


Research article

Interventions to promote mental and physical health in changing working environments due to climate change, sustainable work practices, and work in green jobs: The EU INTERCAMBIO project



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ARTICLE INFO

Keywords:

Climate change
Green transition
Intervention
Mixed-methods
Occupation

ABSTRACT

Introduction: Work environments are rapidly changing in Europe, with climate change, the transition to the circular economy, and expansion of work in green jobs among key factors. Research and interventions are urgently needed to promote worker health and well-being. The European Union (EU) INTERCAMBIO project is the first large-scale initiative to systematically assess mental and physical health effects of climate change and green transition-related occupational exposures through intervention-based research using a common methodological framework across multiple industries and countries.

Methods: INTERCAMBIO will 1) promote advanced research methods throughout the work; 2) evaluate occupational heat, cold, and solar ultraviolet radiation exposures and potential short- and long-term mental and physical health effects in observational studies; 3) evaluate impacts of specific workplace interventions in five

Abbreviations: BDNF, brain-derived neurotrophic factor; CRP, C-reactive protein; DGEBA, diglycidyl ether of bisphenol A; DGEBF, diglycidyl ether of bisphenol F; EDA, eco-driving assistance; EMA, ecological momentary assessment; ER, epoxy resins; HRV, heart rate variability; ID, inhalable dust; IFN, interferon; IL, interleukin; ISO, International Organisation for Standardisation; ICAM, intercellular adhesion molecule; JEMs, job-exposures matrices; NGAL, neutrophil gelatinase-associated lipocalin; PPE, personal protective equipment; PRODISQ, PROductivity and DISease Questionnaire; RD, respirable dust; SAA, serum amyloid A; TNF, tumor necrosis factor; UV, ultraviolet; VCAM, vascular cell adhesion molecule; WBGT, wet-bulb globe temperature; WHO, World Health Organisation.

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<https://doi.org/10.1016/j.joclim.2025.100620>

Received 19 August 2025; Accepted 5 November 2025

Available online 27 March 2026

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key industries, namely outdoor construction, healthcare, public transit, renewable energy, and waste management/recycling; 4) model socio-economic impacts of interventions and develop a policy framework for social protection and decent green jobs; and 5) coordinate stakeholder engagement and develop a new health research agenda.

Results: Targeted multidisciplinary workplace interventions developed with co-creation methodology in a broad range of strategic, rapidly evolving industries will be evaluated, considering the multifaceted impact of climate change and the green transition on workers.

Conclusion: INTERCAMBIO will fill important data gaps and provide an evidence-base for protecting workers' health. While INTERCAMBIO focuses on specific industries in the European context, further intervention-based research is also needed more broadly in industries worldwide.

1. Introduction

Work environments are rapidly changing in Europe due to a range of factors, including direct and indirect impacts of climate change, the transition towards a more sustainable and circular economy, and expansion of green jobs [1,2]. Although the transition towards a green and circular economy is vital, there are a broad range of occupational health risks that can already be identified, and there is little research on these effects or interventions to mitigate them [2–5]. Work in green jobs may involve exposure to known or unknown agents (e.g., chemicals, dusts, and metals), which are important to identify, assess and control [2,5]. Research remains fragmented and effectiveness of interventions, or impacts of changes in work practices, has rarely been addressed, particularly in terms of health outcomes [6,7]. There are important data gaps in the evidence-base with which to develop effective workplace prevention strategies.

The INTERCAMBIO project is a European multi-country research project that seeks to address these critical needs by initiating the first large-scale initiative to systematically assess the mental and physical health effects of climate change and the green transition through intervention-based research in workplaces across multiple industries, using multidisciplinary approaches [8]. The project is based in a broad range of strategic, rapidly evolving industries using a common methodological framework, and highlights at the same time, both shared and diverse multifaceted impacts of climate change and the green transition on worker health [1,2]. The overarching hypothesis is that workplace interventions addressing adverse exposures to climate-related, green and sustainable work practice exposures/stressors will enhance worker health across multiple industries. In each intervention study, we will co-design, implement and evaluate interventions to reduce adverse exposures, or in the case of already ongoing workplace changes we will assess adaptation to the implemented work practices.

In addition to intervention-based studies, complimentary field studies will characterise occupational heat, cold, and solar ultraviolet (UV) radiation exposures across countries, develop new European quantitative job-exposures matrices (JEMs) using a transparent methodological framework [9–11], and apply them in large-scale population- and register-based epidemiological studies across countries. An observational study of short-term effects will also be performed. A range of harmonized assessments will be performed throughout the project, including of sensor-based personal and environmental exposures, working conditions, mental and physical health, biomarkers, sickness absence and productivity loss, supporting integration of study findings.

The project seeks to characterize climate-relevant occupational exposures across jobs in Europe, assess health impacts and mechanisms underlying them. A range of open research and policy tools will be developed including protocols and training materials, exposure measurement databases, quantitative JEMs for occupational heat, cold, and solar UV radiation, a policy tool-kit, and a new health research agenda as a resource to support industry- and population-based research in this rapidly evolving area. An ultimate objective is to establish long-term coordinated European engagement in climate-relevant workplace interventions, stimulate greater occupational research in industries linked with sustainable and circular economies, support policy translation, and

guide future research priorities in occupational and environmental health.

Overall, INTERCAMBIO consists of 11 main research areas (or work packages) organized by five objectives, to 1) promote advanced research methods throughout the work (e.g., exposome methods, co-creation approaches); 2) evaluate occupational heat, cold, and solar UV radiation exposures and potential short- and long-term mental and physical health effects in observational studies; 3) evaluate impacts of specific workplace interventions in five key industries, namely outdoor construction, healthcare, public transit, renewable energy, and waste management/recycling; 4) model socio-economic impacts of interventions and develop a policy framework for social protection and decent green jobs; and 5) coordinate stakeholder engagement and develop a new health research agenda (Supplemental Figure 1). INTERCAMBIO forms part of the WISEWORK-C Workplace Innovation for Sustainable Well-Being Network Cluster [12,13]. This paper provides an overview of the main aims of the project.

2. Materials and methods

2.1. Workplace intervention studies relevant to climate change and the green transition

Workplace interventions addressing adverse exposures to climate-related, green and sustainable work practice exposures/stressors, will be performed in large-scale industries that are among the most relevant and accessible [2]. Interventions will be co-designed (or adaptation to new work practices being implemented will be assessed) and as such, the final design of the studies here will be determined throughout the course of the work. A summary of the planned intervention studies appears below (see also Table 1 and Supplemental Table 1).

2.1.1. Outdoor construction

Outdoor workers who perform intense physical tasks, such as construction, are among the most affected by climate change [6,14,15]. Excessive heat exposure is increasing in Europe and Central Asia at double the global rate [14]. Outdoor workers in Southern Europe are already at particular risk [15]. INTERCAMBIO will co-design an intervention (or improve existing plans) to mitigate adverse health effects of heat exposure among outdoor construction workers in Barcelona, Spain [16,17]. We will implement a controlled before-after study with two arms, an intervention and control group. We will recruit 220 construction workers during summer who will participate for 5 working days. At baseline (pre-intervention), volunteers will wear sensors that measure personal skin temperature, and physical activity, report symptoms, and perform cognitive testing (selective attention (inhibitory control) and information processing speed) [18]. Environmental heat will be measured using personal temperature and humidity loggers and stationary wet-bulb globe temperature (WBGT). Interventions will be evaluated by repeating the 5-day monitoring campaign. Interventions may include engineering improvements (e.g., increased shade or cooling), heat awareness training, changes in scheduling, rest periods, access to restrooms, hydration, clothing, and personal monitoring [16,17, 19–21]. Ethnographic research methods will gain insight into worker

Table 1
Overview of intervention studies related to climate change, sustainable working practices, and green jobs in the INTERCAMBIO project.

Industry	Outdoor construction	Healthcare	Public transit	Renewable energy/wind turbine blade manufacturing	Waste management/recycling
Trial registration number	ISRCTN12209427	ISRCTN25033513	NCT06688721	ISRCTN10031201	ISRCTN19236285
Primary objective	Evaluate the effectiveness of an intervention to mitigate the adverse health effects of heat exposure	Evaluate the impact of (introduction of) sustainable work practices on changes in working conditions, health, and productivity	Evaluate the impact of onboard eco-driving assistance (EDA) on bus drivers' health and well-being	Evaluate the effectiveness of an ultraviolet (UV) visualisation system-based intervention to reduce risks of skin contamination	Evaluate the effectiveness of an intervention to mitigate exposure and health effects of hazardous exposures
Hypothesis	Implementing a preventive co-designed workplace intervention is effective in reducing adverse health effects of heat exposure	Introduction of sustainable work practices will lead to rising job demands and diminishing job resources and high levels of job strain and work stress adversely impacting workers' health	EDA increases stress and psychophysiological response	Implementing a preventive co-designed workplace intervention using UV visualisation systems is effective in reducing skin sensitisation risk	Implementing a preventive co-designed workplace intervention is effective in reducing adverse exposure levels and prevalence of waste-related illness symptoms
Secondary objectives	Co-create a new intervention, or improve on existing policies; Evaluate perceptions, knowledge, attitudes of heat and preventive policies; Acquire insight of culture and gender identity; Characterise exposure to heat	Acquire insight of factors through which sustainable work practices change working conditions, workers' behaviour and attitudes; and into individual and organisational factors that facilitate or hamper their implementation	Assess perceived stress; Examine associations between participants' self-reported responses and measures of stress-related biomarkers	Assess baseline prevalence of skin sensitisation; Assess fluorescent properties of epoxy resin systems; Assess hydration status; Characterise the work experience of exposed workers using personal sensors	Characterise the work environment and health effects; Evaluate risk management and identify conflicts; Co-create new suggestions to improve the work environment; Support actions to reduce workers' exposure
Location Planned	Spain	the Netherlands	Switzerland	Denmark, Portugal, Spain	Denmark, Portugal, Sweden
Participants (n)	220	500	50	1,500	300
(Possible) Intervention(s)/natural experiment(s)	Worker-level: hydration, clothing; Company-level: awareness campaigns, training, scheduling of activities, rest periods, engineering improvements	New environmentally sustainable work practices: "Sustainable healthcare", "Transition towards Zero Emission Endoscopy", and the Laboratory Efficiency Assessment Framework	Bus drivers randomly allocated to EDA- or non-EDA-equipped buses using company algorithm independent of presence or absence of EDA	Detection of skin contamination with epoxy resins using ultraviolet light visualisation systems for worker awareness and risk communication	Personal protective equipment use, ventilation, hygiene, worker and employer awareness and dialogue
Worker observation	Five days pre- and post-intervention	Six months	At least five working days, five hours driving shifts with and without EDA	One year	Six months
Co-creation	Co-create intervention	Conceptual model, study organisation, logistics, evaluation	Preparatory phase, study organisation, logistics, result interpretation and co-creation of adaptive solutions for improved EDA implementation and acceptance in public transit	Co-create intervention	Co-create intervention
Primary outcomes	Heat illness symptoms (sum), skin temperature	Well-being, self-rated health	Heart rate variability	Skin sensitisation	Inhalable dust, chemical exposure levels (measured with dust, urine, blood samples)
Timing	Daily	1, 2, 3, 6 months	Daily	One year	Six months
Secondary outcomes	Individual heat illness symptoms, hydration, tiredness, heat risk perception, cognitive performance, mood, sleep, perceived stress, physical demands, thermal environment	Psychosocial working conditions (amount of work, procedural clarity, autonomy), work perceptions (work engagement, sense of agency, intention to leave), sleep, perceived stress	Cortisol and cortisone (saliva), biomarkers of oxidative stress and inflammation (exhaled breath condensate and dried blood spots), lung function, perceived stress	Skin irritation / symptoms, skin contamination rates, physical demands, thermal environment, dehydration	Lung function, respiratory symptoms, musculoskeletal symptoms, organic chemical exposure levels (measured in urine and blood samples)
Common (secondary) outcomes^a	Self-rated health and well-being, productivity loss, sickness absence	Self-rated health and well-being, productivity loss, sickness absence	Self-rated health and well-being, productivity loss, sickness absence	Self-rated health and well-being, productivity loss, sickness absence	Self-rated health and well-being, productivity loss, sickness absence
Additional data contributions to other work packages	JEMs, short-term health effects, values, norms and conflicts	Values, norms and conflicts	JEMs, short-term health effects	JEMs, short-term health effects	JEMs, short-term health effects, values, norms and conflicts
PROSPERO ID	CRD42024628600	-	-	-	CRD42024628992

Abbreviations: eco-driving assistance (EDA), job-exposure matrices (JEMs), ultraviolet (UV).

^a The WHO-5 Well-Being Index [46] is a general scale designed to assess overall mental health, without primarily focusing on depressive symptoms or disorders. It includes five positively phrased questions that address various aspects of mental health, such as mood, vitality, and general interests, is available in INTERCAMBIO country languages with demonstrated usefulness in community-based studies. For physical health, a single question with an overall assessment by respondents of their

dynamics that shape attitudes toward safety and well-being [22], including the influence of masculinity on occupational behaviors [20–25]. Interventions will address cultural and gender norms [23–25]. Primary outcomes include heat-related illness symptoms [26] and average skin temperature (International Organisation for Standardisation (ISO) 9886:2004). Residential heat exposure and sleep parameters will be captured [27].

2.1.2. Healthcare

The transition to sustainable healthcare is of major importance globally [28–30]. In the Netherlands, the healthcare sector accounts for 7 % of greenhouse gas emissions, 4 % of waste, and 13 % of raw material usage [31,32]. Changes in work practices to improve sustainability such as introduction of new waste separation procedures or transition from disposable to reusable products may increase worker engagement and wellbeing but also job demands [33–36]. INTERCAMBIO will evaluate impacts of introduction of new sustainability interventions that require a measurable change in work practices in Rotterdam, the Netherlands on changes in working conditions, perception of work, mental and physical health, and productivity using a natural experimental design [37,38]. New initiatives include reducing use of disposable products and unnecessary medication prescriptions [39], transition to sustainable endoscopy [40], and laboratory efficiency [41]. Other new sustainable practices can also be included over time. For quantitative evaluation, a pre-post design with interrupted time series among 500 healthcare workers will be used. Workers will install HowAmI (TNO, Leiden, the Netherlands), a mobile application on their smartphone to collect questionnaire data, based on a conceptual model, using ecological momentary assessment (EMA) at baseline and follow-up [42]. Primary outcomes are overall mental health (World Health Organisation (WHO)-5 Well-Being Index) [43] and physical health (self-rated health) [44]. Qualitative research will explore mechanisms through which sustainable work practices change working conditions and factors that facilitate or hamper their implementation. Structured observations will examine impacts on working time (time benefits or delays) and arrangements (changes in key tasks and activities).

2.1.3. Public transit

Efforts to reduce the carbon footprint of transport and public transit are also being promoted [2,45,46]. In Switzerland, a pseudo-randomized controlled trial will assess whether eco-driving assistance (EDA) impacts bus driver health and well-being (see also [47]). EDA is implemented in a public transport company in 10 % of buses. EDA has additional sensors on the bus that monitor driving behavior and contextual information and an algorithm calculates driving quality scores which are reported to the driver. Fifty drivers will be randomly allocated to EDA- or non-EDA-equipped buses using the company fleet algorithm [47]. Buses with EDA will be the intervention driving-shifts, and without control shifts. The allocation ratio will be at least 5 h driving with EDA and 5 h without EDA (participants may be followed over several days to weeks). This within-subject design assumes a short-term reversible effect and that a short wash-out period can prevent carry-over effects [48,49]. The primary outcome is heart rate variability (HRV) assessed using the Bittium Faros™ electrocardiogram device (Bittium Corporation, Oulu, Finland) measured during working days [50]. HRV represents the variation in time between adjacent heartbeats and provides information on the autonomous nervous system and balance between parasympathetic and sympathetic activity. HRV is an important marker for work stress studies [51–53]. Self-collection of saliva will be used to assess cortisol and cortisone levels [54–56].

health in general, using the WHO recommended European version of self-rated health, is widely regarded as a measure of physical health [44]. Productivity loss at work is assessed through reduced individual labour productivity (sometimes referred to as presenteeism) over a short time period (the most recent work day) using the PROductivity and DISease Questionnaire (PRODISQ) [97]. Sickness absence is measured by the number of days' absence in the past 3 months [98].

2.1.4. Renewable energy/wind turbine blade manufacturing

In 2023, the wind energy sector employed 316,300 workers in Europe and is set to increase [2,57]. Wind turbine blade manufacturing uses epoxy resins (ER) associated with high rates of contact dermatitis [58,59]. Although engineering, personal protective equipment (PPE) [60], and other preventive procedures exist [61], high rates of skin sensitization persist [62], and use of ER systems is expanding [63–65]. INTERCAMBIO will evaluate effectiveness of a co-created intervention based on UV visualization to increase awareness of skin contamination and reduce risk of skin sensitization and dermatitis. Participants will be recruited among those involved in manual lamination and filling procedures in Denmark, Portugal, and Spain. For factories that use transparent ER systems with a fluorescent tracer or fluorescence, intervention will entail detection of skin contamination with ERs using UV visualization. This may entail a custom-built system (EPOXYVISION) [66] and/or additional UV illumination for specific work or decontamination processes. For factories that use transparent ER systems without fluorescent tracer or fluorescence, intervention will focus on training and risk communication [67–69]. At baseline and follow-up, participants will undergo allergy skin patch testing (diglycidyl ether of bisphenol A (DGEBA) and diglycidyl ether of bisphenol F (DGEBF), along with controls) and clinical skin examination [62]. Heat strain and dehydration will also be assessed for lamination and filling tasks. Work teams will serve as the unit of intervention allocation.

2.1.5. Waste management/recycling

There are substantial knowledge gaps about health risks in recycling work and interventions to address them [2,70–72]. In Europe there were 4.4 million workers in circular economy jobs, including recycling, in 2023 [2,73]. INTERCAMBIO will evaluate effectiveness of a co-created intervention among workers in Sweden (metal, e-waste), Denmark (domestic, plastic, e-waste) and Portugal (plastic). We will recruit 100 recycling workers in each country and assess 1. exposures (air, bio-monitoring, questionnaires); 2. health effects (pulmonary function testing, biomarkers, questionnaires); 3. evaluate existing risk management; and 4. via co-created interventions, new strategies to minimize risks and promote health. Elevated levels of dust and metals were observed at baseline in Swedish recycling workers based in individual air and biomonitoring sampling [74]. Anticipated interventions include: improved air quality (encapsulation, extraction, monitoring, system checking), administrative controls (hygiene, awareness and dialogue), and PPE [75,76]. Effectiveness will be evaluated by comparing changes in exposure levels, primarily dust concentrations in air, chemical concentrations in biological samples, and self-reported symptoms. Primary outcomes include: inhalable dust (ID) (three countries) and respirable dust (RD) (Sweden, Portugal). Concentrations of metals in ID and RD will be analyzed [76,77]. Metals in biological samples (pre-shift urine, post-shift urine and blood) will be determined [78]. Organic analyses (perfluorinated compounds, phthalates, bisphenols) will be performed [79].

2.2. Observational studies of occupational heat, cold, and solar UV radiation exposure

Long-term health effects of occupational heat stress, cold, and solar UV exposure in European workers are insufficiently understood, and large-scale studies with reliable occupational exposure estimates are needed [9]. New European quantitative population-based JEMs for heat, cold and solar UV radiation for use in epidemiological studies will be created using a transparent framework that accounts for geographical and temporal/seasonal variation in exposure [9–11]. Previous JEMs for heat for example have typically been based upon expert opinion for

single countries [80,81]. Analysis of long-term health effects will build upon recent/ongoing initiatives to coordinate occupational cohorts in Europe, including in large-scale population-based and national-scale registry-based cohorts [82–85], re-orienting work towards climate-relevant topics to study novel hypothesis regarding mental and physical health (e.g., depression, respiratory, cardiovascular, cancer, maternal health, birth outcomes, child neurodevelopment, and labour force participation) [86,87]. Impacts of hypothetical interventions also can be studied providing complimentary evidence [88]. Machine learning supporting automatic coding of occupational data will be enhanced to include additional languages [89].

For heat, an initial JEM is based on guidelines and standards of the ISO for heat stress assessment (Fig. 1) [9]. Annual hours of exceedance of the WBGT reference value were estimated based on historic climate data (hourly with 0.1 by 0.1 degrees spatial resolution [9,90,91]), expert assessment of outdoor work [11], clothing, local heat sources and cooling, and modeled data on physical activity [92]. In INTERCAMBIO a measurement campaign will be conducted in seven countries (Belgium, Denmark, the Netherlands, Portugal, Spain, Sweden, Switzerland) to capture sensor-based measurements of WBGT, personal air temperature and humidity, solar UV radiation, and metabolic rate, as well as questionnaire data and structured observations according to a common protocol. For cold, a new quantitative JEM will be based on a corresponding methodological framework to that of heat. For solar UV, an initial JEM based on expert ratings of outdoor work and published summary measurement data [11] will be enhanced with new personal measurement and meteorological data [93]. We will capture harmonized data on a range of jobs across countries and assess the validity of assumptions and input parameters among the initial JEMs (for example expert assessment vs sensor-based or self-reported data). Nine hundred workers with jobs covering the entire distribution of the extent of outdoor work will be monitored [11], with a focus on prevalent outdoor jobs as well as jobs with local indoor heat (and cold) sources [9]. A subsample of measured workers will undergo repeated measurement.

Finally, short-term health effects of occupational heat, cold and solar UV radiation will be investigated in an observational study of 150

workers in an extended measurement protocol to that of the JEMs (above). Biomarkers related to kidney (e.g., neutrophil gelatinase-associated lipocalin (NGAL), creatinine) and cardiovascular strain (e.g., C-reactive protein (CRP), Factor VII, intercellular adhesion molecule (ICAM)-1, serum amyloid A (SAA), vascular cell adhesion molecule (VCAM-1)), inflammation (e.g., interferon (IFN)- γ , interleukin (IL)-1 β , IL-2, IL-4, IL-6, IL-8, IL-10, IL-12p70, IL-13, tumor necrosis factor (TNF)- α), and mental health (e.g., brain-derived neurotrophic factor (BDNF)) in self-sampled dried blood spots [94] and urine samples will be assessed and mental health (well-being, anxiety, stress state) and cognitive testing performed (Supplemental Figure 2).

3. Results and discussion

Interventions in a broad range of strategic, rapidly evolving industries will be evaluated, highlighting the multifaceted impact of climate change and the green transition on workers and the need for multidisciplinary approaches [1,95]. While co-creation integrates diverse perspectives, it will need to account for culture, power dynamics and competing interests [1,96]. Prevailing conditions and high rates of personnel turnover may also not promote field studies with complex protocols. Participating companies may have preventive measures in place, thus additional measures may provide incremental benefit. Natural experiments may also be limited by the magnitude and timing of intervention [38]. Systematic living reviews will inform the design of the interventions that are implemented in outdoor construction and waste management/recycling (Table 1). Although gendered perspectives in co-creation and evaluation of interventions will be considered to the extent possible, industries here will likely not permit within industry comparisons due to the predominance of specific genders within each industry (e.g., males in outdoor construction), though between industry comparisons may be considered to the extent relevant. Interventions also include a set of harmonized core questions for mental health [43], physical health [44], and productivity loss [97,98] selected to be valid (including across languages and in population studies), concise, well-known, and responsive to change (focus on common symptoms

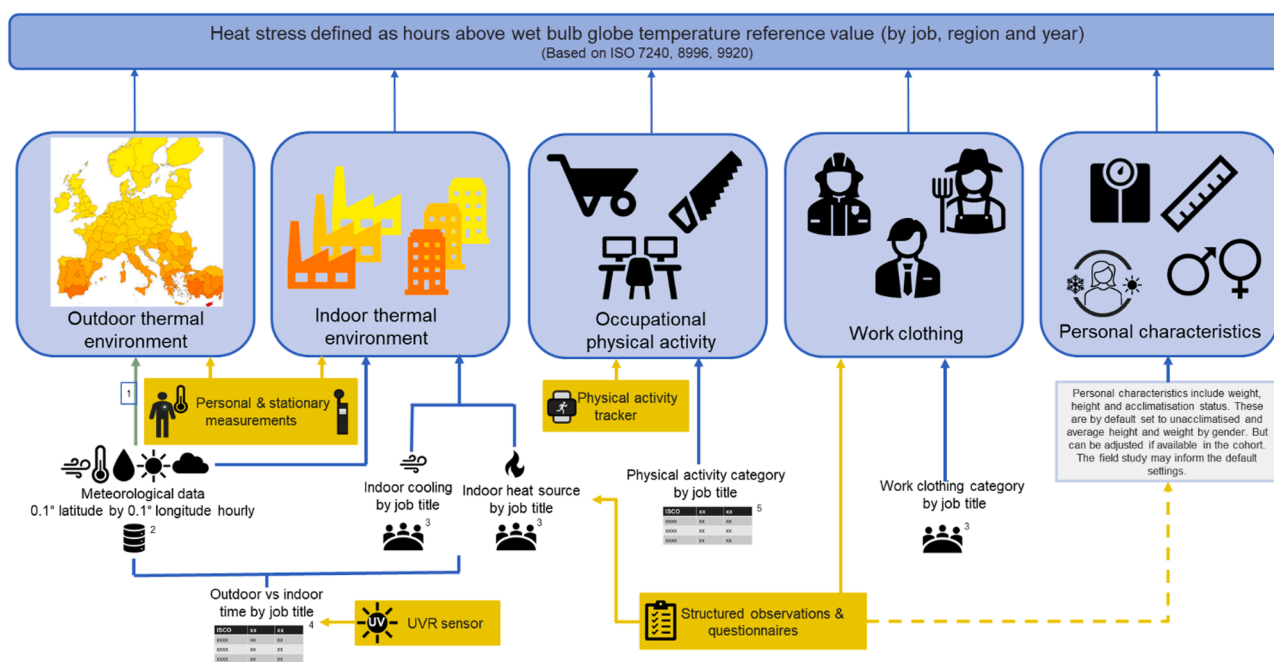


Fig. 1. Modular Framework of the Heat JEM [9]. Blue boxes show the initial heat JEM. Yellow boxes show the data collected in the INTERCAMBIO project measurement campaign. ¹Liljegren et al. [91]; ²European Centre for Medium Range Weather Forecasts database [90]; ³Expert panel consisting of five experts in occupational hygiene and exposure from the Netherlands, Belgium, Spain, Norway; ⁴Würtz et al. [11]; ⁵Solovieva et al. [92]. Abbreviations: International Organisation for Standardisation (ISO), ultraviolet radiation (UVR).

rather than disorders) (Supplemental Table 2). Heterogeneity in exposures and (changes in) work practices within some industries, such as in waste management/recycling or healthcare, may complicate study design and evaluation.

Findings will be used to estimate impact of mitigating interventions on mental and physical health, both in the short- and longer-term; and economic consequences based on a conceptual model that describes how climate change influences hazardous working conditions [99–103]. To develop a policy framework for social protection and decent green jobs, we will map values, norms and conflicts that emerge in the transition to sustainable work practices across industries. Surveys and interviews will capture engagement with sustainability and how the green transition is experienced. A comparative socio-legal analysis will examine the intersection of labor, health, and sustainability within various social, political, and economic contexts [104–106]. Combined with policy analysis, regulatory gaps, and legal innovation, policy recommendations will be proposed.

Finally, we will coordinate the development of a cross-cutting stakeholder community that reflects regional diversity in Europe leveraging existing networks and initiatives [84,107–108]. Work in INTERCAMBIO will be synthesised and gaps for research and policy identified. Development of a new health research agenda will need to be responsive given the pace of climate change, disruption in technology, and developments in the political sphere. While INTERCAMBIO focuses on specific industries in the European context, further intervention-based research is also needed more broadly in industries worldwide [2,95,109]. INTERCAMBIO seeks to lay the groundwork for intervention studies in other related industries, as well as support further development of shared tools and resources.

Sources of funding

This work was supported by the European Union's Horizon Europe Research and Innovation programme grant number 101137149 (INTERCAMBIO; <https://intercambio-project.eu/>). MCT is funded by a Ramón y Cajal fellowship (RYC-2017–) from the Spanish Ministry of Science, Innovation and Universities and co-funded by the European Social Fund. ISGlobal acknowledges support from the grant CEX2023–0001290-S funded by MCIN/AEI/10.13039/501100011033, and support from the Generalitat de Catalunya through the CERCA Program.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

INTERCAMBIO Study Group: Sara Bernardo, IISPV, Tarragona, Spain; Anke Boone, KU Leuven, Leuven, Belgium; Thomas Charreau, Unisanté, Lausanne, Switzerland; Maria Costa, ENSP-UNL, Lisbon, Portugal; Ana Gama, ENSP-UNL, Lisbon, Portugal; Calvin Ge, TNO, the Netherlands; Cristina Godinho, ENSP-UNL, Lisbon, Portugal; Karin Grahm, KI, Stockholm, Sweden; Boris Kingma, TNO, Utrecht, the Netherlands; Lisa Klous, TNO, the Netherlands; Marije Koks, ErasmusMC, Rotterdam, the Netherlands; Maryline Krummenacher, Unisanté, Lausanne, Switzerland; Heidi Lammers-van der Holst, ErasmusMC, Rotterdam, the Netherlands; Sara Lasuncion, ISGlobal, Barcelona, Spain; Carla Martins ENSP-UNL, Lisbon, Portugal; Esben Meulengracht Flachs, RegionH, Copenhagen, Denmark; Oriana Miraka, Halmstad University, Halmstad, Sweden; Estelle Montet, Unisanté, Lausanne, Switzerland; Mary Njoroge, LSHTM, London, UK; Karen Oude Hengel, TNO, Utrecht, the Netherlands; Amin Parsa, Halmstad University, Halmstad, Sweden; Marilia Paulo, ENSP-UNL, Lisbon, Portugal; Peter Philipsen, RegionH, Copenhagen, Denmark; Gunilla Rydenstrand KI, Stockholm, Sweden; Vivi Schlünssen, Aarhus University, Aarhus, Denmark; Mattias Sjöström, KI, Stockholm, Sweden; Regitze Sølling Wils, RegionH, Copenhagen, Denmark; Anja Stajanko, Lund, University, Lund, Sweden; Sara Stanulovic, ISGlobal, Barcelona, Spain; Sorosh Taba, Aarhus University, Aarhus, Denmark; Maxime Turuban, ISGlobal, Barcelona, Spain

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.joclim.2025.100620](https://doi.org/10.1016/j.joclim.2025.100620).

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