

European Agency for Safety and Health at Work

Work-related cardiovascular disease prevention: regulations, policies, strategies and initiatives

Report

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List of abbreviations

Abbreviation	Definition
CVD	Cardiovascular disease
EC	European Commission
EEA	European Environmental Agency
EU	European Union
EU-OSHA	European Agency for Safety and Health at Work
FoP	Focal Point
INSST	Instituto Nacional de Seguridad y Salud en el Trabajo (Spanish National Institute for Safety and Health at Work)
MS	Member State (of the European Union)
MSD	Musculoskeletal disorder
NCD	Non-communicable disease
OECD	Organisation for Economic Co-operation and Development
OSH	Occupational safety and health
RAW	Retention at work
RTW	Return to work
SME	Small and medium-sized enterprise
WHO	World Health Organization
WHP	Workplace health promotion
WMO	World Meteorological Organization
WR-CVD	Work-related cardiovascular disease

Executive summary

Background and objectives

Cardiovascular diseases (CVDs) remain the leading cause of mortality in the European Union (EU), where they account for approximately 1.7 million deaths each year. While CVDs have traditionally been attributed to behavioural and clinical risk factors, emerging research highlights the significant role of occupational determinants. This study builds on a growing body of evidence demonstrating that:

- occupational risk factors such as stress, long working hours, shift work, sedentary work and exposure to noise and chemicals can all contribute to cardiovascular morbidity and mortality;
- occupational risk factors often interact with lifestyle and socioeconomic determinants, which can exacerbate health inequalities among workers and sectors;
- recognition of these interdependencies has led to efforts to integrate cardiovascular health into European and national occupational safety and health (OSH) strategies, as reflected in the EU Strategic Framework on Health and Safety at Work 2021-2027 (European Commission [EC], 2021b), the Healthier Together initiative (EC, 2022) and the Council Conclusions on non-communicable diseases (NCDs) (Council of the EU, 2024b).

The study contributes to a major research project currently being carried out by the European Agency for Safety and Health at Work (EU-OSHA) on CVDs and OSH, and aims to:

- assess how EU Member States (MSs) and selected international initiatives have integrated cardiovascular risk prevention and return-to-work (RTW) and retention-at-work (RAW) measures into OSH and public health frameworks;
- identify success factors and good practices for the successful prevention of work-related CVDs (WR-CVDs) and the promotion of RTW and RAW measures;
- identify gaps and unmet needs in existing initiatives to provide policy pointers and enhance strategies for the prevention of WR-CVDs, support RTW for workers after CVDs and promote RAW for workers with chronic CVDs.

In addition to the report, five case studies have been prepared to serve as relevant examples of initiatives that integrate CVD prevention and RTW and RAW practices.¹

Policy context

The review identified three overarching policy trends shaping the current European landscape with regard to the prevention of CVDs and the promotion of RTW for workers after CVDs or RAW for workers with chronic CVDs.

Integrated and collaborative approaches

Policy frameworks are increasingly recognising the complexity of health challenges and the need for collaboration across sectors, disciplines and national systems, including partnerships between OSH authorities, public health agencies, employers, social partners and community organisations.

Growing focus on climate-related occupational risks

Climate change has increased exposure to environmental hazards such as extreme heat and air pollution, which are increasingly understood as contributing to cardiovascular strain.

Prevention through lifestyle interventions

Many interventions, often referred to as workplace health promotion (WHP) initiatives, focus on encouraging lifestyle modifications, reducing tobacco and alcohol consumption, and promoting healthier diets and physical activity. While these approaches are beneficial, they often overlook the role of workplace exposures and organisational determinants, as well as employers' obligations under the EU OSH Framework Directive (Council Directive 89/391/EEC) to prevent work-related risks to workers' safety and health, including CVD risks (Council of the European Communities, 1989).

¹ See *Case studies* subsection below.

Key findings

While recent European strategies have addressed cardiovascular health in the workplace, their implementation through national programmes and practical interventions remains limited. A comparative analysis of 20 initiatives identified the following trends:

Objectives and scope

- Increased awareness of cardiovascular risk within the workplace was the most common objective among the reviewed initiatives.
- Awareness was promoted primarily through lifestyle-focused interventions to encourage healthier behaviours among workers.
- Limited attention was given to the role of workplace prevention, risk assessment, occupational exposures and socioeconomic determinants of health in the development of CVDs.

Target groups and effectiveness

- Most initiatives targeted broad worker populations rather than specific sectors, occupations or risk groups. Although this approach maximised reach, it often resulted in lower specificity and reduced effectiveness, as interventions were not tailored to the needs or risk profiles of particular occupational groups.

Engagement strategies and behavioural change

- Initiatives that reported the strongest behavioural impact used a combination of engagement methods such as individual support and workplace adjustments.
- Personalised support such as counselling and tailored advice, alongside changes to the work environment, contributed to positive and sustained behavioural change.

Evaluation and outcomes

- Many initiatives included evaluation mechanisms to assess implementation and outcomes.
- However, follow-up periods were often too short to observe long-term health impacts, which limited the evidence on sustained effectiveness.

Success factors

- Successful initiatives demonstrated early stakeholder commitment and cross-sector collaboration.
- Effective interventions provided tailored support based on the workplace context, clearly defined objectives and indicators, involvement of health professionals and targeted assistance for small and medium-sized enterprises (SMEs).

Assessment of transferability

Transferability was strongest where initiatives were:

- evidence-based in terms of their design;
- adaptable to different workplace environments and sectoral contexts;
- supported by scalable implementation structures;
- underpinned by robust monitoring and evaluation frameworks.

Initiatives lacking stable funding, cross-sector coordination or formalised monitoring systems demonstrated reduced potential for successful transfer.

Methodology

The methodology followed in this study was implemented in several stages:

- A primary review of literature and policy covering 83 initiatives launched between 2019 and 2025, including academic and grey literature, was conducted. In parallel, 81 references cited in EU-OSHA's Focal Point (FoP) survey were reviewed.

- From this body of evidence, 20 initiatives addressing WR-CVD prevention and RTW and RAW strategies were selected based on predefined criteria and subjected to a preliminary analysis.
- Of these, five initiatives were identified as examples of holistic approaches and developed as case studies, informed by fieldwork and a total of eight stakeholder interviews.

Case studies

To complement the comparative review and illustrate how occupational health policies are being translated into practice, a set of detailed case studies was selected. These examples provide insight into how different national systems operationalise CVD prevention, WHP, and RTW and RAW support in real organisational and sectoral contexts. By examining a range of approaches, from community-based outreach and structured professional guidelines to enterprise-level programmes, they highlight both promising practices and persistent implementation gaps across Europe. The following five case studies were developed:

1. **Farmers Have Hearts** (Ireland): a community-based CVD prevention programme for farmers delivered through direct outreach at farmers' markets.²
2. **fit2work** (Austria): a national programme that provides counselling and comprehensive support to workers with chronic illnesses, as well as to companies to enhance prevention and reintegration capacity.³
3. **WHP programmes** (Italy/Spain): public accreditation systems incentivising companies to implement comprehensive health promotion programmes.⁴
4. **STAR-VITAL – Joint Measures for the Vitality of Older Workers** (Slovenia): a workplace health initiative that supports SMEs in implementing health prevention initiatives.⁵
5. **NVAB Guideline on Ischaemic Heart Disease** (Netherlands): professional standards and recommendations for occupational physicians to support secondary prevention and the RTW and RAW of workers after cardiac events.⁶

Conclusions

The analysis of EU and national initiatives demonstrates that successful interventions are achievable when they are well designed, context-sensitive and adequately supported. However, their long-term impact continues to be limited by gaps in funding, work-related cardiovascular risk assessment protocols and the integration of broader socioeconomic determinants of health, including education, income, working conditions and access to healthcare. The conclusions below reflect both the strengths identified and the areas where targeted improvements are needed:

- The review identified several promising practices across Europe, thus demonstrating that well-designed workplace initiatives can effectively support CVD prevention and management, as well as RTW and RAW measures, when they are appropriately resourced and tailored to workers' needs.
- Successful initiatives consistently secured strong commitment from funders, managers and workers, which shows that early buy-in and the presence of programme 'champions' can significantly enhance implementation and uptake.

² See: *Cardiovascular disease prevention for farmers through workplace health checks*

<https://osha.europa.eu/en/publications/cardiovascular-disease-prevention-farmers-through-workplace-health-checks>

³ See: *Fit2work in Austria: supporting return to work after illness*

<https://osha.europa.eu/en/publications/fit2work-austria-supporting-return-work-after-illness>

⁴ See: *Accreditation scheme promotes workplace health to prevent cardiovascular disease*

<https://osha.europa.eu/en/publications/accreditation-scheme-promotes-workplace-health-prevent-cardiovascular-disease>

⁵ See: *Supporting workplace health promotion for workers in Slovenian small businesses*

<https://osha.europa.eu/en/publications/supporting-workplace-health-promotion-workers-slovenian-small-businesses>

⁶ See: *Work-related cardiovascular disease: Dutch guidance on prevention and return to work*

<https://osha.europa.eu/en/publications/work-related-cardiovascular-disease-dutch-guidance-prevention-and-return-work>

- Dialogue between stakeholders should form the foundation for successful initiatives. Multidisciplinary collaboration and worker involvement should be fostered when developing OSH initiatives and providing holistic support to workers and companies.
- A comprehensive approach is needed to understand the factors underlying CVD risk and to design interventions that are relevant, feasible and capable of achieving sustainable behavioural change while addressing occupational factors, including work-related psychosocial and organisational risks, as well as environmental and wider socioeconomic determinants.
- Non-financial mechanisms such as certification and award programmes could be considered for companies that have gone above and beyond the minimum regulatory requirements and implemented good OSH practices.
- Effective programmes considered the broader socioeconomic, cultural and organisational context, thereby demonstrating that embedding interventions in local communities or adapting to organisational constraints (e.g. during Covid-19) increases accessibility and relevance.
- Involving dedicated health professionals emerged as a core strength of successful initiatives, since this helps ensure continuity of care and strong coordination between workers, employers and healthcare providers.
- Initiatives specifically supporting SMEs through organisational guidance, training or reintegration support highlight the importance and feasibility of helping smaller companies overcome resource and capacity barriers.
- The identified initiatives lacked sustained funding, which limited their potential impact. To ensure interventions translate into lasting health outcomes, financial frameworks should be integrated into national OSH budgets to secure the long-term continuity of initiatives for the prevention of WR-CVDs.
- The programmes did not adequately address how workplace risk factors can exacerbate CVDs. Sector-specific guidance is needed to guide and inform a holistic framework that recognises the workplace as a modifiable factor, where WR-CVD risks can be effectively prevented and managed in line with the EU OSH Framework Directive, rather than simply as a setting for health promotion interventions.
- Particular attention should be given to high-risk sectors such as construction and workers subject to specific working conditions, including night or irregular shift work and prolonged exposure to noise and chemicals.
- Socioeconomic determinants of health are currently insufficiently integrated into OSH policies, despite the complex contexts in which workers operate. These include sociodemographic and clinical characteristics, working conditions and lifestyle factors.

Key policy pointers

To strengthen the integration of cardiovascular health into OSH policy and practice, the following key policy pointers are proposed, developed and published in a standalone document⁷:

1. Mandated institutions and authorities should introduce and implement sector-specific risk assessment guidance and protocols for assessing and managing WR-CVD risks. These should aim to identify, assess and eliminate or minimise occupational risk factors in line with the EU OSH Framework Directive, while providing recommendations for prevention, monitoring frameworks, training and job-related controls.
2. Multidisciplinary collaboration and worker involvement should be fostered in the development of OSH initiatives to facilitate implementation and ensure risks are identified from multiple perspectives, thus providing workers with holistic prevention and support.

⁷ See policy brief *Work-related cardiovascular diseases: policies for prevention, return to work and retention at work* at: <https://osha.europa.eu/en/publications/work-related-cardiovascular-diseases-policies-prevention-return-work-and-retention-work>

3. Greater efforts should be made to promote awareness of and training on WR-CVD risk factors within organisations to drive stronger commitment to occupational health initiatives and increase momentum for interventions that address CVDs within the workplace.
4. The role of occupational health practitioners in supporting RTW and RAW programmes should be evaluated to identify cost-effective ways of involving them in different national and sectoral contexts.
5. Policies that incentivise sustainable funding mechanisms such as grants and tax breaks should be designed to encourage organisations to go beyond the minimum regulatory national standards and actively promote good practices for the prevention of WR-CVDs.

1 Introduction

1.1 Project scope

In recent years, public health authorities have increasingly focused on measures aimed at reducing cardiovascular risks, given that CVDs are a leading cause of death in the EU (Wilkins et al., 2017). As with other public health priorities, efforts to reduce CVD risk increasingly consider broader health systems, occupational health frameworks and environmental policies, with growing recognition of how these domains interact to shape individual health. In this regard, complex public health challenges must be understood as the product of dynamic and interdependent systems (e.g. societal, environmental and psychosocial) and require a holistic approach that considers how these factors interact (Crielaard et al., 2025). WR-CVD risk factors have gained visibility, as reflected in European initiatives such as the Strategic Framework on Health and Safety at Work 2021-2027 (EC, 2021b) and the EU Healthier Together initiative (EC, 2022), both of which highlight the workplace as a key setting for CVD prevention. More recently, in December 2024, the Council of the EU called for more robust measures to be taken by EU MSs to prevent CVDs (Council of the EU, 2024a).

In this context, regulations, policies, practices, strategies, initiatives and programmes aimed at preventing CVD risks within the workplace play a crucial role, not only in preventing the onset of CVDs among workers, but also in supporting RTW after CVD events and promote RAW for individuals with chronic CVDs. However, while the need for actions to reduce the burden of CVDs is clear, the evidence for their implementation is uncertain and fragmented. Large-scale interventions aimed at reducing occupational CVD risk factors are limited, which makes it challenging to assess their effectiveness.

1.2 Project objectives

This project contributes to a major research initiative currently being carried out by EU-OSHA on CVDs and occupational safety and health (OSH), and pursues three main objectives:

- to conduct an overview and analysis of regulations, policies, practices, strategies, initiatives and programmes at EU, national and sectoral levels to prevent WR-CVDs, support RTW for workers after CVDs or RAW for workers with chronic CVDs;
- to identify and analyse key success factors and highlight case studies or relevant examples that have contributed to the prevention of WR-CVDs, RTW for workers after CVDs or RAW for workers with chronic CVDs;
- to identify gaps and unmet needs in existing policies and provide policy pointers to enhance strategies for preventing WR-CVDs and supporting RTW for workers after CVDs or RAW for workers with chronic CVDs.

This report brings together findings from a literature review and fieldwork research, based on interviews, to provide an overview of policy and regulatory efforts and identify trends and case examples within (and beyond) the EU in occupational health and other related policy areas, such as public health, the environment, and nutrition and food policies. Related to this work is the creation of five case studies identified as relevant examples, as well as a policy brief⁸, all published as standalone documents.

1.3 Methodology

The desk research aimed to map European and selected international initiatives that have addressed the prevention of WR-CVDs and provided support for RTW and RAW. The study focused on initiatives launched between 2019 and 2025, while also considering earlier cases if they were particularly innovative or transferable. The desk research was organised around a set of guiding research questions (see **Appendix A: Research guiding questions**) that aimed to investigate three interconnected domains: the exposure of different groups of workers to WR-CVD risks, the design and effectiveness of prevention and reintegration measures, and the identification of regulatory or institutional gaps.

The research involved examining legislation, policies, programmes, campaigns and studies sourced from academic, governmental and grey literature. The search string used for online assets can be found

⁸ See policy brief *Work-related cardiovascular diseases: policies for prevention, return to work and retention at work* at: <https://osha.europa.eu/en/publications/work-related-cardiovascular-diseases-policies-prevention-return-work-and-retention-work>

in **Appendix B: Desk research methodology: search string**. A total of 83 initiatives were identified: 14 as strategy, guidance or policy documents on workplace CVD/NCD risks; 25 as long-term occupational health programmes; 19 as published studies focusing on evidence and evaluation; 13 as legislative measures; and one workshop. The findings reveal a variety of approaches, with a significant focus on programmes and research but fewer awareness and training activities, thus indicating both progress and areas for improvement.

Responses from EU-OSHA's FoP survey submitted by national OSH authorities complemented the desk research (see **Appendix C: Focal Point survey results**). The survey collected data on regulations, policies and strategies to prevent WR-CVDs, support RTW efforts and manage CVDs. These results were integrated with the findings from the desk review. Sixteen EU MSs provided 81 references. After screening, 56 were deemed relevant; these were primarily campaigns, training activities and legislation predating 2019, as well as programmes and workshops that met the inclusion criteria. Initiatives were categorised by country, type, implementing body, timeframe, scope, objectives, description and impact, with evaluations focusing on CVDs and occupational health topics. Section 1.3.3 outlines the assessment process for the 20 initiatives identified through the survey.

A review of 83 desk research references and 81 FoP survey sources further narrowed the selection of initiatives relevant to WR-CVD prevention, RTW and RAW. Selection was guided by thematic relevance, completeness of data, health promotion, behavioural interventions, occupational risk prevention and employer responsibility. Pivot tables were used to support a comparative analysis and assess effectiveness, which revealed both policy overlaps and implementation disparities across EU MSs. Ultimately, 30 initiatives met the inclusion criteria. Following a detailed review, 20 high-performing and well-aligned initiatives (15 from desk research and five from the FoP survey) were retained. The majority consisted of programmes and guidance materials rather than legislation or specific RTW schemes, thereby underscoring the limited presence of national frameworks addressing CVDs within occupational health.

Five final case studies were selected from the 20 identified initiatives to serve as relevant examples. The final selection criteria for the prioritisation of initiatives are outlined in **Table 1** below.

Table 1: Selection criteria for the final five case studies

Criteria	Description
Recency	Initiatives launched within the past two to three years or currently being implemented, thereby ensuring alignment with current policy priorities, labour market trends and emerging public health challenges.
European focus	Initiatives implemented within EU MSs, thus supporting coherence with EU policy objectives, governance frameworks and cross-border relevance.
Transferability	Initiatives with a demonstrable capacity to be effectively adapted and replicated across diverse European contexts and regions, irrespective of national or local variations in policy frameworks, institutional capacities or socioeconomic conditions. High transferability also implies that the approach, methodology or outcomes can be readily adapted to contexts beyond the original implementation setting.
Availability of information	Initiatives with adequate, publicly accessible documentation and data, such as reports, evaluations and online materials, to facilitate transparency, comparability and knowledge transfer among stakeholders.
Direct link between CVDs and the workplace	Initiatives that explicitly address workplace-related determinants and risk factors associated with CVDs, thereby contributing to improved occupational health and well-being outcomes.
Evaluation available	Initiatives that include a formal evaluation or assessment mechanism designed to measure effectiveness, outcomes and potential for scalability, thus enhancing accountability and evidence-based policy learning.

Source: authors' selection criteria and methodological approach.

Once the five case studies had been selected, semi-structured interviews were conducted with key stakeholders, organisers and participants associated with each initiative. The interviewees comprised academic researchers, representatives of public authorities, healthcare professionals and workers, who were purposively selected based on their direct involvement in the design, implementation, monitoring or evaluation of the initiatives.

The qualitative data obtained from these interviews covered a range of thematic areas, including:

- goals and objectives,
- development and implementation processes,
- target groups and beneficiaries,
- core messages and communication strategies,

- resource requirements and availability,
- levels of engagement and adherence,
- achievements, challenges and lessons learned,
- evaluation methodologies and findings,
- revisions or adaptations over time,
- potential for transferability across EU MSs.

Each case study was then synthesised into a detailed individual report to provide a structured account of the background, methodology, outcomes and contextual factors that shaped the initiative's success.

A consolidated analysis of all case studies, combined with insights from the preceding desk research and mapping stages, informed the comparative assessment. This final analytical phase identified common trends, gaps and emerging needs and provided the basis for strategic priorities, conclusions and policy pointers aimed at enhancing the relevance, impact and scalability of WR-CVD prevention initiatives across the EU.

1.4 Structure of the report

This report is divided into four main sections:

Section 1 – Introduction presents the project's purpose and objectives and provides an overview of the methodology used for the literature review, the analysis of the FoP survey results and the consultation process with key stakeholders.

Section 2 – Overview of the state of the art examines the link between CVDs and occupational risk factors, policy approaches and European initiatives concerning OSH in this area. It also presents psychosocial, ergonomic and environmental risk factors, behavioural risk factors and RTW and RAW initiatives.

Section 3 – Regulations, policies and initiatives for preventing work-related cardiovascular diseases present the current policy landscape related to OSH, public health, environmental health and CVDs, as well as a detailed description and comparative analysis of 20 regulations, policies, practices, strategies, initiatives and programmes for WR-CVD prevention, RTW and RAW. It also addresses possible gaps and priorities for OSH policies.

Section 4 – Conclusions and policy pointers details actions aimed at improving the prevention of WR-CVDs.

2 Overview of the state of the art

2.1 Link between cardiovascular diseases and occupational risk factors

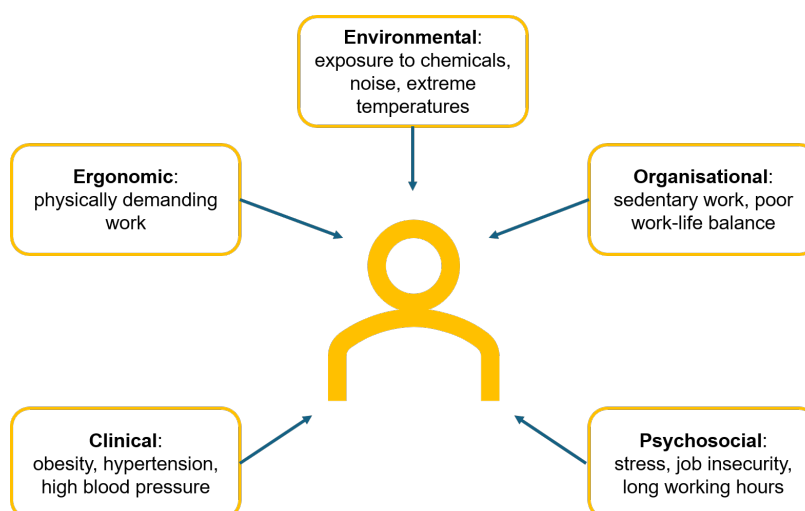
CVDs are a significant global health burden, given that they represent one of the leading causes of mortality worldwide and the second-largest cause of work-related deaths in the EU (EC, 2021b). According to the World Health Organization (WHO), an estimated 19.8 million people died from CVDs in 2022, which represented 32 % of all deaths worldwide (WHO, 2025). In 2021, diseases of the circulatory system were responsible for approximately 1.71 million deaths in the EU (Eurostat, 2024). CVDs encompass a wide range of conditions affecting the heart and vascular system, including coronary, cerebrovascular and peripheral arterial diseases, as well as arrhythmias and inflammatory disorders such as rheumatic heart disease.

The development of CVDs is influenced by both non-modifiable and modifiable risk factors. Non-modifiable factors include age, sex, family history, ethnicity and genetic predisposition, while modifiable factors include behavioural and lifestyle factors such as smoking, unhealthy dietary patterns, physical inactivity, hypertension, dyslipidaemia, diabetes and alcohol consumption. However, these individual factors do not exist in isolation – they are strongly influenced by broader socioeconomic determinants of health, including education, income, working conditions and access to healthcare services, which together shape exposure, vulnerability and capacity for prevention.

Recent studies indicate that occupational exposures may play a role in the development and progression of CVDs. Certain working conditions can increase cardiovascular risk, especially when job demands exceed workers' capacity to recover or adapt.

As illustrated in **Figure 1**, WR-CVD risk factors can be grouped into five broad categories: environmental factors such as exposure to heat, noise and pollutants; organisational factors such as low job control and poor work-life balance; psychosocial factors such as stress, job insecurity and long working hours; ergonomic factors such as physical strain and static postures; and clinical factors such as hypertension, obesity, dyslipidaemia and other metabolic disorders influenced by work-related conditions. These occupational exposures often interact with behavioural and clinical risk factors, as well as wider socioeconomic determinants such as income, education and access to healthcare, thus creating cumulative effects over the course of a working life.

Figure 1: CVD risk factors



Source: authors' analysis of the literature findings.

Key occupational risk factors identified in the literature include long and irregular working hours, night and shift work, excessive workload, job strain and limited decision latitude, all of which can induce chronic stress responses linked to hypertension, metabolic disorders and other CVD precursors.

Physical exposures such as noise, vibration, extreme temperatures and exposure to hazardous substances can further amplify risk, particularly in industrial and construction sectors (EU-OSHA, 2023a).

Certain occupations are therefore exposed to a combination of multiple risk factors. For example, individuals with pre-existing health vulnerabilities, lower socioeconomic status or limited access to healthcare are disproportionately represented in occupations characterised by long working hours, irregular or night shifts and exposure to hazardous physical, ergonomic, chemical or psychosocial risk factors (Organisation for Economic Co-operation and Development [OECD], 2022). These overlapping risks can increase the incidence of cardiovascular events in ways that exceed the effects of any single exposure. Understanding the combined and prolonged effects of such risk factors and identifying how specific work practices or organisational interventions can buffer them is critical for designing effective prevention, RTW and RAW strategies. At the same time, workplaces that actively promote protective practices such as flexible work schedules, health monitoring, ergonomic improvements and psychosocial support can mitigate risks and reduce health inequities among workers.

The economic implications of CVDs are closely linked to occupational health outcomes. Across the EU, the annual cost of CVDs is estimated at approximately EUR 210 billion (EC, 2025a), with most of this stemming from healthcare expenditure. However, around a quarter of these costs arise from productivity losses associated with absenteeism, presenteeism and premature exit from the labour market due to CVDs. These figures highlight the fact that poor cardiovascular health not only affects individual well-being but also erodes organisational performance, workforce sustainability and economic competitiveness. Integrating CVD prevention into OSH policies is therefore both a public health imperative and an economic necessity.

2.2 Psychosocial occupational risk factors and related European initiatives

Certain psychosocial risks in the workplace have been associated with an elevated risk of CVDs, including high job demands combined with low job control, low reward, workplace bullying, role ambiguity and effort-reward imbalance (Leka et al., 2011). The link between psychosocial stress and CVDs is mediated by both biological and behavioural mechanisms. Chronic stress activates the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system, which results in prolonged release of cortisol and catecholamines. Over time, this can contribute to sustained elevations in blood pressure, endothelial dysfunction, systemic inflammation and metabolic disturbances, all of which are established pathways contributing to CVD development. Stress can also influence health-related behaviours, including increased tobacco and alcohol consumption, reduced physical activity and unhealthy dietary patterns, which further compound cardiovascular risk (Kivimäki et al., 2012).

According to Aust et al. (2023), organisational-level interventions that address occupational psychosocial risks have demonstrated substantial benefits in reducing burnout and improving overall well-being. Although these interventions do not typically target burnout directly, they modify structural and organisational features of work known to influence exposure to stress. This is achieved through approaches such as redesigning work to balance job demands, training managers to improve communication and leadership, and increasing employee autonomy and job control. The strongest evidence for their impact relates to reductions in burnout, while more moderate effects have been observed for general health and well-being; evidence of their effects on stress reduction and long-term RAW remains inconclusive.

At EU level, psychosocial risks are addressed indirectly by the EU OSH Framework Directive, through the general duty of employers to assess and prevent occupational risks (Council of the European Communities, 1989) and in the EC communication on Safer and Healthier Work for All (EC, 2017). In addition, social-partner agreements such as the Framework Agreement on Work-Related Stress (European Social Partners, 2004) provide a negotiated template for identifying, assessing and preventing psychosocial hazards across EU MSs. More recently, the EU Strategic Framework on Health and Safety at Work 2021-2027 (EC, 2021b) highlighted the prevention of psychosocial risks and the promotion of mental well-being as key priorities within the broader agenda for a safe and healthy work environment. The EC's communication on a comprehensive approach to mental health (EC, 2023), part of President von der Leyen's policy agenda, set out a cross-sectoral strategy to address mental health challenges, including those linked to workplace stress and psychosocial risks.

However, binding national-level policies specifically aimed at systematically safeguarding workers against psychosocial risks remain limited across EU countries. While EU directives and guidance offer general frameworks, they rely upon national transposition for more specificity, enforcement mechanisms and standardised monitoring of cardiovascular and stress-related outcomes. Outside of the EU, and as an example, Japan launched the Stress Check Programme under the Industrial Safety and Health Act (Government of Japan, 2015b), which requires employers with more than 50 employees to conduct annual psychosocial risk assessments and provide follow-up support through occupational physicians. This system institutionalises the early identification of psychosocial risks and links it to preventive interventions, including counselling and work adjustments.

2.3 Ergonomic occupational risk factors and related European initiatives

Work-related musculoskeletal disorders (MSDs) remain one of the most prevalent occupational health problems across the EU, where they contribute substantially to morbidity, disability and productivity losses. They are caused primarily by repetitive movements, manual handling of loads, awkward or static postures and high physical demands, particularly in sectors such as healthcare, construction, manufacturing, agriculture and transport (EU-OSHA, 2019). MSDs are now recognised as chronic, multifactorial conditions influenced not only by biomechanical strain but also by work-related psychosocial and organisational risk factors, including excessive workload, low autonomy, time pressure and insufficient recovery periods (Macdonald & Oakman, 2015). These interacting exposures contribute to cumulative physical strain, fatigue and long-term degenerative changes. In addition to causing direct musculoskeletal damage, chronic pain and functional limitations can reduce overall physical activity levels and increase stress responses, which may link MSDs to cardiovascular and metabolic health outcomes (EU-OSHA, 2019).

Sedentary work has emerged as a critical concern in knowledge-based and service economies. A large-scale prospective cohort study involving nearly half a million participants found that workers who predominantly sat during working hours had a 34 % higher risk of cardiovascular mortality compared with those who did not, even after adjusting for demographic and lifestyle variables (Gao et al., 2024). This finding illustrates how modern work organisation, digitalisation and limited opportunities for movement have created new cardiovascular risk profiles, even in occupations traditionally perceived as low risk.

Recent analyses have shown that prevention is most effective when both physical and psychosocial dimensions of work are addressed simultaneously. Task variation, mechanical assistance and improved workstation design can reduce biomechanical load, while participatory approaches that involve workers in risk assessments and decision-making can improve adherence to and the sustainability of interventions (Bezzina et al., 2023). Organisational strategies, including workload management, adequate rest breaks and supervisory support, are equally critical in mitigating psychosocial strain. The EU has established several legislative and policy measures to mitigate these risks. Council Directive 90/269/EEC on manual handling of loads (Council of the European Communities, 1990a) and Council Directive 90/270/EEC on display screen equipment (Council of the European Communities, 1990b) provide the primary regulatory framework for ergonomic risk management by requiring employers to assess, prevent and reduce hazardous manual handling and screen-related work. The EU Strategic Framework on Health and Safety at Work 2021-2027 reinforces MSD prevention as a strategic priority by promoting integrated approaches that encompass physical, psychosocial and organisational risk factors (EC, 2021b). EU-OSHA's campaign Healthy Workplaces Lighten the Load (2020-2022) further supports these efforts through awareness-raising, sectoral guidance and the promotion of participatory ergonomics (EU-OSHA, 2022). However, emerging challenges associated with digitalisation, telework and an ageing workforce require updated and adaptable ergonomic strategies that promote movement, recovery and inclusivity. These strategies must be applied consistently across MSs while accounting for differences in resources, workforce composition and technical capacity.

2.4 Environmental occupational risk factors and related European initiatives

Environmental workplace hazards arising from exposure to physical or chemical factors, such as noise, air pollutants, heat and certain industrial chemicals, are associated with cardiovascular outcomes through a range of mechanisms, including sympathetic activation, systemic inflammation and direct cardiotoxic effects (Teixeira et al., 2021). For example, long-term exposure to high levels of occupational

noise and certain airborne pollutants is associated with a higher incidence of hypertension, ischemic heart disease and other CVDs. Likewise, exposure to extreme heat and some chemical agents has been associated with acute cardiovascular strain. Occupations particularly exposed to these hazards include construction workers, factory and assembly-line operators, firefighters, agricultural labourers, foundry workers and healthcare staff working in high-intensity environments.

In 2025, the WHO and the World Meteorological Organization (WMO) released guidelines highlighting that climate change-induced workplace heat stress poses serious risks to workers' health and productivity. Physiological responses include higher core and skin temperatures, increased heart rate and cardiovascular strain. The accompanying report linked heat stroke to an increased risk of ischaemic heart disease and other CVDs such as major cardiovascular events, ischaemic stroke and atrial fibrillation in long-term follow-up periods (WHO & WMO, 2025).

European regulatory instruments that address these environmental risks operate at several levels. Occupational exposure limits and control frameworks, such as Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (European Parliament & Council of the EU, 2006a), Chemical Agents Directive 98/24/EC (Council of the EU, 1998) and Air Quality Directive 2008/50/EC (European Parliament & Council of the EU, 2008), aim to reduce workers' and the public's exposure to cardiotoxic agents and particulate pollution. The national transposition of occupational exposure limits, together with employer-level exposure assessment and technical controls such as ventilation, enclosure and substitution, forms the primary mechanism for mitigating these hazards in the workplace.

Despite these efforts, EU policy contains critical gaps in the protection of cardiovascular health in the workplace. Existing regulations are largely specific to individual chemicals or pollutants and do not comprehensively address the cumulative cardiovascular risks arising from combined environmental, ergonomic and psychosocial stressors. There is also limited guidance on occupational heat stress management and the long-term monitoring of cardiovascular outcomes among exposed workers. Moreover, EU policy tends to rely on national transposition and employer compliance, which results in variability in enforcement and effectiveness across MSs.

2.5 Behavioural risk factors and related European initiatives

Behavioural risk factors, such as physical inactivity, sedentary behaviour, unhealthy dietary patterns, and tobacco and alcohol consumption, have been identified as significant contributors to cardiovascular risk. These behaviours are widely recognised as the main modifiable contributors to the development of CVDs through well-established pathways such as hypertension, dyslipidaemia, obesity and impaired glucose metabolism.

Importantly, the work environment can strongly influence these behaviours and often exacerbate their impact. For example, shift work may disrupt normal meal timing and sleep patterns, thereby making it difficult for workers to maintain a balanced diet and prepare healthy meals. Similarly, heavy workloads and long working hours can leave workers with insufficient time or energy for regular physical activity, thus limiting opportunities to maintain cardiovascular fitness. High-stress or monotonous work may also increase reliance on tobacco, alcohol or energy-dense convenience food as coping strategies (Gao et al., 2024).

Public health guidance (e.g. WHO, 2020) and EU health promotion campaigns (e.g. EC, 2021c) support employer-based programmes such as workplace smoking cessation, healthy catering policies, active design for offices and the provision of facilities that encourage active commuting. EU-OSHA and national occupational health services produce toolkits and guidance to help employers implement behaviour-change interventions.⁹ Such initiatives emphasise that multicomponent programmes, which combine environmental changes with individual counselling, are more effective than single-component approaches. Several meta-analyses and systematic reviews have found moderate evidence for workplace interventions improving weight and physical activity (Proper & van Oostrom, 2019).

Despite these efforts, many WHP programmes are limited in duration, intensity and resources, which often prevents them from producing sustained health outcomes. Furthermore, most interventions focus on individual behavioural change without adequately addressing the working conditions that contribute to unhealthy behaviours. For instance, interventions that target dietary patterns or exercise are unlikely

⁹ For further information, see EU-OSHA web section on Psychosocial risks and mental health at work: <https://osha.europa.eu/en/themes/psychosocial-risks-and-stress>

to succeed if workers continue to face heavy workloads, irregular shifts, sedentary work or limited access to healthy meals. Consequently, these programmes have limited potential to reduce cardiovascular risk unless they are integrated within broader organisational measures to modify the work environment itself, such as flexible work schedules, workload management and structural opportunities for physical activity and healthy eating (Teixeria et al., 2021).

Workplace programmes that combine supervised exercise, dietary counselling, smoking cessation support and psychosocial care have been associated with improved functional capacity and quality of life. Linking workplace behavioural programmes with occupational health services can support safer and more sustainable RTW trajectories (Tjahjono & Arthamin, 2024).

2.6 Returning to work after a cardiovascular event

As stated in a systematic review and meta-synthesis of qualitative research, individuals recovering from CVDs face a wide range of barriers to returning to work, including fatigue and cognitive impairments (Andersen, Kristiansen & Jørgensen, 2023). Work disability frameworks recognise that the RTW process is shaped by a number of factors, including gender, age, educational attainment and income level (Loisel et al., 2013). Returning to work following a CVD event is particularly affected by clinical severity, functional capacity, comorbidities, psychosocial factors, work demands and workplace accommodations (Boudrez, De Backer & Comhaire, 1994).

Following a CVD event, persistent physical symptoms, particularly fatigue, and reduced stamina are the most frequently cited obstacles to resuming employment, according to the systematic review and meta-synthesis of qualitative research carried out by Andersen, Kristiansen & Jørgensen (2023). These symptoms often interact with comorbidities and age-related limitations, which can prolong workers' recovery and undermine their confidence in their ability to perform their work. In addition, cognitive impairments, including reduced concentration, memory lapses and difficulties with executive functioning, can present significant challenges, especially for those in cognitively demanding roles. The abovementioned study demonstrated that there are also significant psychological barriers, with fear of relapse, uncertainty regarding physical capabilities and feelings of vulnerability consistently identified across the reviewed articles. In the study, patients frequently reported reduced self-confidence and concerns about fulfilling their professional responsibilities to the required standard. The lack of systematic psychosocial support within rehabilitation programmes further compounded these issues, and often left individuals to manage complex emotional and vocational challenges on their own.

Furthermore, work-related factors such as high physical or cognitive work demands, rigid job structures and an absence of workplace adaptations limited the feasibility of RTW, particularly in blue-collar occupations. Limited understanding of cardiovascular recovery among employers, inflexibility regarding workloads or work schedules, and unsupportive supervisory relationships were cited as factors that can discourage RTW in the study by Andersen, Kristiansen & Jørgensen (2023). Conversely, employees who reported constructive dialogue with their employers and access to phased RTW options or modified tasks described more positive RTW trajectories (O'Hagan, 2019).

Finally, systemic and structural barriers, such as difficulties in navigating social security and employment legislation and uncertainty around entitlements to sick leave or disability benefits, also present significant barriers. A lack of coordinated vocational guidance within health services creates uncertainty for many workers about how to navigate the RTW process. In addition, fragmented communication between healthcare providers, occupational health services and employers can lead to delays and inconsistent support (Andersen, Kristiansen & Jørgensen, 2023). These factors are illustrated in [Table 2](#) below.

Table 2: Types of barriers to RTW following a CVD event

Physical limitations	Psychological factors	Working context	Systemic support
▪ Fatigue ▪ Weakness ▪ General health status ▪ Comorbidity ▪ Side effects of medication	▪ Lack of motivation ▪ Worries and insecurity ▪ Cognitive impairment	▪ Manual work ▪ High workload ▪ Limited possibility of workplace adaptation ▪ Unfavourable employment terms ▪ Lack of support from employers ▪ Low job control	▪ No assessment of work ability ▪ Lack of information on physical limits ▪ Lack of structured RTW planning ▪ Difficulties understanding legislation

Source: authors' interpretation of the findings of Andersen, Kristiansen & Jørgensen (2023).

Facilitators of successful RTW often mirror these barriers. These include strong personal motivation to regain a sense of normality and restore a sense of identity through employment. Improvements in physical health and psychological adjustment are also important enabling factors, as are financial pressures that may encourage an earlier RTW. Financial security during recovery is also considered important, since it allows individuals sufficient time to recover before resuming work. Supportive workplace environments, characterised by flexibility, understanding and accommodations such as reduced working hours or modified tasks, are consistently associated with a smoother reintegration process (Andersen, Kristiansen & Jørgensen, 2023). **Table 3** below outlines the main facilitators to RTW following a CVD event.

Table 3: Types of facilitators to RTW following a CVD event

Restoration of functional capacity	Well-being	Financial concerns	Working context	Systemic support
▪ Desire to return to everyday life and become meaningfully occupied	▪ Distraction from worries ▪ Opportunity to cope with stress ▪ Increased self-confidence	▪ Poor financial situation ▪ Need for financial stability	▪ Workplace adjustments ▪ Flexibility ▪ Autonomy ▪ Less strenuous tasks ▪ RTW planning and support from OSH staff ▪ Support from employers	▪ Support from healthcare professionals ▪ Professional advice on how to approach the work situation

Source: authors' interpretation of the findings of Andersen, Kristiansen & Jørgensen (2023).

RTW programmes can contribute to sustaining employment after a cardiovascular event by providing workers and employers with structured and coordinated support. These programmes, while not CVD-specific, are adaptable to individual needs and typically include phased or part-time options for RTW. Examples include the Austrian part-time RTW scheme, part of the fit2work programme. By integrating workplace adjustments, occupational health input and psychosocial support, RTW programmes help

address barriers related to health, work organisation and systemic frameworks, thereby facilitating reintegration and supporting longer-term RAW.

2.7 Retention at work for people with chronic cardiovascular diseases

Long-term RAW among people living with chronic CVD depends on disease severity and stability, workplace adaptations, ongoing clinical management and social policy support. Prospective studies have shown that patients with stable disease who receive secondary preventive treatment can remain in employment but face increased risks of absenteeism, reduced hours and job changes. Comorbidities, such as diabetes and depression, and high physical or psychosocial job demands increase the likelihood of these workers leaving employment. Ongoing occupational health surveillance and adjustments to job demands are therefore central to RAW strategies (Haafkens et al., 2011).

Negative organisational attitudes can hinder worker retention after a CVD event. Employers often cite financial concerns, scepticism about the need for accommodations and worries about the reactions of co-workers, which can lead to delays or refusals in making the necessary adjustments. Some organisations choose to lay off staff with chronic conditions instead of investing in RAW (Bosma et al., 2021). At worker level, hesitation to disclose health status and participate in collaborative processes with employers can present a barrier. Following a cardiovascular event, workers may choose not to share details about their limitations due to concerns about stigma, job security or changes in workplace dynamics. Factors such as denial, difficulty accepting altered abilities, feelings of shame and uncertainty about their prognosis may reduce their willingness to discuss workplace accommodations. If disclosure does not occur, employers and occupational health services may have limited ability to adjust work tasks, schedules or the work environment to support continued employment (Nazarov et al., 2019).

Within occupational health services, certain systemic factors can influence RAW. Occupational physicians are in limited supply and are often not highly visible to employees and employers, which can limit access to preventive or supportive consultations (Kempa, 2020). According to Bosma et al. (2021), such interventions in the Netherlands are frequently reactive rather than preventive, with occupational health professionals often focusing on managing sickness absence instead of anticipating or addressing work-related issues proactively. While regulations to promote prevention may exist, enforcement varies, particularly in smaller organisations or those with less developed infrastructure. Moreover, collaboration among occupational physicians, supervisors, human resources staff and healthcare providers may not always be optimal, and expectations among occupational health professionals and employers can differ. For instance, employers might find occupational health advice insufficiently specific, while occupational health professionals may observe that issues are not identified early enough or that recommended accommodations are not consistently implemented. Data protection and privacy laws may also affect communication, thereby creating uncertainty regarding workers' health conditions and the accommodations they may require.

Worker retention following cardiovascular events is influenced by organisational culture, supportive policies and coordinated healthcare and occupational health interventions, in addition to medical recovery. In the European context, policies such as the EU OSH Framework Directive (Council of the European Communities, 1989) and the European Disability Strategy (EC, 2010) help create an enabling environment for RAW by mandating risk assessments, reasonable accommodations and protection against discrimination, although implementation and enforcement vary across MSs. Evidence indicates that proactive employer engagement, supported by occupational health services and social protection schemes, increases the likelihood of workers with chronic conditions remaining in employment.

3 Regulations, policies and initiatives for preventing work-related cardiovascular diseases

This section of the report presents the main findings of the project. It first sets the scene by outlining key trends in the European policy context in relation to OSH and other policy areas relevant to CVDs, such as public health, environmental and nutrition policies. Second, it describes and critically assesses 20 regulations, policies, practices, strategies, initiatives and programmes that were identified as relevant examples, in accordance with the criteria outlined in the methodology section, in preventing WR-CVDs, supporting RTW for workers after CVD events or promoting RAW for workers with chronic CVDs. A comparative analysis of the initiatives then examines differences in their objectives and scope, target groups and coverage, tools used, impacts, success factors and relevant practices, transferability, and challenges and gaps.

From the 20 initiatives identified, five were selected as case studies and are described in detail in standalone documents.¹⁰

3.1 Introduction to the policy context

One of the objectives of the desk research was to provide an overview of the current landscape of recent policies and regulations related to CVDs and OSH, as well as related policy areas, such as public health, environmental, nutrition and food policies within (and beyond) the EU, and to identify key trends shaping the relevant initiatives. This section presents the findings in detail and provides context for the subsequent discussion of the initiatives and selected case studies.

In July 2021, the EC adopted the Strategic Framework on Health and Safety at Work 2021-2027 (EC, 2021b), which proposed a set of actions aimed at addressing changes in the world of work, enhancing prevention of workplace accidents and illnesses, and improving preparedness for future health crises. In particular, it called on MSs to address occupational risks related to CVDs.

Some European countries have recently renewed their national strategies by establishing objectives to make workplaces safer and healthier. In 2023, the Spanish government published its Occupational Safety and Health Strategy 2023-2027, which outlined six main objectives and related areas of action, including reducing accidents in the workplace and increasing protection for the most vulnerable workers (Instituto Nacional de Seguridad y Salud en el Trabajo [INSST], 2023). Specifically, the strategy sets out measures to address and prevent workplace accidents by identifying activities with a higher incidence of CVDs. It also commits to developing guidance on lifestyle factors, clinical factors and workplace stressors that may increase CVD risk, together with prevention strategies. Recognition is given to companies for their efforts to reduce CVD risk.

In 2022, the Belgian Federal Public Service Employment, Labour and Social Dialogue published its national action plan to improve the well-being of workers in the performance of their work for 2022-2027 (Federal Public Service Employment, Labour and Social Dialogue, 2022), which included a commitment to overcome data fragmentation challenges by creating a centralised database of all Belgian data on occupational risk and working conditions, including psychosocial and CVD data.

In addition, Hungary committed to reducing occupational CVD risks and supporting workers by taking into account workload, individual health status and age-related characteristics (EU-OSHA, 2023b).

Further recognising the need to reduce the burden of CVDs, the Council of the EU adopted the Conclusions on the improvement of cardiovascular health in the EU in 2024 (Council of the EU, 2024b). As a direct result, the EC developed the Safe Hearts Plan, which is designed to support EU MSs in

¹⁰ For further information, see:

Cardiovascular disease prevention for farmers through workplace health checks

<https://osha.europa.eu/en/publications/cardiovascular-disease-prevention-farmers-through-workplace-health-checks>

Fit2work in Austria: supporting return to work after illness

<https://osha.europa.eu/en/publications/fit2work-austria-supporting-return-work-after-illness>

Accreditation scheme promotes workplace health to prevent cardiovascular disease

<https://osha.europa.eu/en/publications/accreditation-scheme-promotes-workplace-health-prevent-cardiovascular-disease>

Supporting workplace health promotion for workers in Slovenian small businesses

<https://osha.europa.eu/en/publications/supporting-workplace-health-promotion-workers-slovenian-small-businesses>

Work-related cardiovascular disease: Dutch guidance on prevention and return to work

<https://osha.europa.eu/en/publications/work-related-cardiovascular-disease-dutch-guidance-prevention-and-return-work>

developing national cardiovascular health plans with the aim of reducing the number of people with CVDs and preventing deaths among those with CVD comorbidities and risk factors such as diabetes and obesity (EC, 2025b). Several EU MSs have also recently intensified their efforts to address cardiovascular health risks strategically:

- In 2023, Poland published the **National Cardiovascular Disease Programme – National Cardiac Strategy for 2022-2032**,¹¹ which focuses on five main pillars, including early diagnosis of CVDs (Structural Heart Disease Coalition, 2023).
- In 2023, Spain published the **Cardiovascular Health Strategy of the National Health System**, which examines the determinants of cardiovascular health among the Spanish population and explores psychosocial factors such as work-related stress (Ministerio de Sanidad, 2023).
- In 2024, Germany proposed the **Healthy Heart Act**, which outlines primary and secondary prevention measures to strengthen cardiovascular health (Bundesministerium für Gesundheit, 2024).
- In 2025, Romania published the **National Strategy for Combating Cardiovascular and Cerebrovascular Diseases 2025-2030**,¹² divided into five strategic directions, including the creation of an integrated data system with the establishment of a national registry of patients with high cardiovascular risk.
- In 2025, the Portuguese Society of Cardiology also published the **Strategic Plan for Cardiovascular Health in Portugal** based on five strategic pillars and prioritising primary and secondary prevention (Cabral et al., 2025).
- In 2025, the Dutch Heart Foundation announced that it was developing a **cardiovascular agenda** jointly with healthcare professionals, patients and the public. The agenda identified seven main challenges, including the creation of healthier everyday environments.¹³

International and European institutions and organisations, such as the WHO and OECD, are also involved in protecting and promoting the health of all workers, including by reducing the burden of NCDs.

An example of these efforts is the WHO's Global action plan for the prevention and control of noncommunicable diseases 2013-2020, published in 2013. The plan provides a policy framework for protecting and promoting workers' health globally and calls on countries to integrate occupational health into national development and public health policies (WHO, 2013).

Similarly, the OECD published the report Promoting Health and Well-being at Work in 2022. This report compiles policies and practices that have been implemented internationally to reduce the burden of unhealthy lifestyles and chronic diseases (OECD, 2022). It also recognises CVDs as a major cause of absenteeism and presenteeism in the workplace and as a factor that can exacerbate occupational risk factors.

To be successful, policy efforts need to be backed up by the latest evidence. For this reason, several research institutions are intensifying efforts to investigate the role of workplace-related risk factors in increasing the risk of CVDs. A few notable examples of research projects currently under way are:

- The **Gutenberg Health Study** funded by the Federal Institute for Occupational Safety and Health in Germany, which began in 2007, is a 10-year longitudinal study involving more than 11,000 individuals. Among other things, it investigates the impact of work-related factors on CVDs, such as shift work, psychosocial stress and excessive working hours. In particular, it examines whether incorporating psychosocial occupational factors improves the prediction of CVD risk, whether night shifts pose additional risks for individuals with hypertension and which aspects of workers' career histories are associated with CVDs and other metabolic diseases.¹⁴

¹¹ For further information, see the programme website (in Polish):

<https://pacient.gov.pl/program-profilaktyczny/profilaktyka-chorob-ukladu-krazenia-chuk>

¹² For further information, see the announcement (in Romanian): <https://ms.ro/ro/centrul-de-presa/rom%C3%A2nia-are-%C3%AEn-premier%C4%83-o-strategie-na%C8%9Bional%C4%83-pentru-combaterea-bolilor-cardiovasculare-%C8%99i-cerebrovasculare-20252030/> and its translation into English: <https://eurohealthisobservatory.who.int/monitors/health-systems-monitor/updates/hspm/romania-2016/plans-to-reduce-the-burden-of-cardiovascular-diseases>

¹³ For further information, see: <https://professionals.hartstichting.nl/these-are-7-challenges-dutch-cardiovascular-agenda>

¹⁴ For further information, see the project webpage: <https://www.baua.de/EN/Research/Research-projects/f2447>

- **Sustainable work & OSH research group** at Karolinska Institutet in Sweden was launched in 2021, and carries out various research projects on sustainable work and OSH topics, such as the effect of shift and night work on workers' health¹⁵ It receives funding from the Swedish Research Council (Vetenskapsrådet).
- **R&D programme funded by Afa Försäkring in Sweden**,¹⁶ which included funding for six key research projects at Swedish Universities on CVD prevention during working life, including studies on the impact of physical and chemical occupational exposures on CVD onset and the link between work-related stress and CVDs. Although the programme ran from 2018 to 2023, the results have not yet been published.
- The **JACARDI project**, which was launched in 2023, is an EU Joint Action that supports European countries in reducing the burden of CVDs and diabetes. It encompasses 142 evidence-based pilot projects in 18 countries. Work package 11 focuses specifically on improving the labour participation of people living with CVDs or diabetes by testing organisational interventions to increase workers' inclusion, RAW and RTW.¹⁷

The analysis of recent policies and regulations related to CVDs, OSH and other relevant policy areas led to the identification of several key emerging trends that are common worldwide. It is essential to understand and analyse these trends, as they influence how CVDs are currently viewed, shape the types of CVD-prevention initiatives that are supported and funded, and offer insights into future global challenges and priorities.

This section provides an overview of three key global trends in policy, research and regulations:

- **Integrated and collaborative approaches** that take a holistic view of health, extend beyond clinical factors to consider the interplay between environmental, behavioural, psychosocial and ergonomic risk factors, and promote cross-country and interdisciplinary collaboration (Crielaard et al., 2025).
- **A focus on climate change-related risks**, including the impact of factors such as higher temperatures and air pollution on workers (European Environmental Agency [EEA], 2023).
- **CVD prevention via changes to behavioural risk factors**, with actions to support healthy lifestyles through changes in dietary patterns, exercise, and tobacco and alcohol consumption, all of which are established CVD risk factors (OECD, 2022).

3.1.1 Integrated and collaborative approaches

Global policymaking on CVDs has shifted towards integrated, systems-based and collaborative approaches (Crielaard et al., 2025). Such multifaceted strategies for addressing public health challenges involve considering the complex clinical, psychosocial, occupational, economic and cultural contexts in which they arise. Accordingly, health burdens cannot be effectively tackled through standard interventions that focus solely on individual behaviour or isolated socioenvironmental factors (Galea, Ettman & Vlahov, 2019). In the context of NCD prevention and management, an integrated approach also considers the individual's entire care journey, from health promotion, prevention and screening through to diagnosis, treatment and rehabilitation (EC, 2022).

In this regard, occupational health is recognised as an integral component of NCD prevention, including CVD prevention. Rather than framing workplace risk prevention solely in terms of hazards and regulatory compliance, this approach views the workplace as an interconnected system shaped by individuals, exposures and the wider sociocultural context.

At its core, an integrated approach requires collaboration and knowledge-sharing across professions and national borders. This is important not only for reducing health inequalities that persist across socioeconomic groups, but also for generating robust and comprehensive evidence through the exchange of international good practices, research findings and national statistics.

¹⁵ For further information, see the research group webpage: <https://ki.se/en/research/research-areas-centres-and-networks/research-groups/sustainable-work-occupational-safety-and-health-emma-brulins-research-group>

¹⁶ For further information, see the programme website (in Swedish): <https://www.afaforssakring.se/ohalsa-och-arbetsuskador/forskning/fou-program/avslutade-program/fou-program-ett-arbetsliv-utan-hjart-och-karlsjukdom>

¹⁷ For further information, see the project website: <https://jacardi.eu/>

This focus on integrated approaches is evident in many international and European initiatives. The United Nations (UN) 2030 Agenda for Sustainable Development includes a target to reduce the risk of premature death from the four main NCDs, including CVDs, by one third among people between the ages of 30 and 70 by 2030 (UN, 2015). The International Commission on Occupational Health (ICOH) also has a dedicated Scientific Committee on Cardiology in Occupational Health (ICOH-CVD), which aims to identify work-related cardiovascular risk factors, research their effects and promote effective interventions to prevent and minimise their impact on workers' health.¹⁸

In 2018, the WHO provided an overview of health outcomes that could be prevented or reduced through the creation of healthier and safer workplaces (WHO, 2018). The report highlighted that some of the most common CVDs, including ischaemic heart disease and stroke, may be associated with exposure to specific occupational risk factors. It concluded that at least 2.1 % of global deaths are attributable to the workplace and called on countries to implement integrated approaches to CVD prevention among workers, with an emphasis on surveillance, risk management and health promotion.

At European level, there has been growing recognition of the need to include CVDs in broader health systems, occupational health frameworks and environmental policies. In 1989, the EU OSH Framework Directive established employers' responsibilities to protect workers' health and safety, which marked a shift towards a prevention-oriented approach based on the identification, assessment and prevention of workplace risks (Council of the European Communities, 1989). Furthermore, the EC's Strategic Framework on Health and Safety at Work 2021-2027 encourages EU MSs to adopt an integrated approach to NCD and CVD prevention by promoting healthy workplaces, supporting mental health and strengthening monitoring systems for the early detection of work-related risks (EC, 2021b).

Organisations and institutions are also increasingly joining forces to share research findings and good practices. In 2022, the International Labour Organization (ILO) and the WHO strengthened their collaboration by aligning their research agendas to enhance efforts to protect workers from occupational injuries and diseases and prepare global workforces for potential public health emergencies (ILO & WHO, 2022).

The Healthier Together initiative promotes collaboration and an integrated approach to prevention and care, with a focus on reducing NCDs, including CVDs (EC, 2022). This initiative, launched in 2022 and running until 2027, provides EU MSs with an overview of policies, good practices and actions to support efforts to tackle NCDs. As one of the initiative's five priority areas, CVDs are addressed through recommendations that promote collaborative action based on an integrated and person-centred approach, while also considering cross-cutting issues such as health literacy and awareness of CVD risk factors. The initiative also calls for regulation and support for adults living with NCDs and their caregivers to facilitate access to the labour market and support RTW.

More recently, the Council of the EU recognised the need to include educational programmes on the importance of cardiovascular health in the workplace (Council of the EU, 2024b). This led to renewed recommendations for EU MSs to strengthen their CVD prevention efforts through workplace health awareness and regular health checks, as well as to incentivise collaboration among the different stakeholders involved in OSH policy and implementation.

Also in 2024, the WHO and the O'Neill Institute for National and Global Health Law at Georgetown University developed the Global Health and Care Worker Compact, a technical guide designed to help WHO Member States implement OSH actions by bringing together relevant laws, regulations and policies in a single resource. Although it does not specifically mention CVDs, the document provides several recommendations to prevent occupational diseases, including the following: 'Ensure, monitor and document working hours, with reasonable limitations, and rest, recognizing the risk to the safety and health of the health workforce, and that of their patients, when health and care workers are overworked' (WHO, 2022). This document led to the creation of the Health and Care Worker Policy Lab in 2024, a digital library that allows users to search for international policies and regulations in fields such as OSH, health services for care workers and enabling work environments. It also enables countries to compare OSH policies, identify gaps, learn from international good practices, access tools to improve workers' health and safety, and protect and advance workers' rights through knowledge-sharing (WHO & O'Neill Institute for National and Global Health Law, 2024).

¹⁸ For further information, see the web section of the scientific committee:
<https://www.icohweb.org/site/scientific-committee-detail.asp?sc=4>

3.1.2 A focus on climate change-related risks

It is estimated that over 18 % of all CVD-related deaths are associated with environmental factors (Vaduganathan et al., 2022), most of which are preventable (EEA, 2023).

Risks associated with climate change have gained particular attention in recent years (EEA, 2023) due to the growing recognition of the impact of environmental factors on workers' health and CVD incidence.

In 2024, the ILO published a report titled *Ensuring safety and health at work in a changing climate*, which highlighted the impact that the increasing frequency of extreme weather events, such as heatwaves, heavy precipitation, wildfires, droughts and cyclones, can have on workers' safety and health worldwide. The report identified climate change-related risks, including exposure to excessive heat, agrochemicals¹⁹ and air pollution, as factors associated with an increased risk of CVDs (ILO, 2024).

Climate change causes extreme hot and cold temperatures, both of which are associated with increased CVD mortality (EEA, 2023). Specifically, in relation to heat, the WHO and the WMO published new guidance in August 2025 on protecting workers from extreme heat in the context of the rise in heatwaves due to climate change (WHO & WMO, 2025). The guidance focuses on manual workers in agriculture, construction and fisheries, and highlights the link between high temperatures and cardiovascular strain. In particular, heat exhaustion is associated with cardiovascular dysfunction, including impaired cardiac function and blood pressure regulation. This can lead to hyperthermia, in which the body is unable to regulate its temperature, which can result in damage to organs and tissues (Leon & Bouchama, 2015). Heat stroke is consistently cited as increasing CVD risk (Wallace et al., 2007). In addition to heat, the report also highlights other occupational hazards, such as air pollution, and calls for holistic environmental risk frameworks when assessing occupational risks. It provides guidance on re-acclimatisation following absence from work and RTW recommendations after heat stroke, including daily medical evaluation, a physical rehabilitation programme and a thorough clinical assessment before work is resumed. The report's policy recommendations include measures to address occupational heat exposure, with consideration of weather trends, specific occupations and vulnerable workers, such as older workers and people with other chronic conditions.

With respect to specific national efforts, Italy launched the Workclimate 2.0 project in 2024 to analyse interventions at the intersection of climate change and OSH. The project led several Italian regions to prohibit outdoor work on the hottest days of summer, with the measures applying to 1.7 million workers in the agricultural and construction sectors (Climate-ADAPT, 2025).

In addition to rising high temperatures, air pollution is increasingly recognised as a major occupational hazard and a leading environmental risk factor for CVDs. Recent studies indicate that both short- and long-term exposure to PM_{2.5}, the most extensively studied air pollutant, is associated with CVD-related mortality and conditions such as stroke, high blood pressure and ischaemic heart disease (de Bont et al., 2022). The ILO estimates that air pollution contributes to approximately 860,000 work-related deaths among outdoor workers each year (ILO, 2021).

The EU Action Plan: Towards Zero Pollution for Air, Water and Soil (EC, 2021a) (commonly referred to as the Zero Pollution Action Plan), part of the European Green Deal, is committed to reducing the health impacts of air pollution by more than 55 % by 2030, in line with the latest evidence-based WHO guidelines. It also aims to reduce exposure to factors associated with the development of CVDs, such as continuous exposure to noise and chemical substances. Furthermore, it explicitly recognises the causal link between pollution and ischaemic heart disease and stroke, two of the most common CVDs.

To protect European workers from increasing air pollution, the Air Quality Directive established a regulatory framework for air pollutants. More specifically, it introduced compulsory monitoring and air quality plans for geographical areas where pollutant concentrations are known to exceed the applicable thresholds (European Parliament & Council of the EU, 2008). In 2023, the European Council adopted a negotiating mandate to revise air quality standards by 2030 and align them with the 2050 objectives set out in the Zero Pollution Action Plan. The mandate commits to reducing the health impacts of air pollution, which is known to exacerbate CVDs, by over 55 % by 2030, in line with updated WHO guidelines (Council of the EU, 2023). Subsequently, Directive (EU) 2024/2881 on ambient air quality and cleaner air for Europe (recast) was adopted in October 2024. This introduced stricter air quality

¹⁹ Or agricultural chemicals such as herbicides, insecticides and fertilisers.

standards from 2030 and set the goal of achieving air quality that does not harm human health by 2050 (European Parliament & Council of the EU, 2024).

European efforts to mitigate and prevent climate-related occupational risks are supported by legislative actions across EU MSs. For example, Italy explicitly recognised the link between air pollution and cardiovascular risk in 2010, by enforcing strict pollutant thresholds (Istituto Superiore per la Protezione e la Ricerca Ambientale, 2010). Later, in 2016, the country reinforced this commitment by establishing a national environmental protection network through legislation to strengthen the monitoring and control of environmental determinants of cardiovascular health (Legge 28 giugno 2016, n. 132, 2016).

In response to the growing number of extreme weather events associated with climate change, Spanish Royal Decree-Law 8/2024 introduced up to four days of paid leave when weather conditions or other adverse weather events prevent workers from accessing their workplace or pose a risk to their safety (Real Decreto-ley 8/2024, 2024).

3.1.3 Cardiovascular disease prevention via changes to behavioural risk factors

Finally, recent OSH trends include a growing focus on how occupational health can be promoted through behavioural change, particularly in relation to dietary patterns, exercise, and tobacco and alcohol consumption, all of which are relevant to CVD risk (OECD, 2022).

Specifically, regarding dietary patterns, several food safety and nutrition regulations contribute to CVD prevention by addressing salt, fat and sugar intake. These include Regulation (EU) No 1169/2011 on the provision of food information to consumers (European Parliament & Council of the EU, 2011) and Regulation (EC) No 1924/2006 on nutrition and health claims, which protects consumers against misleading information on food products (European Parliament & Council of the EU, 2006b). In particular, the 2011 regulation requires clear labelling of nutritional values, allergens and ingredients to enable consumers to make more informed choices about their intake of potentially harmful nutrients such as sodium, saturated fats and added sugars.

Other initiatives that aim to support healthy diets include the EU's Food 2030 research and innovation policy framework²⁰, the European Food Safety Authority (EFSA) campaign #Safe2Eat²¹ and the EU's Farm to Fork Strategy (EC, 2020), all of which promote healthier and more sustainable diets.

Regarding tobacco, the EC is currently revising the Tobacco Taxation Directive (Council Directive 2011/64/EU) to increase tax rates and expand coverage to new tobacco products such as e-cigarettes, heated tobacco and nicotine pouches (EC, 2025c). Furthermore, it is now recommended that smoking bans be extended to include outdoor and semi-outdoor public spaces, including areas linked to workplaces (Euronews, 2024).

Together, all these policies contribute to supporting healthy lifestyle choices for workers across Europe.

3.2 Regulations, policies and initiatives for preventing work-related cardiovascular diseases and supporting return to work and retention at work

A review of policies, literature, fieldwork and FoP survey data from EU MSs identified 20 initiatives focusing on workplace CVD prevention and RTW and RAW strategies. This section briefly describes each initiative, including its scope, objectives, outcomes and transferability.

3.2.1 Detailed description of the 20 initiatives

▪ TANSNIP-PESA trial (workplace lifestyle intervention), Spain²²

The objective of this study, implemented through a collaboration between a Spanish bank, the European Regional Development Fund (ERDF), a pharmaceutical company and a research institute, was to explore the effectiveness of a three-year workplace lifestyle intervention on cardiovascular metrics

²⁰ For further information, see:

https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy/food-systems/food-2030_en

²¹ For further information on the campaign, see: <https://www.efsa.europa.eu/en/safe2eat>

²² For an overview of the TANSNIP-PESA intervention, see:

https://www.insst.es/documents/d/portal-insst/primer-premio-accion-cv_-banco-santander

(Coffeng et al., 2017). Through motivational interviews, workers were encouraged to increase exercise, reduce sedentary behaviour, cut down on smoking and follow a Mediterranean diet.

A randomised control trial (García-Lunar et al., 2022) showed that participants exposed to the intervention presented significant improvements in the Fuster BEWAT score²³ over the three-year period. The authors concluded that the intervention improved the lifestyle behaviour and overall cardiovascular health of workers, including improvements in blood pressure, increased physical activity, healthier diets and reduced tobacco use. However, the effects of the intervention declined after the second year, probably because of the sustained effort required to maintain the improved lifestyle. The findings highlighted that motivation alone is not sufficient to sustain healthy behaviours. One of the study's main limitations was the limited extent of workplace-level changes, which focused on measures such as the introduction of standing desks instead of addressing structural and social barriers within the organisation, such as those affecting work-life balance.

▪ **Lavora con il Cuore ('Put your heart into your work'), Italy²⁴**

Lavora con il Cuore was a WR-CVD prevention campaign aimed at raising awareness and assessing cardiovascular risk among around 550 employees at the Ministry of Labour's central offices in Rome. The project involved informational seminars, distribution of educational materials, medical examinations and blood tests to identify CVD risk factors among participants. Following the medical examinations, the CVD risk was calculated, and individuals were provided with tailored interventions consisting of both dietary and lifestyle advice.

According to a study by Volpe et al. (2018), the initiative successfully increased workers' awareness of CVD risks and their willingness to discuss the health risks identified with their doctor. The initiative highlighted the importance of WHP programmes in identifying at-risk individuals and promoting healthier lifestyles. However, the assessment did not report any improvements in clinical risk factors linked to CVDs. Furthermore, the initiative did not address workplace factors directly linked to CVDs.

▪ **Workplace Health Promotion (WHP) programme, Italy²⁵**

The programme, which received European funding through the CHRODIS Joint Action,²⁶ was initially launched in the Italian region of Lombardy and offers companies the opportunity to obtain a certificate recognising their efforts to promote health in the workplace. To obtain certification, they must meet specific requirements, including implementing initiatives such as CVD risk screening, dietary counselling, health education and specific cardiac health assessments. The programme adopts a multicomponent approach to promote the implementation of recommended and evidence-based practices in healthy diet, physical activity, smoking cessation, drug use prevention, work-life balance, well-being and mental health. It also involves employers and workers in a continuous, step-by-step process to create safe and healthy workplaces. Satisfaction surveys were distributed to all participants.

Cremaschini et al. (2015) conducted a controlled, non-randomised study that found significant improvements in smoking cessation and healthier dietary intake. More specifically, there was a four times increase in smoking cessation rates among exposed workers (but no increase among the control group) and a 10 % increase in consuming five portions of fruits/vegetables a day among exposed workers (but only 4 % among the control group). However, some concerns were raised in relation to the validity of the study, particularly regarding the lack of randomisation and the appropriateness of the selected outcomes. As described by Ruiz-Dominguez et al. (2021), the programme was subsequently adapted to the Spanish context and successfully implemented in Andalusia as part of the European Joint Action CHRODIS PLUS²⁷. The initiative, which targets SMEs, has also been successful in engaging companies, with implementation still ongoing.

²³ The Fuster-BEWAT score is a composite measurement based on blood pressure, exercise (both sedentary and physical), weight, diet and tobacco use.

²⁴ For more information on the Lavora con il Cuore initiative (in Italian), see: <https://fondazionecuore.it/wp-content/uploads/2021/02/News-Letter-07.pdf>

²⁵ For more information about the programme, see: <https://webgate.ec.europa.eu/dyna/bp-portal/best-practice-file/17>, and case study *Accreditation scheme promotes workplace health to prevent cardiovascular disease* at: <https://osha.europa.eu/en/publications/accreditation-scheme-promotes-workplace-health-prevent-cardiovascular-disease>

²⁶ CHRODIS was a Joint Action initiative aimed at addressing chronic diseases and healthy ageing across the life cycle and received funding from the European Union, under the framework of the health programme (2008-2013).

²⁷ CHRODIS PLUS was a three-year Joint Action initiative aimed at supporting EU MSs through cross-national initiatives to reduce the burden of chronic diseases.

▪ **NVAB Guideline on Ischaemic Heart Disease, Netherlands²⁸**

The NVAB Guideline on Ischaemic Heart Disease was developed by the Netherlands Society Association for Occupational Medicine (NVAB), as part of a collection of national guidelines (NVAB, 2020a). It provides structured, evidence-based guidance to support occupational physicians in assessing work capacity after an episode of ischaemic heart disease, planning safe and timely RTW processes, and preventing recurrent cardiovascular events. The guideline is embedded within the Dutch occupational health system through its connection to the Working Conditions Act (Arbowet) and its application by the Dutch Employee Insurance Agency (UWV), thereby contributing to high levels of adherence among occupational physicians.

Although not focusing on the NVAB guideline on *Ischaemic heart disease*, studies on the general use of guidelines among occupational physicians show mixed results. Occupational physicians generally considered them relevant (van der Weide et al., 1998). However, a randomised controlled trial assessing their impact on workers' body-weight outcomes found no significant difference between the intervention and control groups (Verweij et al., 2013). Nevertheless, practitioners have reported increased confidence in advising workers and employers, as well as improved communication between clinical and occupational physicians. The guideline emphasises early involvement during cardiac rehabilitation, coordinated reintegration with cardiologists and employers, and systematic assessment of personal and work-related risk factors. It also promotes long-term cardiovascular risk management through workplace-based interventions targeting smoking cessation, dietary patterns, physical activity, sleep hygiene and stress reduction. Its structured development process, integration with national legislation and combined focus on rehabilitation and prevention provide a model that could inform approaches to preventing WR-CVDs in other EU MSs.

▪ **AGROSH+: OSH for the European agriculture sector, Romania, Bulgaria, Greece, Ireland and Spain²⁹**

This initiative, implemented between 2016 and 2018 with funding from the ERASMUS+ programme, sought to strengthen the expertise and knowledge of OSH professionals and occupational physicians providing services to companies in the agricultural sector (Borisova et al., 2018). The initiative developed training materials for occupational physicians and safety experts, as well as sector-specific training for forestry, poultry farming and fish farming. A dedicated training module addressed the CVD risk factors to which agricultural workers are exposed.

The initiative was successful across the different stakeholder groups involved. For occupational physicians, the training increased their knowledge and skills related to health risks in the agricultural sector. For companies, the project supported the provision of higher-quality and up-to-date services to workers. Finally, for participating institutions, at both national and international levels, the initiative strengthened their capacity to deliver training in OSH and occupational medicine for the agriculture sector. However, despite its cross-national implementation, no qualitative impact assessment has been carried out.

▪ **STAR-VITAL – Joint Measures for the Vitality of Older Workers, Slovenia³⁰**

This comprehensive workplace intervention targeted SMEs in western part of Slovenia over the course of four years. It supported workers and employers in implementing health measures tailored to their specific needs. It was initially implemented by under the partnership of the universities, the National Institute of Public Health, and the Chamber of Craft and Small Business of Slovenia. Funding came primarily from the European Structural Fund (ESF) 2014-2020, with the remainder provided by the Ministry of Labour, Family, Social Affairs and Equal Opportunities of Slovenia. The programme's main objective was to create healthier workplaces, raise awareness of workplace health promotion and protection, and prevent and manage chronic diseases in the workplace. It was initially designed for

²⁸ For more information on the programme (in Dutch), see: <https://nvab-online.nl/app/uploads/2024/06/RL-Ischemische-Hartziekten-2020.pdf>, and case study *Work-related cardiovascular disease: Dutch guidance on prevention and return to work* at: <https://osha.europa.eu/en/publications/work-related-cardiovascular-disease-dutch-guidance-prevention-and-return-work>

²⁹ For more information on AGROSH+, see the project website: <http://www.agrosh.ro/>

³⁰ For more information on STAR-VITAL (in Slovenian), see: <https://www.star-vital.si/>, and case study *Supporting workplace health promotion for workers in Slovenian small businesses* at: <https://osha.europa.eu/en/publications/supporting-workplace-health-promotion-workers-slovenian-small-businesses>

workers aged 45 and above but the activities proved equally relevant to younger employees, so all workers were invited to participate.

High levels of engagement were achieved with personalised digital content. For example, positive behavioural change was reported in physical activity (walking and stretching routines), dietary habits (reduced salt intake and healthier lunch choices) and stress-coping mechanisms (Širok et al., 2022). The combination of workplace health interventions and digital technologies provided a unique, multifaceted and individualised approach. These features make STAR-VITAL a potentially useful model for application in other EU settings, where tailored support combined with digital tools is becoming more popular.

- **Dinámica Una: el juego para cuidarte ('a game for your health'), Spain³¹**

The initiative, implemented by the Spanish company BASF Iberia in 2023, consisted of raising awareness through a card game based on the format of UNO. The cards were designed by the company's medical team and were organised by colour, with each colour representing a different type of content, including health myths, scientific evidence, practical recommendations and misinformation. During the game, workers discussed the information presented and debunked common health myths in the workplace. The format enabled employees to learn about CVDs in an innovative and engaging setting. After each game, workers were also asked to complete a written health survey, which was sent to the medical team for review and possible follow-up.

The company that implemented the initiative evaluated the effectiveness of the intervention through a questionnaire. More than 1,500 employees, accounting for 50 % of BASF Iberia's workforce, participated. The reported results indicated that 98 % of participants felt that the game improved their well-being, 96 % had incorporated healthy habits and 95 % were making or considering positive changes. Additionally, 35 % had adopted at least one new healthy habit. The initiative can be considered highly transferable across workplaces, as it is easily accessible and requires few resources. However, its long-term effectiveness is questionable: although awareness is likely to increase through the information provided and discussions with colleagues, this may not necessarily translate into sustainable behavioural changes.

- **Cardiovascular health: recommendations for its management in the workplace, Spain³²**

This document, developed and published by INSST and prepared by Solé Gómez and Solé, provides practical, evidence-based guidance on addressing the causes and impact of CVDs in the workplace (INSST, 2024). It aims to raise awareness of the effects of CVDs on workers and the consequences for businesses, while providing recommendations for employers, health professionals and policymakers.

The guidance focuses primarily on ischemic heart disease and cerebrovascular conditions and offers general prevention strategies and RTW recommendations, in line with the Spanish Occupational Safety and Health Strategy 2023-2027, also produced by INSST. This strategy was approved by the Council of Ministers in March 2023 and was designed to serve as a national reference framework for occupational risk prevention policies. Its approach is based on the principles of prevention, coordination, inclusion and adaptability to address both traditional workplace hazards and emerging risks (INSST, 2023). Together, the two documents demonstrate the Spanish focus on risk factors relevant to cardiovascular health. The guidance provides broadly applicable, evidence-based advice and recommendations, which makes it highly transferable. However, it provides limited guidance on how these measures could be implemented in practice in Spanish workplaces. It also overlooks the resources employers may need to implement the recommendations effectively and the incentives that could support or encourage their adoption.

- **Act Promoting Measures to Prevent Death and Injury from Overwork, Japan³³**

Japan was the first country to enact dedicated legislation – the 2014 Act Promoting Measures to Prevent Death and Injury from Overwork – to address the serious issue of *karoshi* (death from overwork). This legislation established a framework for proactively preventing overwork-related cerebrovascular and cardiovascular diseases, including measures to reduce working hours and protect workers' health. To

³¹ For more information on Dinámica Una (in Spanish), see:

<https://miempresaessaludable.com/gamificacion-con-proposito-asi-juega-basf-para-transformar-la-salud-laboral/>

³² For more information on the guidance (in Spanish), see:

<https://www.insst.es/noticias-insst/ntp-1191-salud-cardiovascular-recomendaciones-para-su-gestion-ambito-laboral-2024>

³³ For an English translation of the legislation, see: <https://www.japaneselawtranslation.go.jp/en/laws/view/3258/en>

support its implementation, the Japanese government developed the Outline for Measures to Prevent *karoshi*, which emphasises reducing excessive overtime, promoting annual leave uptake and addressing workers at higher risk of overwork.

Furthermore, the legislation not only placed limits on total working hours, a recognised risk factor for CVDs, but also sought to improve overall working conditions. Measures included restricting prolonged periods of continuous work, regulating night and shift work, reducing irregular schedules and addressing roles involving high psychological demands, all of which have also been linked to CVD risk.

The legislation was associated with a 26 % reduction in the annual incidence of overwork-related CVDs, equivalent to 78 fewer cases per year (95 % confidence interval: 29-173) (Lin et al., 2020). Approximately 41 % of this reduction, corresponding to 32 cases per year, could be attributed to reduced working hours. The transferability of the legislation can be considered limited, as it was shaped by Japan's specific cultural and labour-market conditions. Its application in European countries would therefore require adaptation to national labour laws, social protection systems, employers' duties and workers' rights. Nevertheless, the legislation represents a highly effective approach aligned with EU priorities on OSH.

- **fit2work programme, Austria³⁴**

Launched in 2011 by the Austrian Federal Ministry of Labour, Social Affairs, Health, Care and Consumer Protection, fit2work is a national occupational health and reintegration programme designed to prevent work disability and support individuals facing health-related work limitations, including those with CVDs. The programme provides voluntary, confidential services, including health assessments, case management, reintegration planning and workplace guidance. A notable feature is the use of the ABI Plus™ tool, adapted from Finland's Work Ability Index, which helps identify risks, such as cardiovascular risk factors, and tailor interventions accordingly. Services are broadly accessible, since they are offered online and by telephone to employees, unemployed people, self-employed workers, with or without Austrian citizenship. Delivery is coordinated through regional centres and trained external professionals, which helps ensure structured and holistic support.

According to the latest available evaluation report (Statistics Austria, 2024), fit2work supported 27,214 individuals and 727 companies between 2020 and 2023. During the same period, 22,775 cases involved initial advice, 5,632 cases involved part-time reintegration agreements and 6,778 included structured case management. The evaluation highlights strengths in comprehensive, client-centred support, underpinned by strong legal and institutional frameworks that facilitated national implementation. The programme's proactive model and structured guidance are particularly relevant for individuals recovering from cardiovascular events, as they help assess work capacity, accommodate functional limitations and support safe reintegration into the workplace. A comprehensive scientific evaluation for 2025-2029 is planned to assess both individual and company-level services (L&R Social Research, 2024).

- **Heart Keepers, Croatia³⁵**

Launched in 2019, Heart Keepers (Hrvatski Čuvari Srca) is a national CVD prevention campaign coordinated by the Croatian Hypertension, Atherosclerosis and Cardiac Societies in collaboration with the Croatian Academy of Medical Sciences and the Croatian Institute for Public Health. The initiative addresses major cardiovascular risk factors, including hypertension, atrial fibrillation, dyslipidaemia and coronary heart disease, through digital education tools and broad public outreach. The campaign focuses on the workplace, since it recognises employment settings as priority channels for reaching working-age adults. Activities include the dissemination of targeted prevention messaging, stress-reduction measures and early detection strategies tailored to employers and employees. The campaign also provides Continuing Medical Education-accredited e-learning modules for physicians and a mobile application that connects patients with healthcare providers, thereby integrating prevention across professional and community spheres.

While no RTW or employment-specific outcomes have been reported, Heart Keepers has achieved wide reach among clinicians and the general population, with impact assessments focusing on knowledge

³⁴ For more information on fit2work, see the programme website at: <https://www.fit2work.at/>, and case study *Fit2work in Austria: supporting return to work after illness* at: <https://osha.europa.eu/en/publications/fit2work-austria-supporting-return-work-after-illness>

³⁵ For more information on the programme, see: <https://www.escardio.org/communities/associations/eapc/Advocacy/prevention-in-your-country/croatia/>

dissemination and awareness. The campaign's structure, which combines digital tools, workplace engagement and coordination across national health institutions, demonstrates high transferability and potential for adaptation in other countries. However, its scope is primarily preventive rather than rehabilitative, and it does not systematically monitor behavioural change, cardiovascular outcomes or employment-related indicators.

- **Fleksjob, Denmark³⁶**

Established in 1998, Denmark's Fleksjob scheme is a RTW and supported employment programme coordinated by municipalities under the guidance of the Danish Ministry of Employment. The scheme is designed for individuals with permanent reductions in work capacity, including those with CVDs who are unable to sustain full-time employment but retain the ability to undertake part-time work. Employers pay wages corresponding to the hours worked and tasks performed, while municipalities cover the remainder of the salary, thereby ensuring that reduced work capacity does not result in financial disadvantage. By allowing flexible adjustments to working hours and job duties, Fleksjob promotes long-term labour market participation, reduces health-related exclusion and complements Denmark's broader strategies for chronic disease management and reintegration.

A major reform in 2013 narrowed eligibility to individuals under 65 with permanent impairments. This aimed to ensure the sustainability of the scheme and target those most likely to benefit from continued employment. The model is widely regarded as a strong and sustainable form of supported employment, underpinned by financial incentives for both employers and workers and tailored job matching. However, challenges remain, including administrative complexity and variations in implementation across municipalities, which can affect efficiency. Although moderately transferable to other national contexts, the scheme's success relies heavily on governance structures and integration with healthcare and social welfare systems.

- **Vocational rehabilitation programmes, Denmark³⁷**

Introduced into Danish law in 2013, vocational rehabilitation programmes (VRPs) were developed to support individuals experiencing prolonged illness, unemployment or social marginalisation in regaining their work ability. Coordinated through the Danish health system and social insurance agencies, the programmes adopt a multidisciplinary approach that combines health services, psychosocial support and structured employment pathways. Each participant receives a tailored support plan that may include internships, training opportunities and coordinated input from healthcare providers, employment counsellors and social workers. This integrated model is designed to address both medical limitations and broader life challenges, thus fostering a gradual transition back into the labour market.

Evaluations of VRPs show that participants often enter the programme with low health status, limited work ability and reduced self-efficacy (Andersen, Stochkendahl & Roessler, 2022). Over time, however, many demonstrate progress in building realistic employment goals, strengthening coping strategies and re-establishing workplace relationships. Positive outcomes have been closely associated with the personalised and flexible design of the support process. While VRPs are not disease-specific and therefore extend beyond CVDs, their structure provides an in-depth, adaptable RTW support model. Given the multidisciplinary nature of the intervention, the potential for transferability is high, although replication requires cross-sector collaboration and sustained institutional commitment to ensure effectiveness.

- **Guidelines on the Prevention of Work-Related Cardiovascular Diseases, Germany³⁸**

In 2019, Germany's Federal Institute for Occupational Safety and Health, together with statutory accident insurance institutions, employers, unions, occupational physicians and cardiology researchers, launched guidelines to prevent work-related CVDs. Grounded in the Occupational Safety and Health Act, the guidelines focus on work-related psychosocial and organisational risk factors such as stress, shift work and high job demands. A research project evaluated workplace reintegration programmes for coronary heart disease survivors and assessed the role of organisational interventions in reducing

³⁶ For more information on the Fleksjob scheme, see: <https://www.borger.dk/arbejde-dagpenge-ferie/Fleksjob-loentilskud-for-foertidspensionister-revalidering/hvem-kan-faa-fleksjob?cookiebanner=true>

³⁷ For more information on the programmes, see: <https://www.norden.org/en/info-norden/back-work-schemes-denmark>

³⁸ For more information on the guidelines, see: <https://www.baua.de/EN/Topics/Prevention/Physical-health/Cardiovascular-diseases/Prevention>

cardiovascular risk.³⁹ The guidelines promote systematic workplace risk assessment, stress reduction, behavioural interventions and coordinated reintegration support after cardiac events.⁴⁰

Findings underscored the significant role of work-related psychosocial and organisational stressors in CVD risk and demonstrated that structured workplace-based interventions can support both health outcomes and RTW processes. The initiative is considered highly transferable within the EU, since it is aligned with European strategies on psychosocial risk management and chronic disease prevention. However, its success depends on employer engagement and strong coordination between medical and occupational health systems. It represents one of Europe's most comprehensive attempts to align legislation, research and workplace practice to reduce work-related cardiovascular morbidity.

- **Betriebliche Gesundheitsförderung (BGF; 'Workplace health promotion'), Germany⁴¹**

Germany's BGF programme represents a longstanding national WHP strategy, coordinated by statutory health insurers under the framework of the 2015 Prevention Act. It supports employers in identifying occupational risks, planning and implementing interventions and evaluating outcomes. Activities target behavioural factors such as nutrition, exercise and stress management, alongside improvements in work organisation, including flexible working arrangements and healthier job design. Although participation is voluntary, BGF has become a key mechanism for embedding health promotion within German workplaces.

Evaluations have reported improvements in job satisfaction, workplace climate, absenteeism and RAW, alongside potential business benefits such as reduced staff turnover and higher return on investment. Healthy eating programmes have seen the strongest uptake, while stress-reduction and ergonomic interventions have presented lower levels of engagement. The model's strengths include its legal framework, quality standards and flexible design, although its voluntary nature limits implementation in SMEs. While not specific to CVDs, it includes behavioural and workplace health promotion measures that can provide an indirect but important contribution to cardiovascular risk reduction at work.

- **Hyvällä sykkeellä töissä ('Psychosocial job characteristics and heart rate variability – a good heart rate for better health'), Finland⁴²**

In 2023, the Finnish Institute of Occupational Health launched the Hyvällä sykkeellä töissä project to explore how psychosocial working conditions affect heart rate variability (HRV), a physiological indicator of cardiovascular and nervous system function. The HRV of 240 municipal employees across five professions was measured, with the aim of examining associations between job demands, resources and cardiovascular health. Alongside the research, online learning tools and a practical workbook were developed in 2025 for employees and managers to guide workplace strategies for regulating psychosocial stressors.

Preliminary findings revealed weaker and more complex associations between HRV and working conditions than initially expected, which highlights the multifactorial nature of psychosocial health risks (Karhula et al., 2025). Nevertheless, the project made an important contribution by examining HRV as a workplace health metric and developing practical materials that can be adapted across sectors. While not designed specifically for CVD prevention or RTW, the approach offers innovative, transferable tools for stress management and occupational health promotion.

- **CHRODIS PLUS Work Package 8, multiple countries⁴³**

As part of the EU Joint Action implementing good practices for chronic diseases (CHRODIS PLUS), Work Package 8 developed practical strategies to promote workplace inclusion for employees with chronic conditions, including CVDs. Coordinated by the Finnish Institute for Health and Welfare, the initiative produced a multilingual training toolkit for managers, designed to improve disease management and RAW and RTW practices. The toolkit was piloted in 10 workplaces across six European countries, including organisations of different sizes and operating in different sectors (EuroHealthNet, 2021).

³⁹ For more information on the research project, see: <https://www.baua.de/EN/Research/Research-projects/f2354>

⁴⁰ For the updated version (2024) of the guidelines, see: <https://www.leitlinien.de/themen/khk>

⁴¹ For more information on the programme (in German), see:

<https://www.bundesgesundheitsministerium.de/themen/praevention/betriebliche-gesundheitsfoerderung.html>

⁴² For more information on the project, see: <https://www.ttl.fi/en/research/projects/psychosocial-job-characteristics-and-heart-rate-variability-a-good-heart-rate-for-better-health>

⁴³ For more information on CHRODIS PLUS Work Package 8, see: <https://chrodis.eu/08-employment/>

Evaluations found that the toolkit was adaptable, resource-efficient and effective in improving workplace well-being and job satisfaction. Its modular design and focus on evidence-based practice make it highly transferable across EU MSs. Although not CVD-specific, its explicit inclusion of CVDs within a broader chronic disease framework underscores its relevance to occupational reintegration and prevention. The initiative demonstrates how cross-national collaboration can generate practical materials to help employers support workers with chronic health needs.

- **Cœur et Travail ('Heart and work') (France)⁴⁴**

Founded in 1985, the Cœur et Travail association in France brings together cardiologists and occupational physicians to strengthen vocational rehabilitation after cardiovascular events. The association's core activity consists of training occupational health professionals in assessing fitness for work, including practical instruction for nurses in ECG use and for physicians in interpreting exercise stress test results. Training sessions, primarily held in Paris, Lyon and other major cities, aim to enhance interdisciplinary collaboration and improve RTW planning for employees recovering from CVDs. By targeting the clinical expertise of occupational health teams, the programme seeks to bridge the gap between medical assessment and workplace reintegration.

While no formal outcome evaluations are available, satisfaction surveys from participating professionals indicate that the training is consistently valued for its quality and relevance. The initiative is particularly valuable in promoting collaboration between cardiology and occupational health, although its reach remains limited. Participation depends on the voluntary engagement of individual professionals and organisations, and the absence of a nationwide institutional mandate limits its impact to localised networks. Nevertheless, the programme offers a transferable model for professional development and interdisciplinary coordination that could be adapted in other contexts to improve RTW outcomes following cardiovascular events.

- **S3 Guideline on Cardiac Rehabilitation (LL-KardReha), Germany, Austria and Switzerland⁴⁵**

The German Cardiac Society, in collaboration with Austrian and Swiss partners, developed the S3 Guideline on Cardiac Rehabilitation (LL-KardReha) in 2020 and maintained it until January 2025. The guideline provides an evidence-based framework for rehabilitation following cardiovascular events and explicitly incorporates vocational aspects into clinical care. It recommends systematic assessment of work capacity, tailored workplace accommodations, phased RTW processes and close coordination with occupational physicians. By embedding employment-related considerations within cardiac rehabilitation, the guideline strengthens the link between medical recovery and sustainable RTW (Rauch et al., 2021).

Although no specific workplace outcome data is available, the guideline has been widely integrated into rehabilitation practices across German-speaking countries and is supported by strong evidence grading. Its structured and multidisciplinary approach makes it a robust model for aligning clinical care with occupational health. However, implementation varies across regions, and adaptation would be necessary in countries with different healthcare and labour systems. Overall, LL-KardReha provides a transferable, well-structured template for bridging clinical rehabilitation and vocational reintegration. The guidelines have not been revised since January 2025 and are therefore no longer valid.

- **Farmers Have Hearts, Ireland⁴⁶**

Launched in 2013, Farmers Have Hearts is a cardiovascular health programme led by the Irish Heart Foundation and supported by the Health Service Executive. The initiative was developed in response to the elevated cardiovascular risk profile among Irish farmers, who were found to be seven times more likely to die prematurely from heart disease (Smyth et al., 2013) and are often underserved by occupational healthcare. The programme delivers mobile workplace-based health screening at livestock marts and agricultural events, during which farmers are offered 30-minute sessions with a local nurse

⁴⁴ For more information on the association (in French), see: <https://coeur-et-travail.com>

⁴⁵ For more information on the guideline (in German), see: https://www.herzwegweiser.de/fileadmin/user_upload/fuer_Patienten/S3-Kardiologische-Rehabilitation-in-D-A-CH_2020-12.pdf

⁴⁶ For more information on the programme, see: <https://irishheart.ie/how-to-keep-your-heart-healthy/healthy-communities/farmers-have-hearts/>, and case study *Cardiovascular disease prevention for farmers through workplace health checks* at: <https://osha.europa.eu/en/publications/cardiovascular-disease-prevention-farmers-through-workplace-health-checks>

who conducts biometric checks and provide brief, tailored lifestyle and health advice to support behavioural change. By bringing prevention and early detection directly to rural workplaces, the programme addresses both accessibility challenges and occupational health needs.

Impact assessments indicate measurable improvements in farmers' cardiovascular risk profiles. The impact report (n=451) found that 82 % of participants had made changes to their health behaviours. It also showed that the proportion of farmers with four or more CVD risk factors declined from 45.1 % to 39.0 % over the same period (Teagasc, 2022). Participant satisfaction was consistently high, which highlights the acceptability of the mobile and the personalised approach. The programme demonstrates strong transferability, particularly to rural and hard-to-reach populations, due to its adaptability, collaborative structure and focus on occupationally relevant prevention. It provides a useful model for how targeted, accessible health interventions can reduce risk factors among high-risk working populations while addressing geographical and healthcare access barriers.

3.3 Comparative analysis of the initiatives

The 20 initiatives were analysed based on information gathered through a literature and policy review, the FoP survey and fieldwork research. A customised data extraction table facilitated comparison between the different types of interventions, legislative instruments and strategic frameworks to be evaluated and highlighted transferable approaches relevant to national and EU-level policy development. Key themes for comparison were identified and grouped into seven themes, outlined below.

3.3.1 Objectives and scope

First, it should be noted that the initiatives varied considerably in scope and objectives, as they encompassed programmes, legislation, initiatives, campaigns, strategies, guidance and policies. Three main objectives were identified, as shown in **Table 4** below.

Table 4: Type and objectives of the 20 interventions

Objectives	Type of intervention	Number of interventions
Raise awareness of CVD risk factors in the workplace	Guidelines, programmes, campaigns	9
Prevent CVDs in the workplace	Guidelines, strategies, initiatives, programmes	6
Support RTW for workers after CVD events and RAW for workers with CVDs	National programmes and guidelines	5

Source: authors' analysis of findings from the literature review.

The majority of the initiatives (n=9) aimed to raise awareness of CVDs in the workplace among workers, employers, organisations or clinicians. In most cases, these initiatives focused on general CVD prevention and health advice, with limited consideration of the role of the workplace in exacerbating these risks. To address this objective, the following types of interventions were developed and implemented:

- **National guidelines and strategies.** These provide an overview of the scientific evidence available within this field, with a primary focus on OSH and cardiovascular health as part of this broader area. The risk factors discussed in relation to occupational health span behavioural, environmental and ergonomic factors. With the exception of the Dutch NVAB Guideline and the S3 Guideline on Cardiac Rehabilitation, which were designed specifically for practitioners, these documents are not embedded within national practice. Rather, they reflect the emerging but still underdeveloped European policy landscape on occupational cardiovascular health.

- **Awareness campaigns.** These target workers or managers and often take the form of workplace-based training through workshops, educational materials and interactive content (e.g. phone applications), which cover topics such as general cardiovascular knowledge, risk factors and healthy habits. Awareness programmes target clinicians and aim to provide them with the knowledge to better support workers after a cardiovascular event or tailor healthcare to specific occupational groups, such as agricultural workers in the case of the Romanian-led AGROSH+ programme.

Another common aim of the initiatives was to prevent CVDs in the workplace (n=6). This was the case with guidelines and strategy documents, as well as workplace health interventions. The main target group was workers, who, in the case of workplace interventions, were encouraged to adopt healthier behaviours, such as healthy diet and regular exercise, to reduce clinical risk factors associated with the onset of CVDs.

It should be noted that large-scale workplace-based initiatives such as the Slovenian STAR-VITAL intervention and the German, Italian and Spanish WHP programmes stood out for recognising workplace settings as modifiable factors that can influence workers' behaviours and health. These initiatives not only emphasise behavioural factors such as healthy diet, physical exercise and smoking cessation, but also consider physical and psychosocial occupational risk factors associated with CVDs, such as work culture and ergonomics. Consequently, they provide workers with holistic, individualised support while also collaborating with employers to modify workplace settings where possible.

Finally, supporting RTW and RAW after CVD events was a common objective of some of the initiatives (n=5). These focus on providing workers with holistic support, with consideration of how individual, psychosocial, environmental, ergonomic and behavioural factors can be modified to remove barriers to RTW. RTW and RAW programmes are often supported by evidence-based practices, with notable examples including the Dutch NVAB Guideline and the S3 Guideline on Cardiac Rehabilitation, both of which targeted occupational physicians responsible for supporting individuals through a timely and sustainable RTW process. Another example of evidence-informed practice was the Danish Fleksjob initiative, which aimed to support individuals with chronic illnesses.

3.3.2 Target groups and coverage

Most interventions targeted workers and, to a lesser extent, employers. Fewer initiatives sought to incentivise companies or the relevant authorities to implement healthy working practices through policy and regulatory measures. The only exception was the Japanese Act Promoting Measures to Prevent Death and Injury from Overwork (*karoshi*), which legally requires companies to address occupational CVD risk factors such as long working hours (Government of Japan, 2015a).

While RTW and RAW support targeted individuals who face barriers to employment (e.g. older workers and people with long-term disabilities), as well as individuals with previous or chronic CVDs, the majority of interventions targeted workers regardless of their occupation, worker group or sociodemographic characteristics and therefore did not provide tailored support for specific occupational risk exposures (see the section '[Gaps, needs and priorities in relation to occupational safety and health policies](#)' below). Exceptions included the Farmers Have Hearts programme, which targeted male farmers, who are considered a hard-to-reach group with particular vulnerability to CVDs, and the NVAB guideline, which aimed to prevent health issues related to shift work. Two workplace interventions, STAR-VITAL and the Spanish WHP programme, targeted workers employed in SMEs, which often face greater barriers than larger companies to implementing WHP programmes, including limited financial and human resources and a lack of knowledge about programmes (OECD, 2022).

Regarding geographical coverage, most interventions were delivered nationally (n=11), with some opting for more targeted regional (n=2) and metropolitan (n=1) coverage. Four interventions were delivered cross-nationally, two of which received financial support from EU funding programmes such as ERASMUS+. The remaining interventions (n=2) took place in workplace settings and were organised at company level.

Finally, it is worth noting that the Dutch and German guidelines targeted occupational physicians and therapists. These professionals play a key role in countries such as the Netherlands and Germany by bridging clinical advice and the workplace. In the Netherlands, occupational physicians are independent of employers and support workers in RTW processes following illness, including by requesting

adjustments to working conditions, which employers must respect, thereby providing individuals with tailored, holistic support.

3.3.3 Tools used

This section describes the different methodologies used to engage stakeholders across the interventions. The effectiveness of each tool was assessed across four levels (very high, high, medium and low), which reflected its contribution to preventing or reducing occupational CVD risk factors and exposures. The levels were assigned to each tool based on the authors' professional judgement and interpretation of the evidence gathered through the literature and policy review.

Table 5: Tools used in the interventions, descriptions and effectiveness

Tool used	Description	Effectiveness
One-to-one tailored support	Interventions providing individual workers with tailored support, including personalised advice on behavioural and lifestyle changes and assistance with RTW and RAW processes, were the most effective. Sessions included motivational interviews, ongoing coaching and counselling, with support provided by nurses, health coaches, occupational physicians and counsellors. This was probably one of the most resource-intensive types of intervention, as it required professional support for each participant. Examples of interventions: NVAB Guideline, STAR-VITAL, TANSNIP-PESA, Farmers Have Hearts (pilot)	Very high, as they targeted individual risk factors. Evaluation of these interventions shows high effectiveness in reducing time away from work.
Workplace adjustments	Changes to workplace settings or working conditions aimed to prevent CVDs or support RTW after a CVD event. These often included ergonomic changes, such as the introduction of standing desks, and reductions in working hours or night shifts. As these measures can be relatively resource-intensive for organisations, they were implemented either within the organisation sponsoring the intervention or in countries with an adequate policy and regulatory context to support such changes. Examples of interventions: NVAB Guideline, STAR-VITAL, TANSNIP-PESA	Very high, as they removed or reduced exposure to the risk factor.
Health screenings	Health screenings were a common component of initiatives aimed at improving clinical indicators of cardiovascular health. They were often used to encourage behavioural change and/or assess the effectiveness of an intervention. Engagement was facilitated by providing screening facilities within workplace settings, which helped reduce logistical barriers (e.g. at livestock marts to reach farmers). Screenings included measurements of BMI and blood pressure, as well as blood tests to assess cholesterol levels and other clinical indicators of CVDs. Health screening can be considered moderately resource-intensive. Examples of interventions: Farmers Have Hearts, TANSNIP-PESA	Medium, as they are most effective when accompanied by tailored support.

Digital tools	Technologies such as mobile apps, behavioural nudge messages and physical activity monitors were often used to increase worker engagement. Digital tools can be considered relatively low-resource interventions, as they only require the initial setup. Examples of interventions: STAR-VITAL, Farmers Have Hearts, TANSNIP-PESA	Medium , as they are shown to increase engagement, thus leading to sustainable behavioural change.
Training materials	These consisted of workshops, training modules, games and discussions aimed at increasing basic knowledge of cardiovascular health, as well as occupational risk factors related to the onset of CVDs. They targeted workers, employers and clinicians. Training tools can be considered low-resource interventions, as most of the content can be made freely available online. Examples of interventions: Heart Keepers, Cœur et Travail, Lavora con il Cuore.	Low , as they are useful for increasing awareness of CVDs, but they often fail to result in practical changes for workers.

Source: authors' analysis of findings from the literature review.

3.3.4 Impact assessment

Although the availability of an impact assessment was one of the selection criteria, only around half of the selected initiatives met this requirement. The methodologies varied across the initiatives that did include an evaluation. However, most involved comparisons between intervention and control groups based on self-reported surveys and clinical measures collected at baseline and after the intervention. A key limitation was that studies often evaluated pilot versions of the interventions rather than their current implementation. In many instances, pilot studies were designed to provide more in-depth and resource-intensive support than the large-scale initiatives. For instance, the Farmers Have Hearts programme was evaluated in its basic form, which included only a general health check (van Doorn et al., 2019), and later in a more in-depth cardiovascular health check programme (van Doorn et al., 2022b). This limitation means that the findings should be interpreted with caution, as effectiveness might not translate directly to large-scale implementation. **Table 6** below present all evaluations published in academic articles.

Table 6: Interventions that included an impact assessment, evaluation indicators and results

Intervention	Evaluation indicators	Results of the evaluation
Fleksjob	RTW, self-sufficiency and reduction in unemployment	A randomised control trial found that the programme reduced the time participants spent in unemployment (Rehwald, Rosholm and Rouland, 2016).
Farmers Have Hearts	Health checks: blood pressure, lipid profile, blood glucose levels Self-reported measures: health outcomes and behaviours (smoking, alcohol consumption, physical activity, stress and well-being) and follow-up with GP services	41 % of participants improved their CVD risk profile. There was a reduction in the proportion of farmers with high blood pressure, elevated lipid levels and blood glucose levels compared to baseline. Farmers also reported reduced stress and positive behavioural changes such as adopting a healthier diet and quitting smoking (van Doorn et al., 2022, Teagasc, 2022).

Intervention	Evaluation indicators	Results of the evaluation
Lavora con il Cuore	Satisfaction survey and health checks: blood tests, BMI, blood pressure and lipid profile	The evaluation found increased awareness of CVDs and a greater willingness to visit a GP. The findings revealed significant differences between genders, with men exhibiting a higher moderate-to-high 10-year risk of CVDs than women. However, the assessment did not report improvements in clinical risk factors associated with CVDs (Volpe et al., 2018).
WHP programme (Italian version)	Pre- and post-intervention questionnaires on health data, habits and perceived usefulness	Positive behavioural changes were observed, including significant results in relation to smoking cessation and healthier food intake. More specifically, there was a four times increase in smoking cessation rates among exposed workers (but no increase among the control group) and a 10 % increase in consuming five portions of fruits/vegetables a day among exposed workers (but only 4 % among the control group). (Cremaschini et al., 2015).
STAR-VITAL	Accelerometer data, heart rate monitoring, blood tests and pedometer data, as well as information from self-reported questionnaires	Positive behavioural changes were reported in relation to physical activity (walking and stretching routines) and dietary habits (reduced salt intake and healthier lunch choices). Workers also reported increased use of stress-coping mechanisms. Management reported greater capacity and willingness to support older workers with chronic conditions (Širok et al., 2022).
BGF programme	Self-reported questionnaires to assess awareness of and participation in the programme	There was high uptake of healthy food options in workplace canteens, but low uptake of back health programmes and stress-management and relaxation initiatives (Ludwig et al., 2020).
TANSNIP-PESA	Fuster-BEWAT score: a composite measurement based on blood pressure, exercise, weight, diet and tobacco use, as well as a self-reported questionnaire	A three-year randomised control trial concluded that the intervention had a positive impact on the Fuster-BEWAT score, but the effects declined after the second year, probably because of the sustained effort required to maintain the new lifestyle (Garcia-Lunar et al., 2022).
NVAB Guideline	Three evaluation studies measured (1) occupational physicians' perceived effectiveness of and adherence to the guideline, and	Regarding the use of the guidelines (not focusing only on the NVAB guideline on <i>Ischaemic heart disease</i>), occupational physicians considered them relevant (van der Weide et al., 1998).

Intervention	Evaluation indicators	Results of the evaluation
	(2) the link between adherence to the guideline and RTW rates	A randomised control trial to evaluate the impact of the guideline on workers' body weight outcomes found no significant difference between the intervention and control groups (Verweij et al., 2013). Adherence to the guideline by occupational physicians for workers with mental health disorders was also not associated with earlier RTW. However, regular contact between occupational physicians and employers was linked to faster RTW (van Beurden et al., 2018).
fit2work	National statistics on employment rates and sick leave days	Compared to the control group, , employment rate among fit2work participants was higher, which indicated that the counselling had a positive effect on participants' employment. Similarly, the counselling offered to companies showed positive effects in terms of the overall number of sick leave days. However, unlike individual counselling, the assessment found no significant reduction in the number of sick leave days among companies that actively sought advice from fit2work, compared to the control group (Statistics Austria, 2024).

Source: authors' analysis of findings from the literature review.

3.3.5 Success factors

The effectiveness of the initiatives in preventing WR-CVDs and supporting RTW and RAW processes among workers with CVDs depended not only on their design but also on a range of factors, including the external conditions that supported successful implementation. Through a literature review and fieldwork research, several factors were identified as key to the success of an initiative. These factors were categorised as follows:

- **Commitment from funders, managers and workers**

Securing the commitment of stakeholders that provide financial support, such as government bodies and relevant ministries, was essential to the success of the initiatives. For publicly funded initiatives, this meant aligning with favourable policy momentum, such as growing interest in protecting older workers in the case of the Slovenian STAR-VITAL initiative. For privately funded initiatives, it meant ensuring that management boards understood the value of the programme and actively championed the proposed changes. One strategy to achieve this was to ensure that initiatives had 'champions' within the organisation, i.e. authority figures identified from the outset as responsible for promoting the relevant activities. This approach was adopted by the Italian WHP programme and the STAR-VITAL initiative.

At the same time, it was essential to ensure that the intended beneficiaries, i.e. workers or employers, were on board with the initiative's objectives. Effective initiatives included strong mechanisms for engagement and recognised the importance of beneficiaries' motivation and participation in achieving lasting outcomes. Successful initiatives motivated participants by giving them the autonomy to sign up and the freedom to select the type of support that best suited their needs. This flexibility took different forms: in the Farmers Have Hearts and STAR-VITAL initiatives, participants could choose their preferred mode of support (e.g. phone, messages or counselling), while in the fit2work programme, it meant

ensuring that workers could request support independently whenever needed and always with their consent.

- **Embedded cross-collaboration**

Collaboration across disciplines, sectors and stakeholders was another key factor in the success of the initiatives, as it ensured that they took into account diverse perspectives and were aligned with both policy and practice. With respect to guidelines and RTW programmes, such as the Dutch NVAB Guideline and the fit2work initiative, this translated into a strong collaborative format that allowed patients, industry representatives, academics, practitioners and policymakers to contribute to the final product. Central to the success of RTW processes is strong collaboration between workers and employers, which must be facilitated by occupational physicians.

- **Tailored, holistic support for individuals**

Tailoring interventions to the specific needs of workers was a decisive factor in their success. Initiatives that went beyond generic recommendations to offer personalised, holistic guidance based on individuals' sociodemographic characteristics, work-related risks and environmental factors were more likely to achieve meaningful behavioural change and reduce the likelihood of CVDs. Rather than providing workers with generic workshops and training, the initiatives offered them personalised, one-to-one support through health coaches or counsellors, who analysed their circumstances, motivations and barriers to change. Similarly, RTW programmes for people who face barriers to employment, such as older workers and people with long-term disabilities, were very effective when designed based on individuals' needs and barriers. The fit2work programme, for example, allowed individuals to access counselling sessions as needed and according to the severity of their case, with case workers supporting employees in conversations with their employer and/or doctor.

- **Recognition of socioeconomic, cultural and organisational factors**

Tailored support was not limited to the individual level but also considered the wider socioeconomic, cultural and organisational factors in which the intervention was implemented. For example, a key success factor of the Farmers Have Hearts programme was its integration within the farmers' local community from the outset. By recognising farmers' specific needs and barriers to accessing healthcare, the programme was able to provide accessible and relevant support. Practical strategies, such as setting up screening stations at farmers' livestock marts, dedicated agri-branches and agricultural events (i.e. their workplace settings) and employing local nurses, helped overcome the logistical challenges associated with visiting a GP, thereby facilitating regular health screenings for a group considered hard to reach in Ireland.

Adapting to organisational factors also required flexibility in response to changing circumstances, such as the restrictions imposed during the Covid-19 pandemic. Programmes implemented during the pandemic, such as STAR-VITAL, had to quickly shift from in-person activities to digital platforms, thereby demonstrating great adaptability and flexibility despite these constraints.

- **Clear objectives and measurable outcomes**

Interventions with well-defined objectives from the start provided clear direction for all stakeholders. Equally important was the use of metrics, including key performance indicators, to track progress and evaluate impact. These included biometric measures, self-reported health behaviours and programme adherence rates, which made it possible to monitor and evaluate the effectiveness of the interventions rigorously over time, justify funding and strengthen future applications. By integrating systematic monitoring and evaluation from the outset, programmes were able to identify challenges early, make necessary adjustments and demonstrate tangible results.

- **Dedicated health professionals**

A common feature of effective national programmes such as fit2work, the NVAB Guideline and the BGF programme was the involvement of dedicated health professionals to support workers through RTW processes following CVD events, as well as RAW processes. These roles are vital not only because they provide tailored, one-to-one expert advice, but also because they act as a bridge between workers, healthcare providers (e.g. by facilitating contact with doctors) and employers (e.g. by discussing workplace adjustments when needed).

- **Support for companies, especially SMEs**

Finally, targeting SMEs was considered a strength of the fit2work and STAR-VITAL programmes. These initiatives recognised that dedicating resources to employees' health and well-being is often challenging for companies with smaller revenues, as they are more likely to face multiple barriers such as limited financial and human resources and a lack of knowledge about programmes (OECD, 2022).

STAR-VITAL, in particular, gained initial buy-in from SME managers by providing relevant organisational support beyond the scope of the programme, such as support for management change. Similarly, fit2work recently developed a new programme that targeted companies and offered them workshops and counselling to support the RTW of workers recovering from illness.

3.3.6 Transferability of selected initiatives

The transferability of the initiatives was assessed based on several factors, including the strength of the evidence base, adaptability to different contexts and target groups, scalability without reliance on resources that may not be available elsewhere, and the presence of a robust monitoring and evaluation framework. Based on these criteria, initiatives such as strategies and guidelines that are highly dependent on their specific national policy context were considered to have low transferability. The following initiatives were identified as highly transferable to other European contexts:

- **Farmers Have Hearts programme (Ireland)**

This sector-tailored initiative addresses the occupational health needs in an underserved group and has demonstrated measurable outcomes. Its innovative yet cost-effective approach, which involves setting up health-check stations at farmers' livestock marts across the country, effectively increases engagement in health screening by removing the logistical barriers that can prevent rural or hard-to-reach populations from accessing such checks. This format could be transferred to other vulnerable and hard-to-reach worker groups, such as professional drivers, to increase awareness of risks and provide tailored support. Furthermore, the programme's implementation has been described in detail in a paper by van Doorn et al. (2022b), which should facilitate its replicability in other settings by providing insights to enable practitioners to adapt the programme to other countries or sector-specific contexts.

- **STAR-VITAL (Slovenia)**

This evidence-based workplace programme targeting SMEs was effective in producing positive behavioural change linked to CVD prevention, such as healthier diets and increased physical activity, as well as strengthening stress-coping mechanisms. Highly transferable elements included the assessment of company- and worker-specific risk factors to tailor support and the use of digital technologies to support workers and employers in making lasting behavioural changes, such as an e-platform with learning materials and interactive games, a website and text messages with nudges. The programme provides a strong model for transferability, as an evaluation paper by Širok et al. (2022) describes the study design and implementation in detail.

- **fit2work programme (Austria)**

This national programme can be applied across different European contexts as a strong RTW model. Given that it is voluntary and easy to access, fit2work does not require specific legislation or policy frameworks to be implemented, but instead relies on professionals to provide workers and companies with tailored support through counselling sessions. Regular evaluations by Austria's statistics office demonstrate its effectiveness in supporting workers' RTW following illness.

- **NVAB Guideline (Netherlands)**

This guideline, part of a collection of national guidelines, aims to support RTW after ischemic heart disease and prevent health issues associated with shift work and can be used to upskill health professionals who support workers with CVDs. The guideline translates evidence-based best practices in occupational and clinical health into practical recommendations for workplace adjustments.

3.4 Gaps, needs and priorities in relation to occupational safety and health policies

Despite numerous success factors, an analysis of the literature and fieldwork research revealed gaps and needs that could be prioritised in European OSH policies. Despite ambitious efforts at European and national levels to prevent CVDs, they remain a critical public health concern and thus require a

system-level approach that is deeply integrated into policy and practice. Strong policies are needed to support healthier working environments and reduce work-related cardiovascular risks. This section outlines the key gaps and priorities for strengthening OSH, with a specific focus on CVDs.

Limited consideration of occupational risk factors in cardiovascular disease prevention and management

Most of the CVD-prevention initiatives considered the workplace merely as a setting for behavioural interventions rather than as a source of exposures that could aggravate CVDs. Thus, their main objective was to address behavioural risk factors associated with CVDs, such as poor diet and limited physical activity. Furthermore, most interventions failed to consider how workplace risk factors can worsen existing conditions. Limited attention was given to reducing environmental, psychosocial and ergonomic occupational risk factors such as exposure to noise, heavy workload, stress and shift work. For instance, the Farmer Have Hearts initiative focused on healthy lifestyle factors but did not consider how farmers' specific working conditions could exacerbate CVD risks. This emphasis on behavioural factors may downplay the impact that working conditions can have on workers' ability to maintain healthy habits. For instance, long and irregular shifts and limited access to healthy food in the workplace can create barriers that make it difficult for workers to maintain healthy habits, regardless of their motivation. In some contexts, behaviour-focused interventions may fail to address structural and environmental factors that negatively impact workers' health. If it had adopted a more holistic approach, the Farmers Have Hearts programme could have addressed occupational risk factors, such as heavy workloads, exposure to noise and psychosocial stressors, during coaching sessions, while also exploring workplace adjustments to reduce these exposures.

There is currently a lack of detailed guidance on how occupational exposures can exacerbate existing health conditions and increase cardiovascular risk. At present, European frameworks such as EU4Health (European Commission, 2021c) address CVDs as part of broader efforts to prevent NCDs or else focus on occupational health with limited attention to CVDs. Furthermore, specific occupational exposures (e.g. noise) and their link to particular types of CVD (e.g. ischemic heart disease) remain underrepresented in European-level guidance.

A lack of occupation-specific interventions

Another limitation of most of the interventions, with the exception of Farmers Have Hearts, is that they did not target a specific worker group, occupation or sector, but rather focused on employees within specific companies. Although this generic approach is easy to implement, it may limit the impact of interventions by overlooking the occupational exposures that workers face in their day-to-day work. For instance, shift workers in the healthcare sector may experience disrupted sleep and unhealthy eating habits, while office workers may be exposed to job strain and prolonged sitting. These different exposures carry different CVD risks and therefore require tailored support.

Sector-specific interventions are needed to guide and inform a holistic framework that considers the workplace as a modifiable factor, where WR-CVD risks are adequately prevented and managed, in line with the EU OSH Framework Directive (Council of the European Communities, 1989), rather than simply as a setting for interventions. Particular attention should be paid to the impact of different occupational exposures on the likelihood of developing CVDs, particularly in high-risk sectors such as construction and among workers subject to specific working conditions such as night or irregular shifts and prolonged exposure to noise and chemicals.

A lack of sustained and dedicated funding for workplace health interventions

There is currently a lack of consistent, sustainable funding mechanisms that European countries can draw on to apply WHP initiatives, which hinders the continuity of interventions and the measurement of long-term health outcomes.

In fact, many of the selected initiatives relied on European or national funding for pilot projects or on corporate social responsibility (CSR) budgets, which ceased when political priorities changed, objectives were met or external funding cycles ended. This resulted in short-term projects and prevented the impact of sustained efforts from becoming apparent or translating into health outcomes. Without mechanisms to ensure ongoing financial support, interventions may be discontinued before they can demonstrate lasting health benefits.

To address these limitations, financial support should be integrated into national OSH budgets to ensure the continuity of initiatives for the prevention of WR-CVDs. This should include public and private

partnerships that emphasise the potential benefits of these interventions for both workers and organisations. In particular, the business case for workplace interventions should be strengthened by highlighting their potential to reduce sickness absence costs, improve well-being, increase productivity and support RAW.

A lack of integration of socioeconomic determinants of health in occupational safety and health policies

While individual behaviour plays a significant role in preventing CVDs, workers' ability to adopt healthy behaviours is heavily influenced by the interplay of numerous factors. These include sociodemographic characteristics, working conditions (including psychosocial and organisational factors) and environmental conditions. Current policies do not place sufficient emphasis on how these factors influence workers' ability to adopt and maintain a healthy lifestyle, or their likelihood of exposure to certain risk factors. For instance, being from a low socioeconomic background is associated with a higher likelihood of working in high-risk occupations with exposure to multiple risk factors, such as long working hours, night shifts, job insecurity, job strain and limited access to healthy food. A high risk of stroke has consistently been linked to long working hours among workers in low socioeconomic positions (Hannerz et al., 2018).

To successfully prevent CVDs within the working population, it is essential to consider the complex context in which workers operate, together with their sociodemographic and clinical characteristics, working conditions and the impact of these factors on their lifestyle. A holistic approach is therefore necessary to understand the underlying causes of CVD risk and design successful interventions that are relevant, feasible and capable of achieving sustainable behavioural change.

4 Conclusions and policy pointers

4.1 Conclusions

In recent years, CVDs have received increasing attention in the EU, with efforts to shift prevention towards holistic, system-based approaches that integrate health systems, occupational health and environmental policies. Growing recognition of WR-CVD risk factors is reflected in initiatives such as the Strategic Framework on Health and Safety at Work 2021-2027 (EC, 2021b) and the Healthier Together initiative (EC, 2022), with the EU Council calling for stronger preventive measures in December 2024. OSH regulations, policies and programmes are critical not only for preventing WR-CVDs but also for supporting RTW and RAW among employees with chronic CVDs. Yet, evidence of their implementation and effectiveness remains limited and fragmented, with few large-scale interventions in place.

Three main policy trends were identified at both European and international level: a shift towards system-based approaches, a greater focus on climate change-related occupational risks and CVD prevention through lifestyle interventions. Although these trends indicate an increasing emphasis on psychosocial, ergonomic and environmental factors in WR-CVD prevention policies, the analysis revealed that this has not yet translated into practice.

The analysis of the 20 initiatives, policies, strategies and programmes at EU, national and sectoral levels aimed at preventing WR-CVDs and supporting RTW and RAW among workers with chronic CVDs revealed a scarcity of interventions directly focused on reducing exposure to occupational risk factors.

The most common objective sought by the different initiatives was to raise awareness of workplace health by focusing on lifestyle factors, with limited consideration of how the workplace itself might contribute to or exacerbate risks. Few interventions directly targeted workplace factors and, where they did, the direct link between these changes and reductions in CVD risk was not measured. In addition, most interventions targeted workers regardless of occupation, sector or worker group, which indicates a limited understanding of the different occupational exposures they face.

Regardless of their objectives, successful interventions employed a variety of engagement tools that may be worth considering for future interventions, including one-to-one support and workplace adjustments, which proved particularly effective in promoting behavioural change and reducing CVD risk factors. This is not surprising, as such tools allow individual factors and their influence on workers' health to be considered on a case-by-case basis. It should be noted, however, that these initiatives are resource-intensive and have only been successfully implemented as time-limited workplace interventions or as RTW programmes in Northern Europe (Austria, the Netherlands and Germany). These programmes reflect stronger national OSH policies and highlight the significant divide across Europe in terms of workers' rights.

Many interventions included rigorous evaluations, although follow-up periods were often too short to capture measurable health outcomes. Nevertheless, these evaluations made it possible to identify good practices across successful initiatives, such as securing stakeholder commitment from the outset, embedding cross-collaboration, offering tailored support while considering wider contextual factors, establishing clear objectives and measurable outcomes, involving dedicated health professionals and supporting SMEs.

Transferability was assessed based on evidence-based design, adaptability to different contexts and target groups, scalability, and the presence of robust monitoring and evaluation frameworks. Four initiatives were identified as the most transferable and were included as case studies.

Several challenges and gaps emerged, including a lack of sustained funding, the tendency to view the workplace merely as a setting for health promotion measures rather than as a source of exposure in its own right, and a limited focus on reducing occupational risk factors. These findings were translated into gaps, needs and priorities in relation to OSH policies, thus providing EU health authorities with guidance on how to more effectively address CVD risk factors in workplaces across Europe.

To conclude, the study revealed that, despite increasing efforts to address occupational risk factors associated with the onset of CVDs, European initiatives remain limited in this regard. Although research and policy are advancing, many European countries lack the resources and institutional capacity to maintain strong, sustainable initiatives. Interventions remain fragmented, short-term and unevenly distributed across EU MSs, which can create considerable disparities in worker protection.

The findings underscore the need for stronger alignment between OSH and CVD prevention policies, thereby ensuring that occupational exposures are addressed alongside other socioeconomic determinants of health. Sustained funding, better monitoring and evaluation frameworks, and multidisciplinary collaboration are critical to bridge the gap between policy aspirations and practice.

Ultimately, progress requires a shift in perspective: the workplace must be recognised not only as a platform for promoting healthy behaviours but also as an environment that can generate or mitigate CVD risks. By integrating occupational risk factors into broader health strategies, the EU has an opportunity to strengthen prevention, improve RTW and RAW outcomes, and reduce the burden of CVDs across Europe's workforce.

4.2 Policy pointers

Policy pointer 1. Recommend the introduction and implementation of sector-specific risk assessment protocols that address work-related cardiovascular risks

This study revealed a lack of sector-specific initiatives targeting cardiovascular risks. Given the proven link between specific occupational exposures and an increased risk of CVDs, there is a need for specific guidance in this area. To this end, risk assessment protocols that address work-related cardiovascular risks should be promoted to ensure that occupational exposure to specific CVD risk factors is identified and eliminated or reduced where possible. These protocols should aim to identify, assess, eliminate or reduce, and manage occupational risk factors, while remaining feasible and economically viable, and should provide recommendations for prevention, monitoring frameworks, training and job-related controls. They should be worker-focused, support both RTW and RAW processes, and consider vulnerabilities and specific working conditions, while outlining how productivity can be maintained without compromising workers' health.

Recommended interventions within these protocols should be evidence-based, with the ultimate objective of eliminating exposure to work-related CVD risks. Tools recommended as part of these interventions should include face-to-face support and workplace adjustments, as these approaches have been shown to promote high worker engagement while allowing support to be tailored to individual needs. Technologies should also be introduced where possible to increase cost-effectiveness and facilitate access to individualised support. Where exposure to cardiovascular risk factors cannot be eliminated, organisations should be incentivised to implement appropriate controls to reduce exposure. Initially, protocols could focus on occupations and sectors with strong evidence of increased CVD risk, such as night-shift and construction workers.

Policy pointer 2. Foster multidisciplinary collaboration and workers' involvement in the creation of occupational safety and health initiatives to ensure holistic support

OSH cuts across ergonomic, psychosocial, environmental, socioeconomic and organisational factors. Dialogue among different stakeholders is therefore key to designing successful initiatives. Involving researchers, workers and their representatives, health and safety officers, occupational health experts and employers is essential to facilitate implementation and ensure that risks are identified from multiple perspectives, thereby providing workers with holistic support.

Academics should be involved in translating evidence into practical insights to ensure that policies, interventions and regulations are grounded in scientific knowledge and to avoid common pitfalls. Furthermore, research could be presented at regular forums and expert panels to give policymakers and other stakeholders an opportunity to discuss the evidence and how it could be translated into policy.

Employers represent another key stakeholder, as engaging companies from the outset helps align interventions with organisational priorities. This early dialogue can help clarify the business case for OSH interventions and highlight benefits such as reduced absenteeism, increased productivity, improved staff retention and enhanced corporate reputation. To this end, employers should be treated as co-creators in the design, delivery and evaluation of interventions.

Similarly, programmes to support RTW among individuals after CVD events and RAW among people with chronic CVDs should be designed through close collaboration between healthcare professionals, occupational therapists and companies. Healthcare professionals should assess workers' initial fitness for work and develop activity plans, while occupational therapists should translate medical recommendations into practical workplace adaptations such as adjusted work schedules, part-time arrangements and ergonomic adjustments. Companies should be regarded as partners in creating a supportive environment for workers' RTW.

Policy pointer 3. Increase efforts to promote awareness and training on work-related cardiovascular disease risk factors within organisations

Workers and employers need greater awareness of how specific occupational exposures contribute to the onset of CVDs. While the workplace is widely recognised as a determinant of other health outcomes, such as MSDs, its active role in both contributing to and protecting against CVDs is often overlooked. Strengthening awareness of this link is crucial, as it can drive greater commitment to health initiatives and build momentum for interventions that address one of the most pressing public health concerns. For instance, training could be designed to help both workers and employers understand the specific risk factors associated with their occupation and identify symptoms associated with exposure to certain risk factors, such as sleep deprivation, prolonged job strain and stress. In addition, companies that employ workers with specific CVD comorbidities should be informed about related occupational hazards.

Policy pointer 4. Evaluate the efficacy of occupational health practitioners in supporting return-to-work and retention-at-work processes

When available, occupational health practitioners play a critical role in supporting RTW and RAW after CVD events, as well as in translating health recommendations into workplace adaptations. This model has already been shown to be effective in countries such as Germany and the Netherlands, where occupational health practitioners provide tailored support that can shorten recovery times and help workers remain in employment. Beyond improving health outcomes, these practitioners have the potential to generate significant cost savings by reducing sick leave and absenteeism. To inform policy and practice at European level, further research is needed to rigorously assess the effectiveness of integrating occupational health practitioners into workplace programmes, the resources required to establish such roles and their overall cost-effectiveness across different national and sectoral contexts.

Policy pointer 5. Encourage sustainable funding mechanisms to implement workplace health promotion initiatives

Most of the health promotion initiatives analysed in this study were unable to provide workers with continued support due to a lack of sustained funding mechanisms for national health authorities or companies. Initiatives were commonly implemented for limited periods only, which prevented long-term positive health outcomes from becoming apparent and made it difficult to sustain significant behavioural changes over time. Policies should provide financial mechanisms, such as grants and tax breaks, to encourage enterprises to go beyond minimum regulatory standards and actively promote health in the workplace. Additionally, non-financial mechanisms, such as certification and award programmes for companies that exceed regulatory requirements and implement good OSH practices.

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Appendices

Appendix A — Research guiding questions

Table A1: Research guiding questions

Scoping framework for the literature review	
Review objectives	- Examine how different worker groups are exposed to WR-CVD risk factors and how these various factors form the focus of different intervention approaches. - Identify and synthesise relevant information and literature on regulation, policies, strategies, initiatives and programmes for the prevention of WR-CVDs, RTW following CVD events and RAW for workers with chronic CVDs. - Expand on initiatives included in the results of the FoP survey.
Strategy	Initial search through: - the websites of relevant ministries of MSs, social partners, sectoral organisations and other relevant institution; - relevant national legislation of EU/EEA MSs. Complemented by: - relevant projects, initiatives, surveys and reports of EU institutions such as the EC and European agencies, MS governments, government agencies, international organisations such as OECD and WHO, and other relevant organisations; - scientific literature published on Pubmed and Google Scholar; - publicly available sources mentioned in the results of the FoP survey.
Research questions	- How are different worker groups exposed to WR-CVDs? - What are the main characteristics of initiatives aimed at preventing WR-CVDs and supporting RTW for workers after CVDs or RAW for workers with chronic CVDs? - What are the key success factors? - What gaps exist in the regulations for WR-CVD prevention and support for workers who have experienced CVD events? - What measures should EU institutions and relevant bodies, authorities and organisations implement to reduce the risk of WR-CVDs and support RAW for people with chronic CVDs and RTW for workers after CVD events? - What policies, practices, strategies, etc. in relation to WR-CVDs exist at EU, national and workplace level? - What OSH risk prevention and management policies, practices, etc. exist? Are these enforced? What is their legal status? - Which sectors and worker types are covered by these policies, practices, etc.? - What challenges and opportunities do these policies, practices, strategies, etc. address? Do any gaps or challenges remain? - What are the roles and responsibilities of policymakers, social partners, inspectorates and other actors?

Scoping framework for the literature review	
Keywords	Workplace, work-related, occupational health, OSH, occupational safety and health, cardiovascular diseases, CVD prevention, sedentary behaviour linked to the workplace, health promotion during working hours, healthy diet in the workplace, physical activity throughout the working day, return-to-work, worker retention, certain CVD events (including heart disease, stroke, hypertension, etc.), job strain, shift work, physical workload, primary prevention, public health.
Timeframe	2019-2025; past initiatives selected for study must have ended no more than five years ago, unless there are exceptional reasons to include them, such as being particularly relevant, innovative or successful.
Geographic focus	EU MSs must be prioritised, but relevant information from non-EU countries should also be identified.
Languages	The search should be conducted in the following official EU languages, based on the linguistic capacity of the project team and partners: English, German, Dutch, French, Italian, Portuguese, Spanish and Swedish.
Inclusion criteria	- Started in or after 2019. - A focus on the prevention of CVDs in the workplace, RTW after CVDs and/or RAW for workers with chronic CVDs. - Completed or ongoing initiatives should be prioritised where possible. Initiatives currently under discussion should also be identified and clearly indicated as not yet implemented.

Appendix B — Desk research methodology: search string

Keywords used in the search of relevant literature:

Core health / medical terms:

("Cardiovascular diseases") OR ("CVDs") OR ("ischemic heart disease") OR ("Heart attack") OR ("Stroke") OR ("Cerebrovascular disease") OR ("Occupational health and cardiovascular risk") OR ("Chronic cardiovascular conditions and work") OR ("Return to work after cardiovascular disease") OR ("Work-related CVDs")

Occupational risk factors:

("Occupational risk factors" AND "Cardiovascular") OR ("Psychosocial risks" AND "Heart disease") OR ("Physical workload" AND "CVD") OR ("Shift work" AND "Cardiovascular health") OR ("Long working hours" AND "Heart disease") OR ("Job strain" OR "Job stress" AND "Cardiovascular") OR ("Workplace exposure" AND ("Noise" OR "Vibration" OR "Chemicals") AND "CVD") OR ("Combined occupational exposures" AND "CVD")

Psychosocial and lifestyle interactions:

("Psychosocial work environment" AND "CVD") OR ("Work stress" AND ("Unhealthy behaviours" OR "Lifestyle"))

Prevention, interventions and best practices:

("Workplace interventions" AND "CVD prevention") OR ("Return-to-work programs" AND "heart disease") OR ("Chronic disease management at work") OR ("Best practices" AND "Work-related cardiovascular disease") OR ("Case study" OR "Policy evaluation" AND "CVD prevention")

Policy, strategy, regulation:

("Occupational safety and health policy" AND "Cardiovascular") OR ("Workplace health promotion" AND "Cardiovascular") OR ("OSH regulations" AND "CVD prevention") OR ("Return to work policies" AND "Chronic disease") OR ("Labour legislation" AND "Cardiovascular disease") OR ("EU OSH strategy" AND "CVD") OR ("Healthier Together initiative" AND "Cardiovascular") OR ("Non-communicable diseases" AND "Workplace")

Appendix C — Focal Point survey results

Table C1: Focal Point survey results

Country	Name of initiative	Type	Description
Austria	fit2work programme	National voluntary programme	- Provides free counselling to workers and companies, including on professional rehabilitation. - Open to all workers. - Does not seem to specifically target CVDs.
Austria	Raising the effectiveness of psychosocial risk prevention	National initiative	- Targets workers with low or medium economic status, executives and managers. - Not yet confirmed; if approved, it will start in 2026.
Belgium	Risk prevention as primary prevention, detection of occupational diseases	National legislation	- Royal decrees requiring employers to identify WR-CVD risks and implement preventive measures, and workers exposed to certain risks to undergo periodic occupational health examinations. - Open to all workers. - Not to be included: from 1996 and older.
Bulgaria	National Programme for Safety and Health at Work 2022-2024	National strategy	- Sets priorities to ensure safe and healthy working conditions. - Does not include direct measures to prevent WR-CVDs; therefore, of limited relevance.
Croatia	National Programme Healthy Living (Health-Friendly Company)	Programme	- Enables companies to obtain certification for promoting workplace health and encouraging employees to adopt healthy lifestyle habits. - Not focused on CVDs, but addresses individual risk factors in the workplace. - Useful for assessing the impact of the project so far. - Open to all workers.
Croatia	'Walk or bike to work, socialise and relax...' campaign	Campaigns, including workshops	- Participating organisations can win two workshops on CVD risk factors. - Not focused on CVDs, but addresses individual risk factors in the workplace. - Open to all workers.

Country	Name of initiative	Type	Description
Denmark	Labour Inspectorate and OSH strategy	National policies, legislation	▪ Sentinel and mandatory reporting schemes for registering occupational hazards, including a whistleblowing function. ▪ Monitoring systems for Denmark's OSH strategy and evaluation of progress towards goals. ▪ More information needed, including the starting year. ▪ National legislation from the Danish Ministry of Employment currently under consultation. ▪ Targets workers and professionals.
Denmark	Prevention of CVDs and support for RTW after CVD events	Programme	▪ Programme aimed at preventing CVDs and supporting RTW for workers after CVD events. It includes rehabilitation initiatives, vocational and non-vocational rehabilitation. ▪ More information needed as no details given.
Denmark	Investigation, treatment and adjustment of the balance between work capacity and work demands	Research	▪ Analysis of a database on the distribution of occupational exposures across job groups and the effects of interventions to reduce WR-CVDs. ▪ Highly relevant research; authors to be contacted for more information.
Estonia	Remote service model for cardiac rehabilitation	Rehabilitation programme	▪ Remote service model for the rehabilitation of people with heart disease. ▪ Targets individuals with heart disease who require rehabilitation. ▪ Impact is currently being evaluated through an ongoing project supported by the Estonian Health Insurance Fund's innovation grant. ▪ Highly relevant; to be contacted for more information.
Finland	Occupational Healthcare Act	National legislation	▪ Legislation on monitoring and promoting the ability of employees with disabilities to cope at work, with occupational healthcare responsible for coordinating treatment and rehabilitation measures related to work ability and RTW.

Country	Name of initiative	Type	Description
			- Two pieces of legislation: the Occupational Healthcare Act (2001) and the complementary Government Decree on the principles of good occupational healthcare practice, the content of occupational healthcare and the qualifications of professionals and experts (2013). - Finland has no specific legislation on WR-CVD prevention or supporting RTW following CVDs. The legislation is not disease-specific but it does regulate and provide guidance on the prevention of all diseases at work and RTW more generally, and is thus applicable to CVDs.
Finland	FINRISKI study	Research	- Population study of risk and protective factors for chronic NCDs in Finland. - List of related CVD studies.
Finland	Exposure and stress in the working-age population – Exposome Project for Health and Occupational Research (EPHOR)	Research	The project conducts meta-analyses based on large cohorts from European countries to establish the link between occupational exposures and common NCDs, including CVDs.
Finland	Occupational dust exposure effect biomarkers in health risk assessment (Pöly-BM)	Research	The project studies occupational exposure to fine dust and fumes and their association with early effects in the body that may lead to conditions such as CVDs and heart attacks through inflammatory mechanisms.
Finland	Psychosocial job characteristics and heart rate variability – a good heart rate for better health	Research	The study examines the physiological effects of psychosocial work factors from the perspectives of stressors and resources.
Finland	Factors affecting work well-being among long-term ill and at-risk groups	Research	- The project aimed to validate an indicator for predicting the development of well-being among employees with long-term illnesses. - It found that a short, easy-to-use questionnaire developed for the general working population can predict individual disability risk even among employees with long-term illnesses or health risk factors.

Country	Name of initiative	Type	Description
Finland	Noise sensitivity, chemical sensitivity, cardiovascular diseases, multimorbidity, work ability and retirement	Research	The study looks at noise exposure in the workplace as a risk factor for CVDs.
Finland	Job accommodation to support returning to work after a stroke	Research	The study explores how interventions that address the cognitive symptoms of strokes and the need for job modifications affect RTW following a stroke.
Finland	Joint Action on Cardiovascular Disease and Diabetes (JACARDI)	Cross-national project	- The project involves 21 EU MSs and aims to improve the prevention and treatment of CVDs and diabetes, while promoting participation in working life among people living with these diseases through the implementation of effective operational models according to national needs. - Highly relevant.
France	Occupational Health Plan 2021-2025 (PST4) and Plan for the Prevention of Serious and Fatal Workplace Accidents 2022-2025	Strategy	Specifically targets agricultural workers, construction and public works workers, temporary employees, women's health at work and lorry or heavy goods vehicle drivers.
Germany	Joint German Occupational Safety and Health Strategy (GDA)	Strategy	- Stakeholders agree on common occupational safety goals, improved advisory concepts and monitoring practices. - The GDA-Psyche initiative focuses on work-related mental health. - No strategies specifically targeting CVDs are currently in place.
Germany	Occupational Safety and Health Act	Legislation	Requires employers to ensure the safety and health of their workers, including the prevention of work-related diseases such as CVDs.
Germany	S3 Guideline on Cardiac Rehabilitation (LL-KardReha) in Germany, Austria and Switzerland	Guidance	The guideline provides recommendations for cardiovascular rehabilitation to improve the long-term health and quality of life of patients recovering from CVDs.

Country	Name of initiative	Type	Description
Germany	S2k Guideline: Health Aspects and Design of Night and Shift Work	Guidance	▪ The guideline provides evidence-based recommendations for managing night and shift work, with a focus on health impacts, particularly cardiovascular risks. ▪ It targets doctors in all fields, OSH experts and night and shift workers.
Greece	National Programme for the Prevention and Treatment of Cardiovascular Risks	National programme	▪ The programme focuses on the early detection and diagnosis of CVDs based on key risk factors among all citizens aged 30 to 70, regardless of whether they are insured or uninsured, as well as their children up to the age of 29. ▪ Actions include free preventive laboratory tests and medical consultations with personal physicians, cardiologists, GPs, etc. ▪ However, no link to the workplace was identified.
Hungary	Active Hungary Initiative – Subprogramme on the Workplace Setting	National programme	▪ Programme encouraging workplaces to participate in sporting activities. ▪ The Active Workplace trademark recognises and supports workplaces that promote physical activity among workers through structured programmes, provide programmes and opportunities for physical movement, foster healthy work environments, and create community-based sports and physical activity experiences. ▪ Through Active Workplace Sports Ambassador training and community building, ambassadors encourage their colleagues to be physically active, organise active lifestyle programmes, support WHP and build strong and engaged communities within companies.
Hungary	Hungary's Comprehensive Health Screening Programme 2010-2020-2030 (MÁESZ)	National programme	▪ Free health screening, including a free 'health book' for companies. ▪ Companies can request health screening, including cardiovascular health. ▪ Workers are then provided with free information.

Country	Name of initiative	Type	Description
Hungary	Occupational Health Services Convention, 1985 (No. 161)	Legislation	- Occupational health services are involved in WHP programmes, mainly in larger companies, and the organisation of emergency care in enterprises. - Occupational health services can provide face-to-face health counselling, with blood pressure measured at almost every visit.
Ireland	Safety, Health and Welfare at Work Act, 2005 (No. 10/2005)	Legislation	- The legislation sets out the main provisions for securing and improving the safety, health and welfare of people at work, including in relation to CVD risks, and applies to all workplaces, including those of self-employed workers. - It clarifies and enhances the responsibilities of employers, employees and other parties involved in work activities. - It is the main legal framework for safety, health and welfare at work in Ireland.
Ireland	S.I. No. 299/2007 – Safety, Health and Welfare at Work (General Application) Regulations 2007 Part 6, Chapter 3 – Night Work and Shift Work	Legislation	- Legislation to protect night and shift workers in Ireland, with CVDs recognised as a potential risk factor. - Highly relevant.
Ireland	Farmers Have Hearts	Programme	- The programme provides free one-to-one health checks at farmers' marts across the country. - As a result of this programme and the subsequent evaluation, cardiovascular health was added to the Farm Safety Action Plan 2016-2021. - The evaluation report and other materials, such as booklets, are available.
Ireland	Healthy Eating at work	Campaign and programme	The programme was developed by the Health Service Executive (HSE) in collaboration with the Irish Heart Foundation and SafeFood, and provides materials to promote healthy food choices in healthcare settings, thus contributing to cardiovascular health.

Country	Name of initiative	Type	Description
Ireland	HSA Guidance on Managing Fatigue with Farm Work	Occupational guidance	▪ This guidance aims to help farmers make informed choices about managing farm work and fatigue to reduce safety and health risks. ▪ It is designed for farmers, contractors, farm relief workers, farmers' partners and family members, and the farm advisory service.
Ireland	HSA Programme of Work 2025	National strategy	▪ The 2025 annual programme places particular focus on work-related MSDs, occupational cancers, psychosocial health at work, health surveillance and cardiovascular health. ▪ Highly relevant.
Ireland	HSA Strategy Statement 2025-2027	National strategy	▪ This outlines the key strategic initiatives for three years, which form the basis for the annual Programme of Work. ▪ Further analysis is required to understand the content related to CVDs.
Ireland	S.I. No. 337/2016 – Safety, Health and Welfare at Work (Electromagnetic Fields) Regulations 2016	Legislation	▪ This regulation imposes duties on employers in relation to electromagnetic fields. ▪ Further analysis is required, as it may not be relevant given that it is not related to CVDs and is more than five years old.
Ireland	Safety, Health and Welfare at Work (Diving) Regulations 2018	Legislation	▪ The regulations aim to protect the safety, health and welfare of all personnel involved in diving at work. ▪ Further analysis is required, as they may not be relevant given that they are not related to CVDs and are more than five years old.
Ireland	The Farm Safety Action Plan	National strategy	▪ The strategy focuses on critical safety areas and aims to continue existing actions and build on the achievements of the previous plan. ▪ The 2025-2027 action plan had not yet been published at the time of drafting. ▪ Highly relevant.

Country	Name of initiative	Type	Description
Ireland	Healthy Ireland Framework 2013-2025 and A Healthy Weight for Ireland	National strategy	▪ The Healthy Ireland Framework was launched in 2013 and sets out four central goals for improving health and well-being. ▪ Further analysis is needed to understand its relevance to CVDs in the workplace, and the framework is more than five years old. ▪ The A Healthy Weight for Ireland plan reflects the government's commitment to helping Irish citizens achieve better health and reduce levels of overweight and obesity.
Italy	IFC Strategic Plan for Cardiovascular Health 2024-2027	National strategy	▪ The main goal of the plan is to improve the cardiovascular health of the Italian population. ▪ Further analysis is needed to determine if it addresses the workplace.
Italy	Lavora con il Cuore	Action plan	▪ The project helped identify people with health problems, empowered them, guided them towards healthier lifestyles and, where necessary, supported their adherence to treatment. ▪ Highly relevant.
Latvia	State Labour Inspectorate's Workplace Accident and Injury Database	Monitoring system	▪ This source provides authoritative, real-world data on acute cardiovascular incidents that occur at work. It is crucial for understanding the immediate impact of CVDs in the workplace, such as accidents caused by heart attacks. ▪ Analysts use the data to argue for preventive measures, such as first aid, health screening and stress reduction, since a notable number of workers have died from heart attacks while on duty.
Lithuania	Cardiovascular Disease Prevention and Early Diagnosis Programme of the Ministry of Health of the Republic of Lithuania	Programme	▪ The programme sets out the selection criteria for identifying patients at risk of CVDs, how services are organised and delivered, and how they are reimbursed through the Compulsory Health Insurance Fund (CHIF).

Country	Name of initiative	Type	Description
			- It aims to reduce preventable mortality from CVDs by identifying patients at risk, providing preventive care, supporting lifestyle modifications and, where necessary, prescribing treatment. - It applies to patients aged 40-60 years (inclusive). The list of eligible patients at a primary outpatient healthcare institution is updated at least twice a year. - Two services are provided: primary and comprehensive CVD risk assessment and prevention. Under the primary service, the tests and risk-factor assessments set out in the programme are performed, overall CVD risk is estimated using SCORE2 (where applicable), and the risk group is determined. A prevention plan is prepared, treatment is prescribed where needed, and follow-up is provided. The frequency of participation depends on the assessed risk level.
Lithuania	Health Promotion Programme for People at Risk of Cardiovascular Disease and Diabetes	Programme	- The programme aims to support implementation by integrating it into the activities of primary healthcare institutions and public health bureaus, thereby encouraging people living in Lithuania to adopt healthier lifestyles and reduce their risk of CVDs and diabetes. - An evaluation report is available.
Norway	Work-related stress	Programme	Further analysis is needed to understand how the programme relates to practical actions in the workplace.
Romania	Monitoring of occupational diseases and occupational disease-related absenteeism	Research/policy	- The initiative is a monitoring mechanism that includes data on CVDs. - It includes the development of an integrated health information system for CVDs and a national registry for stroke and other CVDs.
Spain	Award for the Best Action in Occupational Health Promotion	Strategy	Each year, INSST presents this award to one of the companies in the Spanish Network of Healthy Companies (REES) that have received recognition of good practices or programme sustainability.

Country	Name of initiative	Type	Description
			▪ The action submitted must align with the objectives of the Spanish Strategy for Safety and Health at Work in relation to cardiovascular health. ▪ The objective is to recognise companies that implement activities to maintain and improve the cardiovascular health of their employees through health promotion campaigns.
Spain	Spanish Strategy for Safety and Health at Work 2023-2027	Strategy	▪ The strategy aims to shape Spain's occupational health agenda over a five-year period. ▪ It is centred on prevention, coordination, inclusion and adaptability, thereby addressing both traditional workplace hazards and emerging risks. ▪ It is structured around six strategic objectives: improving prevention, managing emerging risks, enhancing OSH management, protecting vulnerable workers, integrating a gender perspective and strengthening the national system for crisis preparedness. ▪ Its key focus is on high-risk sectors and the occupational health issues that most significantly affect workers, such as MSDs, mental health, exposure to carcinogens and physical overload.

The European Agency for Safety and Health at Work (EU-OSHA) contributes to making Europe a safer, healthier and more productive place to work. The Agency researches, develops and distributes reliable, balanced and impartial safety and health information and organises pan-European awareness raising campaigns. Set up by the European Union in 1994 and based in Bilbao, Spain, the Agency brings together representatives from the European Commission, Member State governments, and employers' and workers' organisations, as well as leading experts in each of the EU Member States and beyond.

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