is not considered at EU level. The reply to the question was

⁸ Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (seventh individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

that the issue was taken into account during the expert group meetings at which national approaches, experiences and procedures were shared.

2.1.3 Highlights of the review on specific work-related diseases due to biological agents

Suzanne Spaan and Nicole van Kesteren from the Netherlands Organisation for Applied Scientific Research (TNO) presented selected results of the project.

The work presented had been commissioned by EU-OSHA to a consortium, and the project had been carried out by the lead organisation, TNO (the Netherlands), in collaboration with the Netherlands Expertise Centre for Occupational Respiratory Disorders, the Finnish Institute of Occupational Health FIOH, Aarhus University (Denmark), the German Federal Institute for Occupational Safety and Health BAuA and the French Agency for Food, Environmental and Occupational Health & Safety Anses.

The results were gathered by means of a scientific literature review (literature from 2010 onwards), a questionnaire survey, the extraction and evaluation of data from selected monitoring systems, semi-structured interviews with experts and focus groups with workplace intermediaries. The results include information on emerging risks and monitoring systems, and information on prevention programmes and other policy measures regarding biological agents. Apart from living microorganisms, substances that originate from microorganisms such as endotoxins were included in the literature review, using a wider definition of biological agents than the one used in the EU directive. Differences between countries were addressed, as were the converging and diverging views of different stakeholders. Sectors/occupations that were identified as 'priority sectors' included animal-related occupations, waste treatment, healthcare and arable farming, and occupations that include travelling for work or contacts with travellers. Animal-related occupations and those that include travelling or contacts with travellers encompass a wide range of occupations associated with exposure to a diverse range of agents'.

The information from the literature review was contrasted with information from the expert interviews and discussions with practitioners. The review confirmed some known facts, but also allowed the identification of emerging issues, which were highlighted for the afternoon discussions.

For some occupations, there are clearly identifiable and known associations between the occupation and diseases resulting from biological agents (not including allergens). These include the risk of blood-borne and other infections for healthcare workers; the risk of tick-borne related diseases for forestry workers; the risk of zoonoses in workers in the agricultural industry and occupations that involve the intentional or inadvertent handling of animals; the risk of legionella infection for workers maintaining air conditioning systems; and the risk of sexually transmitted infections in sex workers. For several occupations, the risks are less clear, for example for workers in aquaculture, bone button makers, border guards, fertiliser workers and outdoor game managers. Travelling, especially outside Europe, is generally assumed to increase the geographical spread of diseases not commonly encountered in Europe. Moreover, the migration of immigrants/refugees to Europe may also introduce diseases not commonly found in Europe.

As regards allergenic agents, the sectors and occupations that have a clear additional risk are the agricultural and fisheries sector, the food industry, wood-working and the metal industry, and occupations in waste and wastewater treatment. Apart from a general appreciation of the level of knowledge on the relationship between exposures and ill health, the researchers gave an overview of typical exposures and diseases that occur in the five sectors listed above, namely healthcare, animal-related occupations, waste treatment, arable farming and occupations that involve travelling or contacts with travellers.

Limited information was found regarding emerging risks; however, livestock handling, and global epidemics were mentioned in the literature review.

Issues common to several sectors were also identified. Examples include exposure to organic dust, (multiple) antibiotic resistance and the risk of infection following accidents with sharp objects. Causal links between exposures and the levels of risk occurring in different sectors were identified. The authors of the review called these 'sector-transcending issues'. For example, the use of antibiotics in farming may lead to treatment-related problems in the healthcare sector. Consequently, one recommendation that emerged from the focus groups was to encourage farmers to report any antibiotics they use for

animals when they seek medical treatment, so that the resistance to antibiotics they have potentially acquired at work may be considered early in the treatment of their disease.

▪ **Vulnerable workers**

One of the objectives of the project was to identify vulnerable workers for whom specific measures should be taken: two groups that emerged as vulnerable across all sectors were trainees and workers in their first job. Other groups include pregnant women; people with pre-existing diseases, such as lung diseases, diabetes (because of increased risk of infections), allergies and asthma; people with (other) chronic diseases; people treated with immunosuppressants; cleaning and maintenance workers; and temporary and undocumented workers, or foreign workers.

The healthcare sector is well regulated: there is a high level of training among healthcare workers. However, in the homecare sector, workers are less aware of risks (than, for example, nurses in a hospital). In addition, homecare workers might carry out tasks for which they are not trained, on demand of the patient. Healthcare workers who are working abroad may be exposed to additional risks, as the Ebola crisis has proven.

Maintenance workers carry out activities that may involve a high risk of exposure and are, on average, relatively unaware of risks and poorly informed regarding them.

A vulnerable group identified in the Netherlands for example comprises the many temporary workers in the waste treatment sector. It has been reported that the companies hiring these workers do not consider themselves responsible for providing appropriate vaccination programmes and information, and the companies that supply them (for example employment agencies) do not always provide these either.

▪ **Issues relevant to small and medium-sized enterprises**

Another issue covered was the capacity of SMEs to deal with risks related to exposure to biological agents. Although the awareness of risks from biological agents was generally assessed as low among all enterprises, it emerged from the interviews with experts and workplace practitioners that awareness is particularly low among SMEs, of which there are many in, for instance, the agricultural sector (both arable farming and livestock farming). SMEs are generally not aware of risks from biological agents, are often more difficult to reach by campaigns and often have fewer (financial) means to implement control measures.

However, examples of successful campaigning were identified: one example from Denmark involved the training and free trial of respiratory and other personal protective equipment (PPE) for farmers, delivered by specialised preventive services that supported farmers in carrying out risk assessments and in setting prevention measures to reduce the risk of exposure to, for example, organic dust. Such an example was also presented by a Finnish expert during the workshop.

▪ **Emerging issues**

The review also identified several emerging issues involving, for example, multidrug-resistant bacteria and epidemics of zoonosis. Potential re-emerging diseases in the healthcare and agricultural sectors are Q-fever, tuberculosis and influenza. In the healthcare sector, the intermediaries considered agents with antibiotic resistance, MRSA and infectious diseases transmitted through blood-borne pathogens highly important.

The increase in travelling, especially outside Europe, may increase the geographical spread of diseases not commonly encountered in Europe, such as Rift Valley fever, yellow fever, malaria, dengue and chikungunya viruses, and Crimean-Congo haemorrhagic fever. Moreover, the migration of immigrants/refugees to Europe may also introduce diseases not commonly found in Europe and may put those who work with immigrants at risk.

The expected increase in green jobs may result in an increase in the prevalence of sensitisation to biomass-related allergens, an increase in disease rates and the occurrence of new WRDs. Furthermore, the increased industrialisation of intensified agriculture and livestock farming, and the increased separation of household waste may lead to changes in exposure patterns in the farming and waste management sectors. Exposure to a combination of biological agents was another issue mentioned in

relation to agriculture and waste management; such exposure may enhance the risk of developing, for instance, respiratory diseases.

However, no system is available at the national or international level that enables the various stakeholders to respond quickly when an emerging risk is first identified, with a few exceptions linked to public health alerts and epidemics. Regarding bird flu, there has been a swift response and implementation of containment measures (e. g. livestock kept in-house), so despite the fact there might not be an actual alert system there is nevertheless capacity to respond quickly. WHO has developed an influenza preparedness plan (replaced the influenza pandemic plan). This plan is implemented at national level, Germany has its own influenza pandemic plan. These plans can provide the base for pandemic plans for other emerging health issues as well.

▪ **Monitoring systems**

The review included the extraction and comparative review of data from different monitoring systems in five Member States. Different types of registration systems and sentinel systems, with different types of reporting entities, for example occupational physicians or general practitioners, were considered. What emerged from the comparison of data from these monitoring systems is that the results differ with respect to which diseases and what type of information are registered; the level of detail, for example on exposure or the circumstances of exposure; and who carries out the process of registering the information. These differences make it difficult or even impossible to analyse diseases due to biological agents at the European level and are assumed to hinder cooperation and/or knowledge exchange among countries. It is also unclear to what extent the outputs of the monitoring systems are used to develop targeted prevention strategies to manage these risks in the workplace, and whether or not these outputs are even suitable for this purpose, especially as data are scarce.

Examples of diseases that emerged from the monitoring systems in several countries are farmer's lung and blood-borne infections such as hepatitis. Other diseases, such as tuberculosis, may also be recorded under the framework of obligatory reporting in public health systems.

The registration of WRDs caused by biological agents is usually integrated into systems that cover other diseases too and notification is compulsory. Furthermore, ODs in general, and therefore ODs related to biological agents, are known to be underreported. The level of underreporting is difficult to assess and compare between countries because of the differences in coverage regarding sectors, the level of detail and the type of data collected. An additional obstacle identified in the review is the very limited public access to data. In some instances, data are published as only a sum over several years or, for instance, only for infectious diseases or by groups of biological agents (bacteria, viruses or parasites, for instance). One particularly interesting example of a monitoring system that allows the identification of emerging WRDs linked to exposure to biological agents was analysed in the review and presented in the workshop.

The review also looked at systems for monitoring exposure and found very limited information. Some countries do perform exposure measurements and record the results in databases, but a lot of the information is not publicly accessible. However, some contextual information on relevant exposure(s) is also recorded when registering a disease in the systems mentioned above, and, in that sense, it can be concluded that the difference between systems that monitor exposure and those that monitor disease are not so clear-cut. However, overall, it can be said that exposure monitoring regarding biological agents is patchier than disease monitoring.

▪ **Prevention measures**

A number of specific prevention programmes address the challenges mentioned above. These include technological solutions, for example automatisisation or measures at the design phase such as considering changing breeding techniques or considering workers' welfare when building agricultural facilities; training and awareness-raising programmes, such as those introduced in Denmark or Finland among farmers; the use of intermediaries, such as specialised OSH consultants; and the implementation of emergency surveillance programmes to address the risks of global epidemics that may be related to zoonoses or travelling or contacts with travellers. Another example of a prevention measure presented involved enhanced multidisciplinary cooperation. In this example, in order to reduce the use of antibiotics, breeders and veterinarians cooperated to develop new ways of caring for animals

without the use of antibiotics. Another example of how risks can be prevented at source through the cooperation of all stakeholders was presented: to prevent needlestick injuries to household waste collectors, efforts were made to raise awareness of proper disposal procedures, and appropriate waste receptacles were provided to homecare patients. More examples related to the five sectors mentioned above were given during the sessions.

▪ **Drivers and obstacles for prevention**

During the focus groups, experts were asked to give examples of policies and to identify their success factors. In total, 46 policy examples were given, and these are included in the final report. Some were addressed in the presentation, and general conclusions from the focus group discussions were also presented:

- Many factors play a role in the implementation of a policy. It is important to gain insight into these factors. Training and information are key to the successful implementation of a policy.
- Implementation is difficult when a policy is difficult to understand or there is a lack of resources (time). It is important that policy measures suit the target group well (they should be specific to the target group). There should be direct feedback systems through which users can report back to intermediaries.
- Awareness raising can be achieved by the active dissemination of the results of research studies. Currently, attention may not be paid to project results and the dissemination might not target the correct people.
- The translation of a policy at the local level may be of low quality and may therefore not be understood and/or applied by workers.
- Most policy measures are aimed at the prevention of specific risks due to a specific biological agent and related disease. However, intermediaries focus more on mixtures of biological agents, such as organic dust, and not on specific agents or microorganisms. They also focus more on activities that pose a risk to workers instead of focusing on exposure to a specific type of biological agent.
- Some policies are more general and are aimed at a combination of biological agents. Some are relevant to several sectors.
- Smaller enterprises, such as farms, often lack the financial means to improve the working environment and reduce exposure to biological agents. It is important to have someone to consult with on policy measures at the organisational level. The intermediaries should receive appropriate training and background information to help identify suitable policy measures.

2.1.4 Recommendations

Recommendations at the European level emerging from the different steps of the project include:

- the need to harmonise the collection of data to improve monitoring systems;
- the need for the better implementation of policies to improve effectiveness;
- the need for more knowledge exchange and communication on good practices;
- the need to increase the availability of reliable and standardised measurement methods;
- the need for selected changes to the EU Biological Agents Directive.

For the national level, the following points were recommended:

- improve the national visibility and approachability of experts on the management of biological agents at work;
- give higher priority to the prevention of workplace risks from biological agents;
- raise awareness of the risks of biological agents for workers at the workplace level.

At the sector/company level, a chain approach to sector-transcending risks was recommended, as well as the introduction of process approaches/higher level solutions with a wider scope. The chain approach, similar to a life-cycle approach for chemicals, considers a whole chain of events from the source to the moment a biological agent becomes a health problem for workers. A chain approach takes vulnerable groups into account, as they would be more likely to be identified as part of the chain of events (for instance cleaning workers in hospitals or maintenance workers in waste treatment).

Examples of chain approaches from this project include providing information to consumers who buy needles on how to dispose of them without creating risks for both themselves and waste treatment workers (to prevent needlestick accidents during waste handling); and minimising antibiotic resistance by reducing the use of antibiotics in both animal care and human healthcare, and preventing the further distribution of antibiotics into the environment (for instance via surface water) by means of waste and/or wastewater treatment.

A process approach would especially facilitate the development of policy measures at the local level. For multi-exposure risks, for example exposure to organic dust, solutions should be created on a level higher than individual company level by developing technological solutions that help to separate and prevent workers from coming into contact with biological agents.

▪ Discussion

It was noted that the definition of biological agents differs between countries. Some countries have a list that contains biological agents not included in the list in the Biological Agents Directive.

Regarding the use and purpose of registration systems, one participant remarked that most registration systems are related to prevention in some way, and some are clearly related to insurance and the compensation of workers. However, ideally, from a safe workplace perspective, all data from registration systems should be used to identify trends in exposure and diseases linked to specific exposures, to determine with a degree of certainty what occupations are emerging as being at risk and ensure earlier and more efficient prevention.

One participant raised the issue that some diseases have an incubation time, which makes it more difficult to establish a causal link between the disease and the specific workplace exposure that occurred when carrying out a specific task. To enable the collection of this type of information, it is very important that general practitioners (GPs) are involved in reporting schemes that link occupational exposure to biological agents and to diseases, to ensure that this information is also 'captured' by the system. If GPs are involved in reporting schemes and can make the link between worker exposure and biological agents and the related health effects, this would result in less underreporting. A GP would be able to identify workers with complaints as a result of exposures in the workplace, which would consequently decrease the level of underreporting of such diseases. GPs are involved in monitoring systems in, for example, the United Kingdom, but in many countries, they are not.

In addition, a comment was made about the language used for reporting information. Frequently, reports are not written in English but in national languages, which hinders the harmonisation and sharing of data at the EU level. To raise awareness of the problems with biological agents, it is important that some data are made available in English. However, the sharing of information could also be improved by establishing an expert network.

Finally, a discussion took place regarding travelling or contacts with travellers and the associated risk of spreading disease. Travelling for work has become more common because of globalisation and increasing economic exchange. When European (occupational) travellers return from a country outside the EU, an infectious disease might enter the EU (that is, workers might act as vectors to facilitate the spread of such diseases). In China, for example, the rate of influenza is increasing, which increases the risk of the influenza virus entering the EU through the mechanism explained above. Travellers from abroad coming to the EU, may be acting as vectors for diseases uncommon or less frequent in the EU than in other regions of the world, for example tuberculosis and haemorrhagic fevers. A better link between OSH and public health actors could help prevent the spread of influenza and improve the protection of healthcare workers.

2.1.5 Germany's national system for the prevention of risks from biological agents — the role of the Committee on Biological Agents and its cooperation with other bodies

Dr Gabriela Förster, Vice Chair of the Committee on Biological Agents (ABAS), explained the legal system in place in Germany to address risks from biological agents at work, and the role of the advisory bodies and their mandate, and gave examples of regulations and codes of practice.

In the German law system, three bodies (the Federal Ministry of Labour and Social Affairs — protection of workers, the Federal Ministry of Food and Agriculture — regulations on genetically modified organisms (all sectors, i.e. workers, public, environment), and the Federal Ministry of Health — public health, epidemics) are responsible for matters related to exposure to biological agents and infection risks.

The Federal Ministry of Labour and Social Affairs is responsible for the implementation of Directive 2000/54/EC and Directive 2010/32/EU on the prevention of sharp injuries in the hospital and healthcare sector in national legislation. These directives are implemented in national legislation through the Ordinance on Biological Agents. The 16 German federal states are individually responsible for the enforcement of the regulations. ABAS is mentioned in the Ordinance and advises the German Federal Ministry of Labour and Social Affairs. It is composed of representatives of employers, workers, the scientific community, federal state authorities and statutory accident insurance bodies with expertise on the topic. Sub-committees and expert groups design technical rules (TRBAs (Technical Rules for Biological Agents/Technische Regeln für Biologische Arbeitsstoffe)) and provide advice. Decisions are made by consensus. Many tasks and occupations involving the unintentional use of biological agents are covered by the TRBAs.

Sub-committees and working groups focus on specific areas, such as classification and laboratory technology such as gloveboxes, or evaluate specific control measures, such as those for mobile biosafety level S3 lab units⁹. Current examples of the work of these groups and sub-committees were presented, including the evaluation and classification of microorganisms (expert group on classification), and the analysis and evaluation of existing safety technology (expert group on laboratory technology). TRBAs provide information on the risks associated with particular occupations and high-risk tasks performed as part of these occupations, including protective measures, and guidance on how to perform a risk assessment. TRBAs exist for, for example, laboratories, providing guidance on protective measures for activities involving biological agents (TRBA 100); sewage plants (TRBA 220); and healthcare and welfare facilities (TRBA 250). In TRBAs, agents that cause similar health effects are described together under specific rules (for instance substances causing airway sensitisation). All TRBAs are written in German and some are also available in English.

ABAS liaises with the Committee on Occupational Medicine, which establishes requirements for mandatory and optional health surveillance in this area. According to these requirements, health surveillance must be mandatory if biological agents classified in Risk Group 4 are used, or for tasks involving unintentional contact with biological agents. Optional health surveillance refers to preventive occupational healthcare, which must be offered on a voluntary basis to workers when certain dangerous activities are carried out. The project groups of the Committee of Occupational Medicine provide information on available vaccinations and advise on specific vaccinations, although vaccination is not mandatory by law in Germany.

ABAS also cooperates with the Committee on Hazardous substances in relation to, for example, sensitisers. TRBA/TRGS¹⁰ 406 'Substances causing airway sensitisation' sets out prevention measures for sensitisers originating from moulds (for example *Aspergillus* spp.), bacteria (for example *Thermoactinomyces vulgaris*), mites or components of bacteria; and materials from plants such as grain and feed, from animals (for example animal hair) and from chemical substances such as disinfectants. Examples of exposures for sectors such as agriculture and forestry, for animal facilities and for waste management are also included. TRBA 214 (2018) also sets out a Technical Control Value (TCV) for colony-forming units of mesophilic moulds for the purpose of reviewing the effectiveness of technical measures in certain branches of waste management.

The 'Guideline for risk assessment and for the instruction of employees in relation to activities with biological agents' (TRBA 400) introduces a convention on sensitising and toxic hazards that follows a control banding approach. It is based on an exposure matrix that links information on assumed/estimated exposure levels (without measuring) with the estimated risk that must be controlled. Exposure matrices for moulds and endotoxins in different occupations are also available and some examples were shown during the workshop and are attached to the presentation (in German).

⁹ Biosafety levels (BSL) are used to identify the protective measures needed in a laboratory setting to protect workers, the environment, and the public. There are many ways to combine equipment, practices, and laboratory design features to achieve appropriate biosafety and biocontainment. BSL-3 laboratories are used to study infectious agents or toxins that may be transmitted through the air and cause potentially lethal infection through inhalation exposure.

¹⁰ Technische Regel für Gefahrstoffe — Technical Rule for Hazardous Substances

ABAS is currently investigating the relationship between stress factors and exposure to biological agents. Acute stress may lead to mistakes, consequently increasing the risk of accidents, for example needlestick injuries in healthcare. Long-term stress may also increase individual susceptibility through effects on the immune system (immunosuppression and immunomodulation), which may affect an individuals' defences against infections, sensitisation or toxic effects. Possible mechanisms were explained in more detail during the workshop.

- **Discussion**

The use of TCVs was questioned by one participant. The levels of these TCVs were considered arbitrary. The question raised related to whether or not a higher TCV should be set for less infectious diseases than for highly infectious diseases. The speaker's response was that the TCV is not based on health considerations, but it is intended to evaluate the effectiveness of the technical measures that are applied to reduce the level of exposure to sensitising moulds in waste sorting and composting. The value mentioned in the presentation is not a general value for all sectors; it applies to only some branches of waste treatment. A TCV is especially important in facilities where the levels of exposure are high, because in these cases it is particularly important that exposure is reduced to the lowest possible level. The TCV is used to evaluate preventive measures, in this case in relation to waste treatment. The approach could perhaps be extrapolated to other biological agents, such as legionella.

2.1.6 Example of a national monitoring approach to work-related diseases, including diseases due to biological agents: rnv3p, the National Network for the Monitoring and Prevention of Occupational Diseases (France)

Professor Gérard Lasfargues gave a presentation on the French rnv3p system and how it applies to biological agents.

In France, rnv3p is a national network comprising 32 occupational disease centres (ODCs) in French university hospitals and is coordinated by Anses. ODC data are collected and added to a national database. Information is coded for each patient including on diseases (using the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10)), exposures (using a specific thesaurus), occupations (using the International Labour Organization's (ILO's) current version of the International Standard Classification of Occupations (ISCO-88)) and occupational sectors (using the French classification of activities (NAF) of the National Institute of Statistics and Economic Studies (INSEE)). In addition, the French Occupational Exposure Thesaurus (TOE) is used to label and describe types of exposure. The TOE contains more than 8,000 labels — of which about 3,000 are related to biological agents — which are divided into the following types: microorganisms (bacteria, viruses, fungi, parasites), animals (invertebrate, vertebrate) and plant material. Currently, more than 250,000 WRDs have been added to the national database, including diseases due to biological agents. Among these, asthma and allergic diseases are the most frequently reported diseases that are related to biological agents. WRDs due to exposure to biological agents are most frequently reported in the food, health and social activity industries, and in the farming, hunting and ancillary sectors. The occupations registering most WRDs due to biological agents are manufacturing of food, manufacturing of clothing, processing of wood and other occupations in industry and manufacturing, and farmers and skilled workers in commercial farming, as well as domestic helpers. Biological agents associated with the main WRDs were scored for imputability, with plant material, invertebrates and fungi scoring the highest.

To better meet its objectives, rnv3p set up a working group charged with the detection of emerging WRDs, including emerging risks due to biological agents. Rnv3p's 'emerging WRD' strategy comprises three steps, the first of which is detection. The aim is to identify and promptly respond to 'signals' relating to the identification of previously unknown or undescribed WRDs. To do this, several sources are used to detect such signals. For the network of rnv3p experts, the identification of a medical signal by a senior physician in an ODC is a key part of detection. This process, initiated by a clinical report, is called 'clinical emergence'. Complementary to this clinical source, the signal detection step is supplemented by a data mining approach. This approach, based on a signal identified through data mining and by using disproportionality metrics, reflects 'statistical emergence'. Through this data mining approach, potential new pairs {disease - agent} (or {disease - occupation}, or {disease - activity sector}) or new trios are sought, which would otherwise go unnoticed in an ever-expanding database. Finally, sources external

to rnv3p are also used to detect warning signals (literature monitoring, national and international health and safety agencies, as well as other contacts worldwide seeking to identify new WRDs).

The second step is the appraisal of the potential pairs and trios identified. To ensure transparency and reproducibility, these pairs are analysed using an algorithm with three dimensions, which gives an 'emergence score'. For each case, the elements 'severity' and 'imputability' (estimation of the causal relationship between disease and occupational exposure) are calculated. A severity score is also calculated. The work imputability of diseases is determined by an algorithm developed by rnv3p using criteria related to exposure, semiology and chronology. The combination of the two parameters 'severity' and 'imputability', using a multiplicative model, allows a score to be assigned to each case.

The third dimension to be taken into account is the number of occurrences of the pair or trio (i.e. the number of similar cases reported). Ultimately, the 'emergence score' of the pair (or trio) under evaluation is the sum of the scores for each of the similar cases.

This decision algorithm allows responses to be proposed (ranging from no action to the wide dissemination for necessary preventive action), which are graded proportionately for each WRD investigated.

This work has led to European collaboration. More specifically, a pilot online tool has been developed to manage clinical emergence at the European level (the Occupational Diseases Sentinel Clinical Watch System project OccWatch¹¹ project) and detection methods have been used in other WRD networks.

▪ Discussion

Q: How are individual cases entered into the rnv3p database, as it cannot cover every person with symptoms?

A: The cases included in the database are those recognised by the 32 French ODCs. All data collected by these occupational health services are analysed before being added to the national database. The system is organised in accordance with medical confidentiality, but the person with the disease can be contacted again. If more information about the patient's exposure in a workplace is needed, this is discussed with the steering commission (comprising representatives of all rnv3p partner organisations) and can result in an exposure assessment being carried out in the workplace if needed. There is a close relationship between rnv3p and regional and national preventive organisations. Therefore, the reporting of cases can directly result in actions at regional and/or national levels.

Q: Is the system transferable to other countries?

A: The basic structure and organisation of occupational healthcare systems may differ among countries, which limits the transferability of the system. However, information has been shared between a United Kingdom (University of Manchester) system and rnv3p. Furthermore, whether or not parts of the French system could be used in Italy is being assessed.

In addition, the online reporting and assessment tool for new work-related health risks, SIGNAAL, developed by Belgian and Dutch colleagues, is similar to the OccWatch tool that operates on a European level. The OccWatch tool was developed with MODERNET¹² partners, coordinated by Anses, and the platform was launched in January 2018. The OccWatch tool is related to rnv3p, and emerging risks that are identified within rnv3p will be shared with the OccWatch platform.

One goal is to use the system approach of rnv3p at the European level in the OccWatch system. There has been extensive collaboration with the researchers involved in the THOR network in the United Kingdom, concerning, for instance, statistical methods, and the TOE, developed by colleagues from the University of Manchester. Both systems use input from GPs and OSH specialists, which means that THOR and rnv3p use similar approaches.

Q: Should other actors, such as GPs, be involved in data collection, as the number of occupational physicians in France is decreasing (occupational physicians are the sentinels for the system)? What would involving more reporters require?

¹¹ <https://occwatch.anses.fr>

¹² MODERNET (Monitoring Trends in Occupational Diseases and Tracing New and Emerging Risks in a Network) was founded in 2008 as a collaboration between academic centres investigating occupational disease and the incidence of work-related ill health in EU countries.

A: It is a great challenge to involve GPs with the system, as this would involve different ministries. However, the connection with GPs is mainly facilitated by the French public health agency that oversees sentinel systems that include GPs.

2.1.7 Biological agents and the Finnish experience of occupational safety and health in agriculture

Kyösti Louhelainen, retired from the Finnish Institute for Occupational Health (FIOH), presented the activities of FIOH in relation to implementing good OSH practices in the agricultural sector.

In Finland, farmers have been able to voluntarily sign up for occupational health services since the Occupational Health Care Act entered into force in 1979. The development of farmers' occupational health services (FOHS) began that same year with an extensive research and pilot project. Based on its recommendations, in the 1980s, a National Board of Health working group issued instructions to health centres on the implementation of FOHS. The extensive studies in agriculture conducted since 1979 have focused on the health of farmers, changes in the working environment and changes in exposure. Studies focusing on exposure and risk assessment in farming showed that farmers were highly exposed to different types of airborne impurities. The most extensively studied exposures are biological dusts, including fungi, bacteria and endotoxins, animal dust and storage mites.

In the early 1980s, a training programme was created for occupational physicians, nurses and physiotherapists to support the implementation of FOHS, as well as for agricultural advisers (a group of trained experts whose role is to support farmers in implementing OSH measures) acting as experts on working conditions in agriculture. The content of the training programme is further adapted and developed on an ongoing basis.

The guide *Good occupational health practice in farmers' occupational health services* was first published in 2000 and is based on extensive research (multiple and thorough studies) performed over decades, starting from 1980. The basic studies were comparative in nature, and several possible systems for organising FOHS were studied and compared, which resulted in the choice of the system currently in use as the basis of FOHS. The guide relies on information and results from (1) law enforcement agencies, (2) several studies from the 'Occupational Health in Finland' series, (3) instructions from authorities and insurance institutions, and (4) other practical instructions.

▪ **Functioning of the system**

When a farmer wants to join FOHS, negotiations are held at the farm and a plan of action is set up in cooperation with the farmer. Affiliated farmers undergo a health examination, which is repeated on demand (every 2-4 years). After a few months, an occupational health nurse and an agricultural adviser carry out a farm visit. The farm visit includes a basic analysis of the work tasks, the materials used and the types of hazards including biological issues. The farmers receive a development plan to familiarise them with the health hazard, and instructions for corrective actions. The farm visit generally takes place every 2 years, but intervals may vary between 1-4 years depending on demand.

The structure of the training for farmers' occupational health personnel has remained almost the same since 1980: theoretical training (2 days) and a practical farm visit (walk through, 1 day) with a development plan to farm personnel.

▪ **Impact of the system**

Studies have assessed the effectiveness of the good occupational health practice implemented by means of FOHS. Two surveys were conducted among farmers in 2004 and 2014 via computer-assisted telephone interviews and showed relatively good coverage of FOHS in all production lines and increased coverage from 2004 to 2014. Studies have also assessed the effectiveness of the services regarding good occupational health practice. In the early days, insufficient human resources in health centres and a lack of training among occupational health personnel had been a problem for implementing activities in line with good occupational health practice of FOHS. The occupational health experts were trained in working methods in agriculture and technical control measures, with the help of the agricultural adviser.

The role of FOHS in occupational medicine and the recognition of symptoms and diseases in farmers has been very important. However, one obstacle in risk assessment is the lack of analysis instruments for biological agents, meaning that visual judgement and experience is relied on.

Emerging risks such as multidrug-resistant bacteria and respiratory viruses have been addressed by FOHS, with the help of veterinary and healthcare experts. Changes in exposure patterns have also been observed over time, and the most obvious reasons for this are changes in work procedures and production methods in agriculture.

- **Farmer's lung**

As confirmed by the focus groups, farmer's lung, a long-known disease in the sector, is still an important issue in the agriculture sector. In Finland, data on farmer's lung have been collected since 1987. Despite this large amount of information, farmer's lung remains a significant OD. Currently, certain types of materials (dry hay or straw) which contain biological agents, are used in less amount than in the past. However, some farmers store and use dried hay and are exposed to bacteria and fungi from organic dust. Activities such as cleaning storage facilities result in dust exposure and cause farmer's lung. As there are no methods available to measure exposure and therefore monitor exposure controls on farms, the occupational service experts mainly rely on visual assessments (for example the visual identification of moulds on hay).

The levels of exposure are still quite high and a reduction in the prevalence of farmer's lung will depend on technical changes in agriculture. The levels of exposure also depend on climatic conditions, as more farmer's lung cases are usually reported after rainy summer and autumn seasons. To prevent exposure, farmers are advised to use respirators when working with crops after such rainy seasons. Currently, when a farmer in Finland is diagnosed with farmer's lung or occupational asthma or organic dust toxicity syndrome (ODTS), farmers' occupational insurance institutions provide a free motorised respirator.

- **Other issues**

Animals that live at storage facilities may also carry viruses. An example of such an animal is the bank vole, a rodent that may cause the disease nephropathia epidemica. The bank vole is the reservoir for the virus, which humans contract through the inhalation of aerosolised vole droppings. Nephropathia epidemica is an official occupational farmers' disease, the occurrence of which is dependent on the number of rodents.

Animal dust also contains storage mites, which thrive in material with high moisture, resulting in more allergies. In addition, cow dander may be present in high concentrations at farms.

The speaker concluded that more money is probably invested in the relatively complex occupational health issues in the farming sector in Finland than in other EU Member States. The FOHS system is unique in Europe.

- **Discussion**

Q: Are there many temporary workers in the agricultural sector?

A: Currently, there are many seasonal and migrant workers on farms in Finland, and informal work has increased. For some occupations, 10-20% of these workers are migrant workers from Estonia/Belarus (for example those who work in strawberry picking).

Q: Is there a need for specific training for these groups of workers?

A: There is currently no specific training for this group and there are no organisations that provide special training for temporary workers, and this might become an issue.

2.2 Group discussions

During the afternoon session, group discussions were held in four groups of six or seven participants (not including research staff). The aim was to discuss the outcomes of the project and to collect valuable additional information. During four different rounds, participants discussed four different topics, listed in Table 1, and moved every 20 minutes to another group discussion. By asking the participants to change

group discussions, input was collected from everyone on every topic. The discussions were supervised by members of the project team who are experts in the particular topic (the chairs) and minutes were recorded (by rapporteurs).

Table 1: **Table 1: Four rounds of 20-minute discussions with chair and rapporteur.**

| Group | Topic | Chair | Rapporteur |
|-------|--|---------------------------------|---------------------------|
| 1 | Monitoring of diseases due to biological agents and exposures to biological agents | G rard Lasfargues (Anses) | Eelco Kuijpers (TNO) |
| 2 | Policies and practices in place to manage and control exposures to biological agents in the workplace | Frank Dieterich (BAuA) | Astrid Kruizinga (TNO) |
| 3 | Specific sectors and groups — the project focused on specific occupations (healthcare, agriculture and waste treatment), are there any others? | Per Malmros (Aarhus University) | Marie Meima (TNO) |
| 4 | EU Biological Agents Directive — relevance of findings | Jos Verbeek (FIOH) | Nicole van Kesteren (TNO) |

The discussions were structured with the help of a list of questions that were given to the workshop participants prior to the meeting (see Annex 1). The summary of the group discussions includes answers to the questions and additional remarks. Some questions could not be addressed because of a lack of time. After the four rounds of discussions, the chairs of each of the topics gave a summary of what had been discussed, and the results were briefly discussed in plenary.

2.2.1 Monitoring of diseases due to biological agents and exposure to biological agents

▪ Objective

The objective of this group discussion was to obtain additional information from the participants on what type of data are collected in terms of monitoring diseases due to and exposures to biological agents in their countries and on the approaches behind these monitoring systems. In addition, participants could provide an indication of the diseases for which data are available and for which they consider it important to collect data, with a view to helping confirm whether or not the issues identified during the project are the same as those considered important in individual countries. They were asked to confirm whether the important issues were covered or whether anything was missing, and whether or not any monitoring methodologies other than those identified in the review should be mentioned. Finally, they were asked whether or not there was a need for cooperation and information exchange in monitoring between countries or whether or not there was a need to cooperate with other policy areas, for example public health, to improve data availability. They were also asked to name any important actors that were missing in the review and how their inclusion could be beneficial.

The participants had received the draft final report before the workshop, which provided insight into monitoring systems in Denmark, Finland, France, Germany, the Netherlands and the United Kingdom, and the challenges regarding the monitoring of diseases and exposure. In addition, TNO presented the main findings regarding this subject at the workshop. The participants were asked to compare these monitoring systems with those operating in their countries, and to indicate additional issues.

▪ Outcome of the discussion

Introduction

The first issue addressed during the discussion group was the availability of (national) disease and exposure data and the methods used to determine the levels of exposure to biological agents and WRDs, for instance by means of monitoring systems.

Differences between Member States

The participants agreed that the challenges identified in the draft report (for example lack of exposure data and proper monitoring tools, the variations in scope of the definition of biological agents) were similar in their countries. However, the availability of data, monitoring methods for the detection of exposure to biological agents and national registration systems vary considerably between Member States. For example, in some countries needlestick injuries are reported in OD systems, while other countries register such injuries as occupational accidents. In Belgium, for example, different departments of the government are involved in the registration of ODs associated with biological agents. These different departments use different systems to register, for example, specific infectious diseases. There are also differences between Member States in terms of knowledge and awareness. In Bulgaria and Slovenia, for example, only a few types of diseases that are linked to occupational exposure to biological agents are recorded, although these countries have legislation on biological agents. It was also noted that, although the registration of ODs is mandatory, it is generally still not done consistently for every biological agent in a structural way. The French monitoring system (rnv3p) is considered a good example that could be used as a starting point for better organising monitoring systems in other countries.

In Italy, since September 2014, a new list of occupational diseases subject to the reporting by GPs is in force, as required by art. 139 of a national Law (Testo Unico — DPR 1124/1965). This list includes some biological agents in the annex. A GPs' complaint /notification is transmitted to the local Labour Offices, to Local Health Authorities, and to Inail, the statutory insurance organisation, for the National Register of Occupational Diseases or WRDs (art. 10 of Legislative Decree 38/2000). All infectious and parasitic diseases (except for ankylostomiasis, which is considered an occupational disease) are treated by Inail as accidents at work.

Exposure data

It was concluded that the lack of exposure data is a major issue, although there are for example efforts to compile data in Germany and the Netherlands on biological agents as air pollutants from concentrated livestock farming facilities. The scarcity of data is due to the difficulty of standardising measurements to monitor exposure to biological agents and to the great variation in exposure levels. There is also great levels of variability in the quality of the exposure data that are collected, that is, in some cases, data might be detailed and have a clear context, while in other cases little is known about the context of the measurements (for example sector, occupation, task, circumstances). Furthermore, the fact that exposure is known to change over time and the fact that biological agents are not visible, as well as the lack of personnel to perform the measurements, make it difficult to map exposure to biological agents. In addition, the underreporting of ODs is a general issue that also leads to a lack of exposure data. Underreporting is caused by, for instance, physicians not relating the occurrence of a disease to an occupational exposure. In addition, in the Netherlands, for example, a sick worker does not normally visit an occupational physician but goes to a GP, which hampers the identification of the WRD. Moreover, in some cases (occupational) physicians will be confronted with biological material collected from workers who have been exposed to biological agents at their workplace (for example serum samples) but will not be able to establish a link with work because they have no information on occupational exposures, which makes it difficult to draw the right conclusions.

There are exceptions to the findings above. For example, in the United Kingdom, a small proportion of GPs is involved in monitoring ODs and exposures. In Germany, exposure data are available, but need to be linked with health complaints, as GPs do not focus on the monitoring of biological agents. In contrast, in eastern Europe, there is a general lack of exposure data and information on health risks. In Italy, Inail has developed an application, available on its website, that includes a database of environmental measurements carried out in different workplaces, the levels of biocontamination found in the various working phases and the information on the sector useful for its characterisation, organized by sectors and production activities. The set of data includes:

- • data on the work environment

- • data on environmental monitoring (sampling medium: air, surfaces, water)
- • monitoring results

Furthermore, awareness of workers' exposure to biological agents may be low in several sectors, for example in waste management and agriculture, and in SMEs.

Factors that might facilitate exposure monitoring for a specific agent or exposure are the identification of a specific (bio)marker and monitoring devices that can be read directly. However, quantifying exposure is very expensive, and therefore a qualitative approach to monitoring exposure should be encouraged as a first step. The use of biomarkers is also considered challenging, as no specific biomarkers are currently available for exposure to biological agents.

The discussion on exposure data led to a discussion on occupational exposure limits (OELs). In the Netherlands, an OEL value for endotoxins was set at 200 endotoxin units¹³ (EU)/m³, and the intention was to lower this value to 50 EU/m³ over time. However, this OEL was withdrawn. In the meantime, the Dutch Health Council revised its review, and proposed a health-based recommended OEL (HBROEL) of 90 EU/m³ in 2010. However, because of a change in legislation, setting OELs for certain substances, including endotoxins, is now the responsibility of companies themselves, and although they should incorporate the current state of knowledge in this process, in practice this often means that little effort is made to actually set and implement a company OEL.

Harmonisation

The discussion revealed that the harmonisation of the definition and classification of biological agents was considered a necessity. Monitoring is very difficult and needs to be performed in a harmonised way to cover all countries. Up to now, data have been difficult to compare because of differences in the definitions used for biological agents and the different monitoring systems used in Member States. Harmonising monitoring systems across countries would facilitate the prevention of disease.

One recommendation was that the International Organization for Standardization (ISO) should define standards for monitoring biological agents. A European Committee for Standardization (CEN) working group on biological agents is already working on the standardisation of measurement methods. Furthermore, it would be beneficial if countries increased cooperation by, for example, sharing data concerning exposure and disease, especially regarding emerging risks. Sharing data would also be easier if there was one database for all Member States (in which data should be anonymous to retain confidentiality).

In addition, guidelines are needed in relation to monitoring exposure and disease in specific sectors. For example, in the Netherlands, information is made available via a website hosted by KIZA¹⁴, which presents information on infectious diseases related to work and working conditions. KIZA aims to harmonise how biological agents are dealt with, providing information regarding exposure to biological agents, monitoring exposures and guidance on preventive measures.

Data from exposure monitoring systems should also be made available and harmonised for risk assessment purposes through, for example, the use of a job exposure matrix.

When unintentional exposure occurs, it is often because a risk assessment was not performed properly. Information leaflets on biological agents could be developed based on the concept of the safety data sheets that address risks from chemical substances at work. These documents would also facilitate the harmonisation of the definition of biological agents.

Cooperation

Cooperation between the areas of occupational health and public health would be beneficial, as public health experts have experience regarding sentinel systems for infectious and chronic diseases, and occupational health experts have valuable knowledge regarding exposure. One approach would be to integrate the registration and monitoring of occupational exposures and ODs into the area of public health. Currently, different monitoring systems for the same disease may operate at the same time in the public and occupational health contexts (for example in Belgium), which is far from efficient. In

¹³ Endotoxin units (EU) are a measure of the activity of an endotoxin. Endotoxins differ in their biological activity or potency. Humans can develop symptoms when exposed to as little as 5 EU/kg body weight. These symptoms include, but are not limited to, fever, low blood pressure, increased heart rate and low urine output; and even small doses of endotoxin in the blood stream can be fatal.

¹⁴ KIZA: Kennissysteem Infectieziekten en Arbeid (information system on infectious diseases and work).

addition, data should be shared through better cooperation, especially regarding emerging sectors and exposures.

GPs should also be involved in the monitoring of biological agents and the associated health effects, as there is a lack of occupational health actors/professionals. An interdisciplinary approach integrating public and occupational health actors would be beneficial regarding biological agents and related diseases because of the complexity of the issues. France has sentinel systems that could be used as a starting point for organising such a combined system, and data mining techniques are available that could be used as the starting point for processing the information gathered in a structured way.

2.2.2 Policies and practices

▪ Objective

The objectives of this discussion group were to obtain examples of relevant policies, initiatives and measures that are in place in different Member States, in addition to the ones included in the presentations (for example risk assessment tools and guidance). Another objective was to obtain examples of what is currently lacking and what should be developed to ensure the systematic prevention of health effects due to exposure to biological agents, for example specific types of measures or initiatives.

The participants had received a draft of the report before the workshop, which contained an overview of the findings of the expert interviews and focus groups and aimed to identify existing policies, gaps in prevention and drivers or obstacles to the successful implementation of existing policies. Some of those were highlighted in the presentation, especially as regards specific sectors.

▪ Outcome of the discussion

Current situation regarding policies and practices

Participants stated that a lack of awareness, knowledge and cooperation between authorities is hindering the systematic prevention of health effects caused by biological agents. Systematic prevention could be improved by raising awareness among physicians, employers and workers; increasing knowledge; and enhancing cooperation and communication between authorities. The lack of awareness and knowledge of biological agents is surprising, as many people are aware of, for example, needlestick injuries and moulds in buildings (particularly in Finland). In addition, the monitoring of exposure (for example to allergens) was considered important for ensuring systematic prevention by raising awareness in the relevant areas. It is important to define what is needed to improve data collection regarding exposure to biological agents.

Currently, in countries with limited (human) resources in the departments that deal with OSH, the authorities aim to implement the minimum standards required by European legislation. Because of a lack of manpower and other resources, these authorities often wait for developments and strategies provided by countries with more expertise in the establishment of OSH policies, and then apply these in their own countries.

In the healthcare sector, communication between hygiene and occupational health and safety experts should be improved to ensure the correct implementation of prevention methods to cover both goals in relation to hygiene and the prevention of exposure to biological agents. In crop farming, livestock farming, aquaculture and fisheries, the need for more knowledge is urgent.

Country-specific policies and issues regarding biological agents

The participants added the following examples of policies and good practices to those already mentioned:

- the use of picture-based short instructions (for example those used in the United Kingdom);
- the annual training of workers;
- the provision of instructions in several languages; for example, in Iceland, Polish translations are available for certain work instructions with the aim of reducing exposure to biological agents, as 10% of the workforce is Polish;

- the provision of general guidelines;
- the use of information sheets for specific areas (such as the 2-page information sheets used in Ireland);
- the use of an e-learning tool.

In general, it was conceded that it is difficult to communicate the risk of unintentional exposure to workers.

The participants reported on the status in their countries and, if relevant, the possible obstacles to or facilitators of the implementation of policy measures.

In Austria, the subject of biological agents is not considered of primary interest. Currently, statutory occupational insurance bodies, labour inspectorates and employers' organisations are discussing future activities. SMEs in particular need practical and simple solutions.

Two sectors in Belgium have developed policies for OSH in relation to biological agents. The first is related to the use of pathogens and genetically modified organisms (GMOs) in biology laboratories (animal laboratory workers). The second relates to sharps injuries and tuberculosis in hospitals (healthcare).

In Bulgaria, there is a scarcity of reported ODs and a lack of policy and prevention methods regarding biological agents.

In Denmark, occupational health is covered by three ministries that need to work closely together. Furthermore, labour inspection (managed by the Danish Working Environment Authority) needs to control companies. However, issues related to biological agents do not receive much attention from inspectors.

In Finland, indoor air problems due to moulds are considered a serious issue. In addition, the directive is given little priority in Finland, except in the healthcare sector.

In Hungary, zoonoses are considered the most serious problem related to biological agents in the agricultural sector (for example in relation to the growing of corn). A campaign has been initiated in this sector, which includes the targeted investigation of biological agents in workplaces. A policy measure in this sector aimed at reducing the use of pesticides has resulted in an increase in the number of rats and consequently a higher incidence of leptospirosis. Another factor contributing to the increase in rats is climate change (for example higher temperatures during the winter season).

In Germany, the employer must perform a risk assessment in workplaces affected by biological agents, and there is a well-established system primarily for laboratories, healthcare, waste management, animal facilities and agricultural sectors. In addition, workplace inspectors in Germany rely on the knowledge of consultants with expertise in the field and then carry out joint workplace inspections, as the inspectors may not have detailed information on specific workplaces.

In Iceland, the topic of biological agents is rather new. At the moment, it mostly concerns moulds in houses, which is not normally related to workplace exposure, with the exception of exposure to moulds in offices and other work-related buildings. Mould at construction sites could also be a problem. Allergies in the fishing industry are also an issue, and fish proteins become airborne when fish are cut.

Ireland has national regulations, a code of practice and guidelines in relation to biological agents. However, these guidelines are very general. In addition, an e-learning tool and 2-page information sheets for certain sectors provide general information.

Italy has both a national system and a regional system. For example, a region can act autonomously on issues concerning biological agents (such as prevention of legionella guidance). However, it is often noted that GPs underreport the associated ODs, as they are often unable to relate a certain disease to an occupation.

In Latvia, in general, policies with respect to biological agents are not centrally organised, implemented or monitored.

In Lithuania, the Biological Agents Directive is implemented by three ministries. Experience in health centres and education centres shows that cooperation between the three ministries supports the implementation of this EU directive.

In the Netherlands, endotoxins in the workplace are considered 'chemical substances' rather than biological agents (and thus regulations regarding how to deal with chemical substances should be

followed). A health-based recommended OEL for endotoxins was derived by the Dutch Health Council to encourage employers to reduce exposure. However, the level of exposure to endotoxins is difficult to determine because of a lack of a standardised measurement method and the great variation in exposure levels over time. Furthermore, setting an OEL for endotoxins as a guidance value for the implementation of prevention measures is currently the responsibility of each individual company that deals with endotoxins, which in practice leads to limited implementation of limit values for endotoxins.

In Luxembourg, OSH prevention strategies in relation to needlestick injuries are well implemented in hospitals, with appropriate devices such as closed receptacles for discarded needles and gloves. However, Luxembourg does not have enough manpower to enforce regulations regarding biological agents.

In Norway, GPs must inform the registry of OSH-related diseases, but such reports are rare. In the healthcare sector, hospitals follow their own procedures and report being aware of all safety issues. However, there is a lack of knowledge regarding occupational health risks in this sector, as hygiene requirements dominate (which is also the case in Germany) and prescribed hygiene measures (for example frequent handwashing) could contradict good OSH practice. For example, restrictions on disinfection may be implemented in hospitals, which could affect workers' health, although this effect is expected to be limited. Good communication between those responsible for hygiene standards and OSH experts should therefore be ensured.

Furthermore, the waste sector for the off-shore industry in Norway is considered of concern in relation to biological agents, as many biological agents grow in the sludge produced by off-shore processes.

In Portugal, all labour inspectors must attend annual training on biological agents (in all sectors). Furthermore, legionella is considered a problem in cooling towers. In particular, contaminated cooling fluids are considered a problem in the metalworking sector.

In Romania, there is a lack of communication between GPs and OSH practitioners. Although in other countries the reporting of ODs is obligatory, this is not the case in Romania. Furthermore, according to the law in Romania, workers should receive training twice a year. At the moment, trade unions are asking the government to focus more on the implementation of OSH prevention.

In Slovenia, different legislation exists for different biological agents, and allergens are not considered biological agents. Because of a lack of financial resources, the implementation of this legislation is considered a problem.

In the United Kingdom, the training of workers in relation to biological agents is required by law. However, the frequency of such training is determined by the employer and depends on, for example, the level of risk of the work.

Recommendations for policies and practices

Protective measures can be technical, organisational or personal. In general, technical measures reach many people, but PPE is sometimes preferred, although at least one of the participants indicated that PPE is considered more expensive. Economic reasons should not play a role in the level of protection that is offered to workers, although, in practice, a company's production, sales and profit margins will generally influence the choice of protective measures, especially if no additional financing is offered by third parties such as the government. Better knowledge and increased awareness are needed for the effective implementation of protective measures. Furthermore, better and more generic risk assessments are needed to enable systematic prevention.

Information for GPs should be made available on the different policy measures. For instance, an information campaign for GPs could be used to strengthen their knowledge of workplace risks due to biological agents.

Another recommendation was to make policies more sector specific, as sectors and regional specificities may vary considerably. For example, sectoral organisations should make an inventory of the relevant biological risks and should develop their own guidelines on how to deal with these risks.

Policy measures should be implemented in a holistic manner (for example by considering all relevant processes and stakeholders that are important for successful implementation and tailoring processes to the severity of the risks).

National differences should be considered in EU regulation and harmonised, and OSH policy should be connected to public health policy. (Note, the European Commission is not responsible for implementation, this is the responsibility of the Member States.)

2.2.3 Specific sectors and groups

▪ Objective

The objective of these discussion groups was to identify priority occupations/sectors. Another aim was to obtain more information on issues related to vulnerable groups and SMEs.

During the project, five sectors of concern were identified: healthcare, animal-related occupations, waste treatment, arable farming and occupations that require travelling across the national border or working with migrants. The focus groups considered three out of the five sectors: healthcare, waste and wastewater treatment, and animal-related occupations. The workshop participants were asked whether or not they considered these three sectors the most relevant with regard to risks due to biological agents and emerging risks, and whether or not any other occupations or sectors should also be considered.

They were also asked whether or not the information regarding vulnerable groups was complete and whether or not any issues concerning SMEs had not been mentioned. Again, they were asked about the need for cooperation across countries and policy areas and whether or not there were any important actors that should be involved.

▪ Outcome of the discussion

Although the participants were asked about risks in occupations and sectors other than the three sectors discussed in the focus groups, some remarks were made on these occupations.

Healthcare, waste and wastewater treatment and animal-related occupations

It was mentioned that the healthcare sector should be divided into three sub-sectors — homecare, clinicians and GPs — as exposure to biological agents differs considerably in different (work) environments. Nurses and doctors are considered well-trained workers; however, many workers in hospitals are unskilled, such as cleaners and some foreign workers. In Romania, the turnover of nurses is considered an issue: nurses acquire skills through training for a short period in one healthcare establishment and then move to work at another hospital. In Italy, training for caregivers has been provided for a few years to educate workers in the risks of chemical and biological agents.

A discussion was held on what parts of the waste treatment sector presents risks due to biological agents. Waste is often treated in open spaces into which aerosols are released. It is difficult to contain biological agents in such open spaces, while in waste treatment facilities the waste treatment process is often much more contained (that is, more controllable). The focus for the waste treatment sector should therefore be on open spaces, as the risk is considered highest in these environments. On the other hand, one expert mentioned that exposure to moulds in a closed environment is very likely. In addition, a Portuguese expert stressed that there is a risk of dermal exposure in the waste treatment sector and said that fungi are an important issue because workers do not wear gloves to protect themselves. As a result, fungi might become trapped under the fingernails, resulting in possible exposure later, for example while eating. A German expert mentioned that the waste sector was well regulated in Germany.

Occupations identified in addition to healthcare, waste treatment and animal-related occupations

Participants referred to 'occupations' of concern rather than 'sectors'. Unintentional exposure was generally considered an important issue. Ambulance workers were specifically mentioned — they tend to be less likely to wear protective clothes because thicker clothes may not be practical for their work; this in turn may lead to a higher level of dermal exposure to biological agents.

Technical measures are lacking for several occupations/sectors, including (1) metalworkers, whose respiratory tract health is at risk from exposure to contaminated cooling fluids, and (2) maintenance workers exposed to bioaerosols during high pressure cleaning (that is, when cleaning air-conditioning systems or windmills). Windmills are cleaned in a humid environment in which moulds thrive, resulting in a higher risk of exposure to moulds during this type of work. Maintenance workers cleaning the top

of the windmills and changing the filters are at an additional risk, as these filters may contain high levels and a wide variety of biological agents.

Participants agreed that occupations that involve travelling or contacts with travellers were of concern because individuals might differ considerably in their level of immunity. Truck drivers in Lithuania were mentioned to be at a higher risk of pre-occupational malaria.

People working with refugees or homeless people are another group at higher risk of exposure to biological agents, as their clients might carry and transfer foreign biological agents. People from western Europe might not be immune to the same types of agents as people from Africa and people from Africa might be carriers of agents infectious to people from Europe. In the Netherlands, the potential additional risk of exposure to biological agents when working with refugees is currently evaluated through workplace risk assessment.

Furthermore, prison workers/guards are a high-risk group in relation to exposure to infectious diseases such as tuberculosis and measles. Regardless of control systems, outbreaks still occur occasionally in this group of workers.

Outdoor workers may face new risks (new microorganisms) as a result of climate change, for example the cases of West Nile virus infection in Italy. Outdoor workers specifically mentioned were public garden workers and road maintenance workers.

Working in childcare is also potentially associated with relatively high levels of exposure, as children are more likely to have infections and may transfer biological agents to workers as a result of high levels of physical contact.

One participant mentioned library and museum workers. Dust in these workplaces may lead to significant exposure to biological agents.

The occupations of concern discussed in the following paragraphs were linked to specific countries.

In Denmark, the maintenance sector is not covered by the Biological Agents Directive and, furthermore, is not regulated by the same authorities as other occupations in which exposure to biological agents is considered a risk. For maintenance occupations, awareness of biological agents is low, which causes problems. One of the representatives from Germany also mentioned maintenance workers in biogas plants who may be exposed to biological agents occurring in biogas production plants.

In Ireland, local authorities carry out various activities that may be associated with a high risk of exposure to biological agents. Such activities include collecting animals from the road, litter picking (e.g. sharps) and sewage treatment. Furthermore, as one Irish expert pointed out, there have been fatalities among workers of drain cleaning companies because of exposure to fermenting bacteria. Ireland has also had incidents with cleaners suffering needle stick injuries, several of these cleaners received their injuries whilst cleaning trains

In Norway, there are risks associated with fish farming because of complacency in this sector, that is, biological agents are not perceived as an issue.

Vulnerable groups

The following groups were identified as vulnerable groups:

- the immunosuppressed, for example people who have undergone or are undergoing chemotherapy;
- people working with migrants (also an emerging risk) and homeless people;
- pregnant women;
- young people (who often lack education/experience);
- elderly people;
- new and temporary workers.

Opinions differed regarding the immunosuppressed. Some participants agreed that this is a vulnerable group, but some participants stated that there is a great deal of awareness of the (additional) risks among this group. In the United Kingdom, a guidance document is available on how to protect the immunosuppressed. For the immunocompromised, it was agreed that information should be more specific, and that any guidance should include information and rules for this specific group.

Furthermore, migrant workers were considered relevant because of potential language problems: workers from this group may only be fluent in their native languages, and consequently may not understand guidance and safety instructions. This problem seems to be especially relevant for workers from some eastern European countries that migrate to western Europe and move on to a third country.

Temporary workers were considered a relevant group: a lack of training may result in a higher rate of accidents and an increased risk or lack of awareness of exposure. In Italy, temporary workers in agriculture are regarded a particularly vulnerable group.

A Dutch expert mentioned that older workers are a vulnerable group in the Netherlands because of a higher retirement age. The experts did not indicate why this would lead to a higher risk; however, this could be caused by, for example, prolonged exposure times or older workers being more susceptible to infections.

Maintenance workers/repair workers were generally considered at higher risk because of a lack of awareness and clear guidelines (for example maintenance workers of cooling systems and water-based systems).

Issues related to small and medium-sized enterprises

Participants agreed that financial resources for addressing health risks and exposure to biological agents are lacking in SMEs. In addition, the low number of workers in each small enterprise restricts the opportunities for workers to attend external training sessions or informative meetings. Moreover, SMEs are considered a difficult-to-reach group. One way to reach these enterprises could be to implement policy measures at the municipal level, as this might create more direct contact between local government and SME owners, resulting in more communication and awareness of the issues.

Several tools and financial support schemes are available to SMEs in different countries:

- In Italy, enterprises that want to improve their occupational conditions, including the control of risks due to biological agents, have been subsidised since 2010.
- In Denmark, financing is granted to develop courses for SMEs.
- In the United Kingdom, the 'SME toolbox'¹⁵ is a successful, freely accessible resource that presents an overview of safety and health issues and includes guidance on risk assessment.
- In Belgium, SMEs are reached by consultants visiting workplaces in specific sectors with a large proportion of SMEs, such as hairdressers. A Belgian participant recommended providing very brief, sector-specific information to SMEs.
- In Ireland, a tool named 'BeSmart'¹⁶ (Business Electronic Safety Management and Risk Assessment Tool) aims to help business owners/managers prepare a risk assessment and safety statements for the workplace. The tool was developed in response to the finding that risk assessment is not well understood by SME employers in Ireland. The tool highlights the main hazards in specific sectors.
- In the Netherlands, Stigas¹⁷ provides a tool for entrepreneurs and workers in the agricultural sector.
- Slovenia has a health promotion project aimed at SMEs that includes risks due to biological agents.

Cooperation at the national level and the EU level

It was generally agreed that sharing knowledge and experience on health-related issues due to biological agents is important at both the national level and the European level. This information can be shared via the internet, meetings and conferences.

¹⁵ <http://www.hse.gov.uk/leadership/smallbusinesses.htm>

¹⁶ <https://www.besmart.ie/>

¹⁷ Stigas is an independent knowledge institute that works for all agricultural and green sectors. Stigas stimulates employers, employees and the self-employed in the agricultural and green sectors to work healthily, safely and sustainably. Its services are, among others, (1) legally required activities such as risk inventory and risk evaluation, and preventive medical research; (2) information and training for machine safety, hygiene and healthy movements during work; and (3) programmes for, for example, sustainable employability.

It might be useful to have a permanent expert network for the efficient, frequent sharing of information and as a discussion forum. In addition, authorities could translate more documentation into English to stimulate the sharing of information. It was generally agreed that the amount of personal contact between all stakeholders in the field of biological agents (for example workers, employers, OSH experts) has been decreasing over the last couple of years. Important issues are currently primarily discussed at a higher level, for example at EU level.

Even though the occupational risks due to biological agents are clear, economic constraints prevent these risks from being addressed. A European approach is needed to overcome these limitations and to ensure that workplaces are safe, and development is responsible.

Other policy areas

Participants from different countries agreed that there is hardly any cooperation between occupational health and public health sectors in their countries, and there is often no direct contact between ministries of labour and ministries of public health regarding the topic of biological agents in the workplace. Moreover, the lists of biological agents covered by policy measures differ in these different policy areas.

▪ **Other remarks and suggestions**

It was suggested that data surrounding previously used approaches to prevention for health-related issues could be captured and stored for recall in order to stimulate rapid action if the same health-related issues arise as in the past. This would stimulate information sharing between European countries, and best practices for preventing ODs due to biological agents would be more widely used.

2.2.4 EU Biological Agents Directive

▪ **Objective**

The objective of the discussion group was:

- to determine whether or not the participating countries have different approaches from or more concrete approaches than those set out in the EU Biological Agents Directive, and whether or not the experts agree with the issues mentioned in the report in relation to the directive;
- to gather examples of more precise regulations and of national legislation that has a specific approach to unintentional exposures, defined prevention approaches or legislation for particular work processes, sectors or occupational groups, and to investigate whether or not these examples could be transferred to other countries;
- to obtain proposals on how to address these challenges or any proposals for amendments to the directive.

Participants were also asked whether or not the definitions of biological agents in their countries cover the sensitising and toxic potential of microorganisms and their constituents. Finally, they were asked whether or not their countries' prevention and legislative requirements were actually linked to the classification of agents into groups.

Questions related to the need for cooperation and to work with other policy areas and other important actors concluded the discussion of this group.

▪ **Outcome of the discussion**

Current view on the EU Biological Agents Directive

Most participants agreed that the current directive covers the topic appropriately and neither its scope nor the definition of a biological agent needs to be changed. It is supported by the Framework Directive, which mandates an employer to implement a preventive policy for agents that are not microbiological agents, such as scabies. A minority of the participants believed that the definition of biological agents should be broadened. This discussion focused on the question of whether or not one should draw a line between microorganisms and non-microorganisms.

In general, however, there was consensus regarding the biological agents list (Annex III of the directive): participants agreed that it should be updated frequently (for example every 6 months) to keep pace with the rapidly changing world, as new materials and solutions arise. Furthermore, there was general

agreement that the annexes of the directive should be changed and updated and should include relevant agents and activities, especially for Risk Group 1.

In addition, the Member State representatives stated that the implementation of the directive could be improved. They said that there should be better guidance at the practical level, that is, it should be clear how employers should implement the regulations. A good example of a directive that includes practical guidelines on implementation is the EU Electromagnetic Fields Directive¹⁸. The Biological Agents Directive is currently difficult to understand for non-experts such as employers and workers, especially in terms of how to carry out a workplace risk assessment. Changing the directive is not a question of expanding its definition but about specifying risk assessment requirements (for example guidance on how to apply risk assessment and on what exposures are expected in certain occupations or when carrying out certain tasks). More emphasis should be placed on how to prevent exposure (instead of the focus on microorganisms).

Moreover, national regulations are not available in plain language, which limits comprehensibility and implementation. The directive should better consider the contexts of sectors, jobs, vulnerable groups, etc., so that employers can better interpret and implement it in practice. An example of this at a practical level is the use of TRBAs in Germany.

One important point made was that the report focuses on those countries that already have relatively detailed regulations and prevention programmes in place to tackle the risks from biological agents. For a number of other countries, developing such programmes and guidance is more challenging.

The identification of occupational groups exposed to specific agents is important because it may facilitate risk assessment. The identification of vulnerable groups is also important, as they differ in sensitivity to biological risks. Older workers were again mentioned as a vulnerable group, as exposure time increases with increased average retirement age.

The participants also suggested new ways of communicating and raising awareness, including through social marketing.

Differences in definitions of biological agents

There are differences in the definitions of biological agents between the EU directive and national legislation. Several countries supplement the directive's list of biological agents, which is very important, but not feasible for smaller countries. Broader definitions of biological agents are used to, for example, include the provisions of the Sharps Directive¹⁹ or provisions for mites. The sensitising or toxic potential of microorganisms and their constituents is addressed in the EU Directive and more explicitly included in some countries' legislation. Exchanging this national information at the European level would be helpful.

One proposal was that a commission or expert group be set up at EU level to update the list of biological agents regularly (preferably every 6 months). An international list would create more unity among Member States.

Unintentional exposures

In addition, during the group discussions, several national approaches were mentioned that may serve as examples for the development of tools and guidance to help identify and address unintentional exposures and stimulate workplace actors to do so. These were (1) TRBAs in Germany; (2) the difference made between intentional and unintentional risks/issues in the United Kingdom and in Germany; (3) the clear PPE terminology used in Hungary; (4) the rnv3p monitoring system operated by Anses in France, which records all health effects, regardless of sector and whether from intentional or unintentional exposure; and (5) the incentives for employers (information/education) used in the Netherlands. Finally, the participants indicated a need for, or likelihood of benefits from, cooperation with other policy areas such as public health, as the areas of public and occupational health often use different lists of biological agents.

¹⁸ Directive 2013/35/EU of 26 June 2013 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (20th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) and repealing Directive 2004/40/EC.

¹⁹ Directive 2010/32/EU of 10 May 2010 implementing the Framework Agreement on prevention from sharp injuries in the hospital and healthcare sector concluded by HOSPEEM and EPSU (Text with EEA relevance).

▪ Recommendations

The scope and definitions in the EU Biological Agents Directive should not be changed. However, it should be amended and expanded in the following aspects:

1. language and comprehensibility;
2. updating the annexes (in terms of classification of microorganisms — Annex III — and adoption of state of the art — Annexes V and VI);;
3. customising the annexes (making these context specific, for example in relation to jobs/sectors and also vulnerable groups).

The participants agreed that they could learn from different national approaches for addressing unintentional exposures. In addition, the participants felt that it was important that actors in different policy areas work together. Currently, in some countries, public health officials use lists of agents that are different from those in the directive.

2.3 Conclusions

The research team and Elke Schneider from EU-OSHA concluded the workshop and summarised the main issues, as outlined below.

Knowledge and awareness of (the risks of) biological agents are still not sufficient and addressing this should be considered a high priority. Awareness, and consequently knowledge, in workplaces could be increased by sharing information, for instance through national and international expert meetings and via websites to reach a larger audience. Targeted campaigns focused on biological agents and the related occupational health effects might stimulate the sharing of information among stakeholders.

Combining information regarding biological agents from different Member States and making it accessible for all stakeholders is still a challenge, as the topic is very broad. Considerable differences exist between countries regarding available and applied monitoring systems, the level of priority that is given to the topic (for instance at the governmental level) and the resources that are available to address this topic (for example with regard to knowledge exchange, enforcement and research capacity). Member States also differ in views and resources, for example which topics are considered important, specific legislation that is (or is not) in place, the definition of biological agents used and the sharing of responsibilities among different authorities. The workshop proved to be useful for gathering additional information from the Member States and recommendations on practical measures to deal with the risks associated with biological agents in the workplace.

Qualitative research among experts and workplace practitioners in this project has shown that there is a need to refocus the prevention of risks linked to exposure to biological agents on higher level control measures (such as engineering controls to eliminate risks at source and administrative controls when elimination or substitution are not possible). Currently, unlike the prevention of risks from chemical agents, when controlling (potential) risks from biological agents the use of PPE seems to be predominant. However, if we consider the hierarchy of controls, PPE (such as gloves and respiratory protection) should be considered a 'last resort'. When carrying out a risk assessment and taking action, the consideration of prevention measures that are already in place to control other exposures (for example dust or chemical substances) may prove to be a good way of also controlling biological risks. Control measures do not necessarily differ between different fields (for example biological agents, chemical agents), and the efficacy of these measures is assumed to be comparable.

Furthermore, when controlling/preventing risks due to biological agents in the workplace, it is important not only to focus on biological agents, but also to be aware that workers are exposed to multiple risks (chemical, physical and other risks) that may interact with the biological risk. Moreover, the whole chain of events related to a biological risk should be taken into account, instead of looking at only one sector or company when aiming to control a certain risk. For instance, for the control of biological agents in bulk material delivered by a supply company to a processing company, both the supply company and the processing company should be considered when devising strategies to control and prevent risks.

One of the challenges identified in the review and the workshop was how to reach out to the majority of enterprises in Europe, namely SMEs. As employers and workers in SMEs are generally less aware of

the risks, they should be given more attention. However, all participants agreed that it is difficult to reach SMEs and there are declining resources for the prevention of OSH risks in general, which of course also affects risks due to biological agents. It was pointed out by several experts who have developed tools for enterprises that it is often easier to reach larger companies with prevention and awareness-raising tools and information than smaller ones.

Unintentional exposure is considered a serious issue, as the related risk of exposure is not always obvious to those at risk. Since some of the health effects related to biological agents are rather unspecific, it is difficult to estimate how frequently exposure to biological agents leads to disease and to identify the exact risk factors that have to be addressed. It might be possible to build on different national approaches that address unintentional exposures, such as those presented at the workshop.

Several groups of vulnerable workers were mentioned during the workshop, such as young workers, temporary workers, the immunosuppressed, people working with migrants and elderly people. Prevention methods need to be tailored to meet their needs.

More information is considered necessary, because of global changes and developments in the world of work (global economy, migration, etc.). The topic of migrants and refugees is currently being discussed at both national and EU levels. For instance, Europol addresses the protection of border staff and staff that deal with securing borders and is carry out controls on infectious diseases they may encounter when they are in contact with migrants and refugees.

Young workers are an important group to consider, and they may need to be addressed differently from older adults by prevention strategies because of differences in their immune systems (for example with regard to sensitisation). Furthermore, as the group of ageing workers is increasing, and older people can be more susceptible to the effects of biological agents, older workers are also considered an important group.

Some of the issues discussed have been raised also in relation to emerging biological risks. Groups of workers that could be more affected are, for example, temporary workers, who are often less educated and less aware of the risks from biological agents than permanent workers; and people working with refugees. EU-OSHA's foresight project²⁰ addresses emerging risks for new jobs and new technologies, and similar issues arise, for example, for 'green' jobs.

Interdisciplinary communication and the sharing of information and experiences (that is, learning from each other and from past experiences) through a large variety of intermediaries is considered very important. Experiences from one sector are sometimes transferable to other sectors and should be shared, for example regarding the prevention of multiple antibiotic resistance or the prevention of sharps injuries. Organising expert groups/meetings/platforms (national and international) would stimulate the sharing of knowledge, make it possible to respond more quickly when an emerging risk is identified and, for instance, facilitate the better harmonisation of registration systems for relevant ODs and exposures to biological agents. If national initiatives are presented to EU-OSHA, it could facilitate the sharing of good practice examples at the EU level, for example by publishing articles on OSHwiki²¹.

Furthermore, cooperation between the actors in the areas of occupational health and public health is considered important, to combine the experiences of sentinel systems regarding infectious or chronic diseases from public health with the knowledge of exposure patterns from occupational health, but also in terms of monitoring ODs.

Ideas regarding broadening the scope of the Biological Agents Directive were also discussed and were in line with the ongoing discussions on possible amendments to the Biological Agents Directive. It was agreed that, as a result of the more dynamic society in which we operate today, a more continuous appraisal of issues with regard to biological agents, instead of a review of a directive once every 10-15 years, may be necessary. The 'immunological situation' in Europe is also changing as a result of, for

²⁰ The Foresight project involves looking beyond those workplace risks that are currently 'emerging', to try to anticipate change in the longer term. It involves developing scenarios in certain subject areas, looking at what might happen given certain technological developments or changes in society, and the implications for OSH, which decision-makers can act on. The first Foresight project has been looking at 'green' jobs; those which involve technology or practices which are designed to reduce environmental impact. A report identifying the key drivers of change in the area and another on the key technologies in this area that may affect workplace health and safety were published in 2011. See <https://osha.europa.eu/en/emerging-risks/green-jobs>.

²¹ OSHwiki (https://oshwiki.eu/wiki/Main_Page) was developed by EU-OSHA to enable the sharing of OSH knowledge, information and best practices, in order to support government, industry and employee organisations in ensuring safety and health in the workplace. OSHwiki aims to be an authoritative source of information that is easily updated, edited or translated and reaches beyond the OSH community.

instance, patterns of migration and a shift towards a global rather than a local economy and is thus not the same as it was 20 years ago, when the current version of the directive was formulated. This should be considered when reviewing and possibly revising the directive.

2.4 Future steps

Based on the outcomes of this project, EU-OSHA will publish the report and offer the summary and articles to its focal points for translation. This will be greatly appreciated in the countries in which information and guidance is scarce and may ultimately enable better prevention of biological risks in workplaces. Through EU-OSHA, it will be possible to make knowledge available (through, for instance, OSHwiki), for example the information on the Finnish occupational health services for farmers. Furthermore, EU-OSHA will facilitate the organisation of workshops at the national level through its focal points, to support knowledge exchange at the national level. EU-OSHA also acknowledges that a link between work-related health and public health is important in relation to biological agents and will therefore inform the European Centre for Disease Prevention and Control (ECDC) in Stockholm of the outcomes of the project and this workshop, to increase cooperation and stimulate an interdisciplinary approach. EU-OSHA will maintain close links with the European Commission and will make the information gathered in the project available for the process of the review and (possible) revision of the Biological Agents Directive.

3 Annex 1: Questions for the group discussions

3.1 Monitoring of diseases and exposure resulting from exposures to biological agents

- Do you see the same challenges in your country as those identified in the review?
- Any examples from your country of diseases and exposures not covered here and other approaches? Are any diseases not mentioned that should be addressed?
- Is there a lack of data on exposure?
- If yes, from your point of view, how could this be addressed?
- Would more systematic monitoring be helpful to target prevention? What could be done to ensure this, at both the EU and international level? Any diseases or exposures that you regard as a priority?

3.2 Policies and practices in place to manage and control exposures to biological agents at the workplace

- Do you have examples of relevant policies, initiatives and measures that are in place in your country in addition to those mentioned during the presentations (e.g. risk assessment tools, etc.)?
- From your experience, can you provide any other examples of what is currently lacking regarding the systematic prevention of health effects due to exposure to biological agents?
- What should be developed to ensure systematic prevention? Are there any types of initiatives/prevention measures that could be implemented or implemented better?
- For which sectors/jobs/biological agents/exposure scenarios?
- What could be the obstacles to or facilitators for putting it in place? How do we measure success, what do we need for success?

3.3 Specific sectors and groups — the project focused on specific occupations (healthcare, agriculture and waste treatment), are there any others?

- In your national experience, are the sectors mentioned during the presentation the most relevant? Are they the most related to emerging risks?
- Are there any sectors missing? Which ones should we focus on and why?

- What vulnerable groups were not mentioned during the presentations but are important to focus on? Why?
- Are there any other issues related to SMEs in these sectors that were not mentioned?

3.4 EU directive on biological agents — relevance of the findings

- In your national context, are there any differences between the directive and the national legislation?
- Is there a broader definition of biological agents? For example, is the sensitising or toxic potential of microorganisms and their constituents explicitly included?
- Is prevention and legislation linked to the approach of classifying agents into groups and are prevention measures linked to classification? Or are there other approaches, for example, defined prevention approaches or legislation for particular work processes, sectors or occupational groups? Could these be applied elsewhere?
- Could we build on different national approaches to, for example, addressing unintentional exposures?
- Are there any sectors not well covered by legislation? What are the challenges?
- In your view, what would be the best approach?