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Intersectoral Convergence: The Approach of Intergovernmental and Non-Governmental Organizations to Healthy Work in the Era of Climate Change

Convergencia Intersectorial: El enfoque de Organizaciones Intergubernamentales y No Gubernamentales sobre el trabajo saludable en la era del cambio climático

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Abstract

Climate change poses significant challenges to occupational health and safety, intensifying risks such as extreme heat, pollution, and vector-borne diseases. This study highlights the importance of intersectoral convergence, where intergovernmental and non-governmental organizations collaborate to develop policies and programs that promote healthy and sustainable work environments. Systematic review methodologies by PRISMA parameters and documentary qualitative research techniques were used to analyze reports from the WHO, ILO, UNEP, ICLEI, and the International Trade Union Confederation. The information was structured using an analysis matrix, allowing a detailed assessment of how these organizations integrate and apply intersectoral strategies. The conclusions say that occupational health in the era of climate change requires a collaborative and multidisciplinary approach that transcends traditional barriers between sectors, ensuring that responses are inclusive, effective, and sustainable. Examples of this collaboration include the integration of occupational health into the climate change policies of the WHO and UNEP, as well as ILO initiatives to promote decent work in a changing climate.

Keywords: *Climate Change, Global Warming, Working Conditions, Workplace Safety, Worker Well-being.*

Resumen

El cambio climático impone desafíos significativos a la salud y seguridad laboral, intensificando riesgos como el calor extremo, la contaminación y las enfermedades transmitidas por vectores, este estudio destaca la importancia de la convergencia intersectorial, donde organizaciones intergubernamentales y no gubernamentales colaboran para desarrollar políticas y programas que promueven entornos de trabajo saludables y sostenibles. Se emplearon metodologías de revisiones sistemáticas conforme a los parámetros de PRISMA y técnicas de investigación cualitativa documental para analizar informes de la OMS, OIT, PNUMA, ICLEI y la CSI. La información se estructuró utilizando una matriz de análisis, permitiendo una evaluación detallada de cómo estas organizaciones integran y aplican estrategias intersectoriales. Las conclusiones indican que la salud laboral en la era del cambio climático requiere un enfoque colaborativo y multidisciplinario que supera las barreras tradicionales entre sectores, asegurando que las respuestas sean inclusivas, efectivas y sostenibles. Ejemplos de esta colaboración incluyen la integración de la salud laboral en las políticas de cambio climático de la OMS y el PNUMA, así como las iniciativas de la OIT para promover el trabajo decente en un clima cambiante.

Palabras clave: *Cambio Climático, calentamiento global, condiciones laborales, seguridad laboral, bienestar laboral.*

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Introduction

Climate change constitutes a global threat that affects multiple aspects of modern life, impacting natural ecosystems, public health, and work environments. Given the urgency of adapting to these new climatic conditions, the well-being of millions of workers is at stake, underscoring the need for timely and effective responses (González Gaudiano & Meira Cartea, 2020).

In the face of this challenge, intergovernmental and non-governmental organizations are adopting a coordinated and coherent approach (Naciones Unidas, 2018). These entities are implementing policies and programs that demonstrate how intersectoral collaboration not only improves working conditions but also facilitates effective adaptation to a changing global climate. According to Vega Artavia (2022), intersectoral convergence emerges as an indispensable strategy to ensure a labor future that is both sustainable and resilient.

The World Health Organization (OMS, 2010) defines healthy work as practices and workplace environments that not only minimize the risks of disease and accidents but also actively promote workers' health and well-being. Similarly, during the United Nations Climate Change Conference (Naciones Unidas, 2023), climate change was described as long-term alterations in climatic and weather patterns. This aligns with the Intergovernmental Panel on Climate Change (2023), which defines climate change as a shift in the statistical distribution of climate patterns over time, manifested as a change in average values or in the variability of climate patterns. Such change may refer to specific climatic properties, such as temperature, precipitation, or wind, or to alterations in regional and global climate systems.

According to Ferreira et al. (2021), intersectoral convergence—understood as collaboration among various sectors and disciplines—is crucial for addressing complex challenges such as climate change adaptation, maximizing the complementary resources and knowledge of each sector involved. This becomes particularly relevant today, as the effects of climate change impact not only natural ecosystems but also socioeconomic structures, public health, and work environments (Igartua Miró, 2022).

Within this context, intergovernmental and non-governmental organizations are adopting the methodology of intersectoral convergence to design more effective and sustainable responses, overcoming traditional barriers between disciplines and sectors. The Organisation for Economic Co-operation and Development (OECD, 2019) emphasizes that this collaborative approach not only facilitates the integration of innovative strategies but also fosters broader and more effective dialogue among key stakeholders.

By working together, these organizations can leverage a wide range of resources and expertise, resulting in more robust interventions adapted to the specific challenges of climate change (Castillo Salas et al., 2021). Furthermore, as Oller Alonso's doctoral dissertation (2022) argues, such synergy enables the creation of holistic policies that take into account environmental, social, and economic impacts. This is essential for developing long-term solutions that benefit current employees while safeguarding the interests of future generations, ensuring the continuity and adaptability of labor practices in a constantly changing world.

In this scenario, a clear link between climate change and occupational health becomes evident, showing how environmental changes directly affect working conditions and workers' health. Previous studies such as those by Portador García (2020), the European Climate and Health Observatory (2023), and Alenza García (2021) have documented how rising temperatures can exacerbate the risks of heat-related disorders, while changes in rainfall and weather patterns can influence the prevalence of vector-borne diseases, particularly affecting workers in sectors such as agriculture and construction.

From a theoretical perspective, the public health ecology model provides a useful framework for understanding these dynamics. As Canals and Cáceres (2020) affirm, this approach focuses on how environmental, biological, and behavioral factors interact to influence public and occupational health. Consequently, it is crucial for the development of

policies and practices that effectively address the complex impacts of climate change on healthy work.

Intergovernmental organizations have played a vital role in addressing the impacts of climate change on occupational health. The WHO (OMS, 2019) has pioneered the publication of reports and guidelines detailing the effects of climate change on occupational health, including risks associated with extreme heat, air pollution, and vector-borne diseases. Its recommendations are essential resources for employers and governments to implement protective measures for workers.

Likewise, the International Labour Organization (OIT, 2023) has characterized climate change as a "fundamental challenge for the world of work," developing tools and resources to facilitate adaptation to these changes, including guidelines on decent work and training in health and safety under changing climatic conditions.

In turn, the United Nations Environment Programme (UNEP), as defined by the ONU (2021), complements these efforts by integrating occupational health into climate change policies and collaborating with the WHO and ILO to strengthen global responses to these challenges. UNEP plays a crucial role, working tirelessly to integrate occupational health into climate-related strategies and policies. This approach is grounded in the understanding that a safe and healthy work environment is vital for the resilience and adaptability of societies in the face of climate challenges.

On the non-governmental side, Local Governments for Sustainability (ICLEI, 2021) stands out for its work with local governments to promote sustainability and address the impacts of climate change on occupational health. Through tools and resources, such as climate risk assessment guides and adaptation plans, ICLEI helps cities prepare for and respond to these challenges.

The International Trade Union Confederation (CSI, 2023) has published reports on the risks of climate change in vulnerable sectors such as agriculture and construction and has promoted policies to protect workers. Similarly, the International Organisation of Employers (IOE, 2024) has recognized climate change as a crucial challenge for businesses, promoting investment in energy efficiency technologies and the adoption of sustainable practices as fundamental to healthy work, while advocating for collaboration among employers, governments, and workers to develop adaptive responses to the changing climate.

For Cuesta (2021), intersectoral collaboration is not only beneficial but essential for effectively addressing the complex challenges posed by climate change in the workplace. Given that the impacts of climate change encompass multiple aspects of occupational health and safety, the union of efforts among different organizations and sectors becomes a powerful tool (Economic Commission for Latin America and the Caribbean [CEPAL], 2019).

Intergovernmental organizations, companies, NGOs, trade unions, and academic institutions contribute unique perspectives and resources which, when converging, allow for a more holistic understanding and the development of more integrated and sustainable solutions (García Rico, 2024). This integration of knowledge and capacities is crucial for designing strategies that are truly effective in protecting workers' health and promoting resilient work environments under adverse climatic conditions (Rettberg Beil et al., 2018).

According to Santos Sarmiento (2019), the preceding discussion highlights the urgent need to adopt a coordinated and multidisciplinary approach to address the impacts of climate change on the workplace. Intersectoral convergence is not merely a desirable option but an indispensable strategy to ensure that responses to climate change are inclusive, effective, and sustainable (Varini, 2022).

Collaboration among different disciplines and sectors—including public health, labor, the environment, and risk management—enables the creation of labor policies and practices that not only address current challenges but also prepare societies for future impacts (Observatorio Regional Planificación para el Desarrollo, 2020). Such comprehensive labor policies and practices become

essential for facing both immediate challenges and for planning long-term responses.

From this perspective, it will be possible not only to understand current efforts and their impacts but also to identify areas requiring greater attention and opportunities to innovate in adapting the work environment to climate change. Accordingly, this article explores in depth the dynamics represented in Figure 1.

Figure 1, entitled *"Intersectoral Convergence and Healthy Work,"* presents the main themes addressed in this paper. It includes a detailed analysis of specific policies and programs implemented by intergovernmental and non-governmental organizations, followed by an evaluation of the results and effects of these initiatives. In addition, case studies are presented that illustrate the successful implementation of intersectoral strategies in diverse geographic contexts and economic sectors. Finally, recommendations are offered to enhance intersectoral collaboration and increase labor resilience in the face of climate change.

Methodology

This research was conducted within the framework of the project "Analysis of the Role of Intergovernmental and Non-Governmental Organizations in Promoting Healthy Work in the Face of Climate Change," which examined policies and programs implemented by both intergovernmental and non-governmental organizations to address the effects of climate change on the workplace.

The analytical basis of this study included WHO policy reports detailing interventions related to occupational health and climate change; ILO publications on climate change adaptation in the workplace and the promotion of healthy work environments; and UNEP data, which integrates occupational health into climate change policies.

In addition, reports from ICLEI—focused on sustainability and the effects of climate change on occupational health at the community level—were analyzed, along with ITUC publications documenting the risks that climate change poses to workers in vulnerable sectors. Recommendations from the IOE were also considered, as they provide guidelines for adapting to and mitigating the effects of climate change by promoting efficient technologies and sustainable management practices.

From a theoretical perspective, this study adopted an intersectoral approach, considering how convergence across different disciplines and sectors can strengthen responses to climate change in the workplace. This approach emphasized the implementation of practices that promote health and safety at work, under the paradigm of public health ecology.

To address this topic, the project employed methodological tools drawn from systematic review approaches, following the parameters of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) declaration established by Urrútia and Bonfill (2010). Accordingly, a systematic literature review was carried out to consolidate data on the policies and programs mentioned.

Specific inclusion and exclusion criteria were applied. Studies and publications were included if they addressed policies and programs related to occupational health and climate change implemented by intergovernmental and non-governmental organizations, were available in English or Spanish, published between 2018 and 2024, and employed a clear and rigorous methodology. Excluded were non–peer-reviewed documents, anecdotal reports, and works that did not provide empirical data or detailed analysis of intersectoral convergence and its impact on occupational health.

In addition, qualitative documentary research tools were used to structure an analysis matrix, adapted from Lotero et al. (2022). This matrix was designed to organize and interpret the collected information according to the categories described in Table 1. It helped identify the critical dimensions of intersectoral convergence and its influence on occupational health. Finally, documentary analysis techniques were applied to examine the documents and publications, with particular attention to the articulation and effectiveness of intersectoral strategies.

The evaluation of information was conducted in three phases:

- Initial Phase: Consolidation and synthesis of information extracted from the systematic reviews into the analysis matrix.
- Intermediate Phase: Detailed interpretation of identified categories and dimensions, analyzing how different organizations integrate and apply the intersectoral approach.
- Final Phase: Descriptive reconstruction of case studies and evaluation of the policies and programs implemented, focusing on their impact and effectiveness in improving working conditions in the face of climate change.

Table 1, titled “Category of Analysis,” structures and synthesizes the main categories and dimensions considered in the research when exploring intersectoral convergence and healthy work in the context of climate change. The selected indicators enabled a detailed analysis of how climate variations specifically impact work environments.

The analysis categories reflected the challenges and highlighted areas where coordinated and effective action is required to adapt and improve working conditions in response to global changes. This provided a crucial framework for evaluating existing policies and guiding the implementation of new strategies that promote a healthy and adaptive work environment.

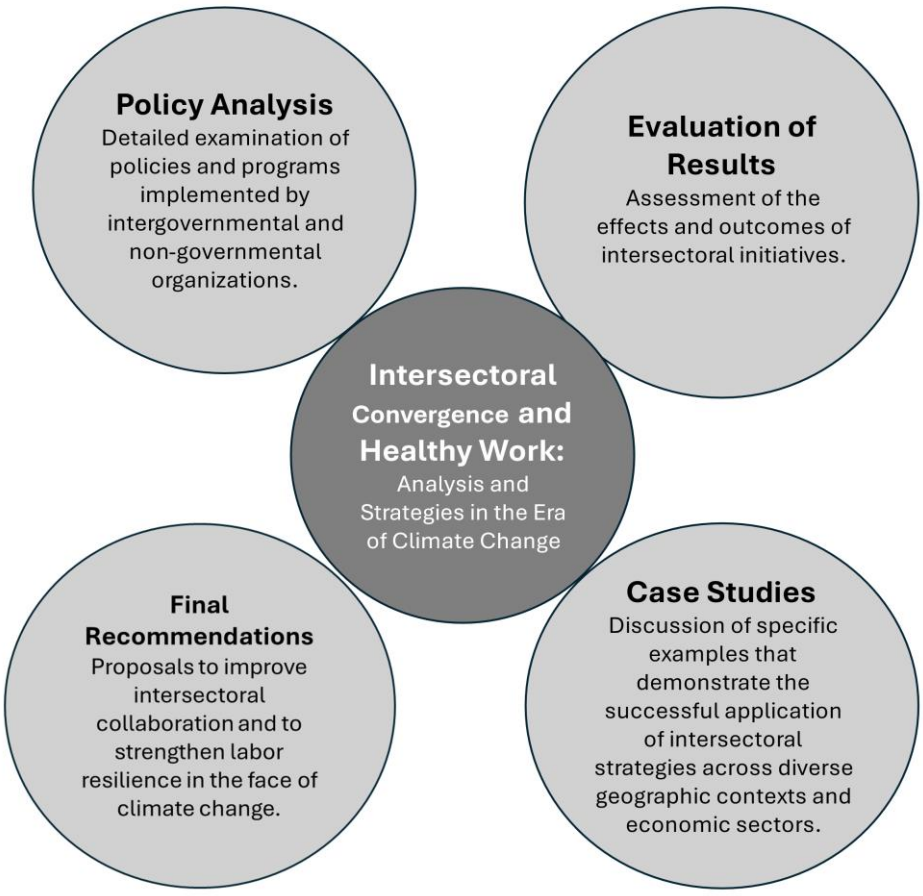

Figure 1. Intersectoral Convergence and Healthy Work.

Note: The diagram illustrates the key components of intersectoral convergence and healthy work strategies in the era of climate change, including policy analysis, outcome evaluation, case studies, and final recommendations.

Table 1. Categories of analysis.

Category	Dimension	Indicators
Impacts of Climate Change on Work	Environmental Effects	Changes in air quality and their effects on respiratory health. Alterations in the thermal stability of workplaces. Changes in the availability of essential natural resources for industries (water, materials, etc.).
	Occupational Health and Safety	Prevalence of heat-related disorders. Risks of vector-borne diseases. Exposure to air pollution.
Organizational Responses	Policies and Programs	WHO guidelines on occupational health and climate change. ILO initiatives for decent work under climate change. UNEP adaptation strategies.
	Collaboration and Convergence	Collaboration projects between WHO, ILO and UNEP. ICLEI initiatives with local governments. Policies promoted by the International Trade Union Confederation.
Effectiveness of Intersectoral Strategies	Innovation in Adaptation	Energy efficiency technologies. Environmentally sustainable management practices.
	Impact and Sustainability	Long-term improvements in occupational health. Resilience of work environments to climate change. Contributions to sustainable labor policies.

Note: The table presents the different categories of analysis related to the impacts of climate change on work, including specific dimensions and indicators. The main categories include environmental impacts, occupational health and safety, organizational responses, collaboration and convergence, as well as the effectiveness of intersectoral strategies.

Results and Discussion

Climate change constitutes a considerable threat to the health and safety of workers globally. Its effects—which include variations in air quality, changes in thermal stability within workplaces, and shifts in the availability of natural resources—have a direct impact on working conditions and productivity. In turn, these impacts present significant challenges for organizations, which must adapt to new climatic realities and protect their workers. Table 2 presents the most significant impacts of climate change in the workplace, categorized by dimension and indicator, and includes examples of affected sectors.

Table 2, titled “Impacts of Climate Change on Work,” provides a description of how climate change is affecting various aspects of occupational health and safety through significant environmental alterations. These are organized into two main dimensions: Environmental Effects and Occupational Health and Safety. Each dimension includes indicators that describe both direct and indirect effects on the work environment and worker health.

In the Environmental Effects dimension, there is an observed increase in the concentration of pollutants such as particulate matter, ozone, and nitrogen dioxide, which, according to Pertuz Meza et al. (2022), is directly linked to an increase in serious respiratory diseases such as asthma, chronic obstructive pulmonary disease (COPD), pneumonia, and lung cancer. Sectors such as construction, agriculture, transportation, and mining are particularly affected due to their continuous exposure to environments with poor air quality (Mertz Domecq, 2021).

Similarly, there is a noted increase in extreme temperatures and the frequency of heatwaves and severe climate events, which, as Revueltas Agüero et al. (2023) point out, exacerbate the risks of heat stress, dehydration, and heat-related disorders such as heatstroke, primarily affecting workers in agriculture, construction, and other outdoor occupations.

A decline in the availability of essential natural resources, such as water and raw materials, has also been recorded, driven by phenomena such as droughts and floods. This results in supply chain disruptions, increased production costs, and job losses, affecting sectors such as agriculture, fisheries, forestry, and tourism (Janqui Esquivel & Segundo Valencia, 2022).

Table 2. Impacts of Climate Change on Work.

Dimension	Indicator	Description	Impacts on Health and Safety at Work	Examples of Affected Sectors
Environmental Effects	Variations in air quality and their impacts on respiratory health	Increase in the concentration of contaminants such as suspended particulates, ozone, and nitrogen dioxide.	Asthma, chronic obstructive pulmonary diseases (COPD), pneumonia, lung cancer.	Construction, agriculture, transport, mining.
	Alterations in the thermal stability of workplaces	Increase in extreme temperatures, heatwaves, or severe climatic events.	Heat stress, dehydration, heat exhaustion, heat stroke.	Agriculture, construction, outdoor work
	Changes in the availability of essential natural resources for industries (water, materials, etc.)	Droughts, floods, rising sea levels, decrease in biodiversity.	Supply chain disruptions, increased production costs, job losses.	Agriculture, fishing, forestry, tourism.
Occupational Health and Safety	Prevalence of heat-related disorders	Increase in heat-related illnesses and injuries, as well as heatstroke.	Higher risk of workplace accidents, decrease in productivity.	Construction, agriculture, outdoor work.
	Risks of vector-borne diseases	Proliferation of mosquitoes, ticks, and other disease vectors due to climate change.	Malaria, dengue, chikungunya, yellow fever, encephalitis.	Agriculture, outdoor work, tourism.
	Exposure to air pollution	Increase in the concentration of contaminants in indoor and outdoor workplaces.	Respiratory diseases, heart diseases, cancer.	Construction, manufacturing, mining.

***Note**:* The table presents the dimensions, indicators, and descriptions of the impacts of climate change on work, as well as the effects on occupational health and safety and the most affected sectors. The dimensions include environmental effects and occupational health and safety, with specific examples from sectors such as construction, agriculture, and transportation.

On the other hand, the Occupational Health and Safety dimension shows an increase in the prevalence of heat-related disorders, with a growing number of illnesses and injuries associated with this phenomenon. According to Moreno Martín and Inglés Torruella (2023), this raises the risk of workplace accidents and reduces productivity, particularly in construction and agriculture.

Climate change has also facilitated the proliferation of mosquitoes, ticks, and other disease vectors, increasing the incidence of illnesses such as malaria, dengue, chikungunya, yellow fever, and encephalitis—especially concerning for outdoor workers and those in the tourism sector (Álvarez Cuesta, 2022a). Moreover, López Zambrano and Piñón Gámez (2023) note that air pollution, both inside and outside workplaces, has intensified, which is associated with a rise in respiratory and cardiac diseases, as well as cancer, affecting primarily workers in sectors such as construction, manufacturing, and mining.

In response to the growing challenges that climate change poses to work environments, various intergovernmental and non-governmental organizations have implemented policies and programs aimed at mitigating these effects and promoting healthy and sustainable work. Table 3 presents the key initiatives adopted by these organizations, outlining the strategies developed to safeguard employee health and safety in the face of climatic adversity.

Table 3, titled “Organizational Responses,” reveals how intergovernmental and non-governmental organizations are addressing the challenges of climate change in the workplace through a collaborative and strategic approach. According to Predassi and Fernández (2024), this approach not only seeks to mitigate the impacts of climate change

Table 3. Organizational Responses

Dimension	Organization	Initiative	Description	Recommendations
Policies and Programs	World Health Organization (WHO)	Guidelines on Occupational Health and Climate Change	Provides recommendations for governments, employers, and workers to protect workers' health from the impacts of climate change.	Implement health surveillance programs to monitor the effects of climate change on workers' health. Develop and apply adaptation strategies to safeguard employees from climate-related risks such as heat stress and vector-borne diseases. Train workers on climate change hazards and how to protect themselves.
	International Labour Organization (ILO)	Decent Work under Climate Change Initiative	Promotes decent work and climate change preparedness in the workplace.	Encourage the development of green and decent jobs in areas such as clean energy, energy efficiency, and sustainable agriculture. Support workers in the transition to new economies and jobs. Strengthen social protection for workers most vulnerable to climate change impacts.
	United Nations Environment Programme (UNEP)	Climate Change Adaptation Strategies	Assists countries in developing and implementing climate change adaptation strategies that consider employment impacts.	Integrate climate change into national development policies and strategies. Strengthen governments' capacity to develop and implement climate change adaptation strategies. Promote stakeholder participation, including workers and employers, in the development and implementation of adaptation strategies.
Collaboration and Convergence	WHO, ILO, and UNEP	Collaborative Projects	Develop joint projects to address climate change impacts on work, such as the "Decent and Safe Work in a Changing Climate" project.	Enhance cooperation among international entities to address climate change in the workplace. Share information and resources on best practices for addressing climate change at work. Support nations in formulating and implementing national-level strategies to tackle climate change in the workplace.
	ICLEI – Local Governments for Sustainability	Initiatives with local governments	Support cities and regions in developing and implementing local policies for decent work and climate change adaptation.	Promote the development of local policies that address climate change in the workplace. Support cities and regions in implementing local policies for decent work and climate change adaptation. Share information and resources on best practices for addressing climate change at the local level.
	International Trade Union Confederation (ITUC)	Union Policies	Advocates for international and national policies that protect workers from the impacts of climate change.	Strengthen the influence of trade unions in the development and implementation of policies to address climate change in the workplace. Pressure governments and employers to take action to protect workers from climate change impacts. Raise awareness among workers about climate risks

Note: The table presents the dimensions, organizations, initiatives, and recommendations related to organizational responses to climate change. The dimensions include policies and programs, as well as collaboration and convergence, with details of initiatives from WHO, ILO, UNEP, ICLEI, and ITUC, along with their specific recommendations to protect occupational health and safety from the effects of climate change.

but also to promote safe and sustainable work environments through well-structured policies and programs.

The WHO has been a pioneer in developing specific guidelines addressing occupational health within the framework of climate change. These guidelines propose concrete measures such as health surveillance programs and training on climate-related risks, focusing on worker preparedness and protection in the face of new climatic realities. According to

Fortoul Van Der Goes (2022), this approach demonstrates the importance of a proactive response that places health at the core of climate adaptation strategies.

The ILO, for its part, promotes decent work under the shadow of climate change, emphasizing the creation of green jobs and the adaptation of the workforce to sustainable economies. From the perspective of Álvarez Cuesta (2022b), this effort not only improves working conditions but also strengthens social protection, providing a safety net for workers disproportionately affected by climate impacts.

UNEP complements these efforts by assisting countries in developing adaptation plans that specifically take into account impacts on labor. This collaborative work among governments, employers, and workers is essential for the effective implementation of strategies that comprehensively address the challenges of climate change (Stuhldreher & Morales Olmos, 2020).

Interorganizational collaboration, as seen among WHO, ILO, and UNEP, exemplifies how pooling resources and expertise can result in robust projects that comprehensively tackle the impacts of climate change on employment. A notable project is “Decent and Safe Work in a Changing Climate” (OIT, 2024), which seeks not only to share best practices but also to strengthen global cooperation in supporting nations to design effective policies.

Locally, ICLEI works with cities and regions to implement policies that promote climate change adaptation and decent work at the local level. According to Carmona et al. (2022), these policies demonstrate the effectiveness of tailoring responses to the specific context of each community, which is essential for effectively addressing local climate change challenges.

Finally, the ITUC plays a fundamental role in protecting workers both internationally and nationally. As noted by Álvarez Cuesta (2022a), it advocates for policies that safeguard workers from the impacts of climate change and raises awareness about the importance of occupational protection measures.

Intersectoral convergence is crucial for effectively confronting the challenges that climate change poses in the workplace. Table 4 explores the effectiveness of various intersectoral strategies implemented by intergovernmental and non-governmental organizations to promote safe and resilient work environments in the face of climate change.

The analysis of the effectiveness of intersectoral strategies, as presented in Table 4, “Effectiveness of Intersectoral Strategies,” reflects a coordinated and multidimensional approach by various organizations to address the challenges of climate change in workplaces. According to Munera Peña (2023), this approach is essential to understanding how collaboration across different sectors and disciplines can result in innovative and sustainable solutions for occupational health in the context of global environmental change.

Energy efficiency technologies and environmentally sustainable management practices highlighted in Table 4 not only demonstrate a commitment to reducing environmental impact but also provide clear examples of how interventions can be adapted and applied across diverse industrial contexts to improve operational sustainability. The implementation of these technologies in different sectors illustrates a successful convergence of economic and environmental objectives, reinforcing the idea put forward by Heras Hernández (2022) that climate change adaptation can also serve as an opportunity for innovation in the workplace.

With respect to impact and sustainability, occupational health programs focusing on climate change–specific risks—such as heat stress and vector-borne diseases—show how intersectoral collaboration can strengthen organizational capacity to protect employee health. Adaptation measures such as climate-resilient infrastructure and emergency policies not only prepare workplaces to face extreme climate events but also, as Cuadrado Sánchez et al. (2023) affirm, ensure essential operational continuity for economic and social stability.

Table 4. Effectiveness of cross-sectoral strategies.

Dimension	Strategy	Indicator	Description	Example
Innovation in Adaptation	Energy efficiency technologies	Reduction in energy consumption in workplaces	Implementation of technologies such as LED lighting, efficient heating and cooling systems, and low-energy equipment.	A textile company reduces its energy consumption by 20% through the installation of LED lighting.
	Environmentally sustainable management practices	Implementation of management practices that minimize environmental impact at work.	Adoption of environmental management systems, waste reduction, promotion of recycling, and use of sustainable materials.	An agricultural company implements a certified environmental management system and reduces its water consumption by 15%.
Impact and Sustainability	Long-term improvements in occupational health	Reduction in work-related illnesses and injuries caused by climate change.	Implementation of occupational health programs addressing climate risks, such as heat stress and vector-borne diseases.	A construction company reduces the incidence of heat-related illnesses by 30% through training and protective measures.
	Workplace resilience to climate change	Capacity of workplaces to adapt to climate change impacts, such as extreme weather events.	Implementation of adaptation measures like climate-resilient infrastructure and emergency planning for extreme weather.	A chemical factory builds a flood-resistant facility to protect operations from climate change effects.
	Contributions to sustainable labor policies	Promotion of public policies that support decent work and climate change adaptation in the labor sector.	Participation in the development and implementation of labor policies addressing climate impacts, such as green jobs and social protection for vulnerable workers.	A labor union collaborates with the government to create a national policy promoting decent work and climate adaptation.

Note. The table presents dimensions, strategies, indicators, descriptions, and examples of the effectiveness of cross-sectoral strategies for climate change adaptation. The dimensions include innovation in adaptation and impact and sustainability, with examples such as energy efficiency technologies, environmentally sustainable management practices, improvements in occupational health, workplace resilience, and contributions to sustainable labor policies.

Finally, contributions to sustainable labor policies, which involve active engagement in the development of national and international policies, underscore the importance of cooperation between governmental and non-governmental organizations. This synergy, highlighted by Lozada Contreras and Bautista España (2024), emphasizes that it is crucial to foster a work environment that is not only capable of adapting to current climate change challenges but is also equipped to face those of the future.

Conclusions

This study has explored in depth the crucial role of intersectoral convergence between intergovernmental and non-governmental organizations in promoting healthy work environments in response to climate change. The findings suggest that a collaborative and multidisciplinary strategy is not only beneficial but essential for effectively addressing the challenges imposed by climate change in the workplace.

First, it has been demonstrated that the policies and programs implemented by these organizations have had a considerable impact on improving employee health and safety by reducing the effects of climate change. These initiatives range from guidelines on occupational health and climate change to adaptation strategies that consider decent work under changing climatic conditions. The intersectoral approach has enabled the effective integration of innovative strategies that foster resilient and sustainable work environments.

In addition, the importance of innovation in adaptation has been emphasized through energy efficiency technologies and environmentally sustainable management practices. These not only reduce the environmental impact of work but also promote long-term operational sustainability. Such practices have proven to be crucial for maintaining productivity and protecting occupational health in the face of climate variability.

Finally, intersectoral collaboration emerges as a fundamental mechanism to overcome traditional barriers between disciplines and sectors, allowing for a more holistic and coordinated response to the challenges of climate change. It is imperative that this collaboration continues and is strengthened to ensure that labor policies and practices not only address current challenges but also prepare societies for future climate impacts.

Nevertheless, it is important to acknowledge certain limitations of this study. First, the selection of sources may have introduced bias, as reports and studies from certain intergovernmental and non-governmental organizations were prioritized, potentially excluding valuable perspectives from other entities. Moreover, the reviewed publications covered a specific period (2018–2024), which may have overlooked relevant studies published outside this timeframe. Geographic limitations of the analyzed cases may also influence the generalization of the findings, since many examples come from specific regions with particular climatic and socioeconomic conditions. These limitations should be taken into account when interpreting the results and applying the study's recommendations to different contexts.

For future research, the following areas are suggested:

1. A comparative analysis of the effectiveness of occupational health and climate change policies in different geographic regions to identify variations and context-specific best practices.

2. Longitudinal studies evaluating the long-term impact of energy efficiency technologies and environmentally sustainable management practices on occupational health and productivity.

3. Research focused on integrating intersectoral strategies into specific economic sectors, such as agriculture and construction, to develop practical guidelines tailored to the needs of these climate-vulnerable sectors.

This article calls on intergovernmental and non-governmental organizations, companies, trade unions, and academic institutions to maintain and expand cooperation, recognizing that occupational health in the era of climate change cannot be effectively addressed in isolation. Only through unified efforts and a shared vision can we aspire to build a future of work that is both sustainable and resilient.

Author Contributions

Conceptualization, All authors; Project design, All authors; Literature review (state of the art), L.R.; Methodology, D.G.; Data collection, L.R.; Data analysis, D.G.; Results presentation, All authors; Discussion and conclusions, All authors; Draft writing (original version), All authors; Final revisions, All authors; Approval for publication, All authors.

References

Alenza García, J. F. (2021). La protección de la salud en la Ley de Cambio Climático y Transición Energética. *Revista Catalana De Dret Ambiental,* 12(2). https://revistes.urv.cat/index.php/rcda/article/view/3170

Álvarez Cuesta, H. (2022). La lucha contra el cambio climático y en aras de una transición justa: doble objetivo para unas competencias representativas multinivel. *Revista de Trabajo y Seguridad Social* CEF, (469), 89–120. https://doi.org/10.51302/rtss.2022.3271

Álvarez Cuesta, H. (2022a). Transición energética y políticas de empleo verde: el caso de la minería del carbón en el noroeste de España. *LABOS Revista de Derecho del Trabajo y Protección Social*, 3(3), 154-179. https://doi.org/10.20318/labos.2022.7372

Canals, M., & Cáceres, D. (2020). Una Salud: conectando la salud humana, animal y ambiental. *Cuadernos Médico Sociales*, 60(1), 9-18. https://cuadernosms.cl/index.php/cms/article/view/121/111

Carmona, R, Biskupovic, C., & Ibarra, J. T. (2022). Respuestas locales para una crisis global: pueblos indígenas, sociedad civil y transdis ciplina para enfrentar el cambio climático. *Antropologías del Sur*, 9(17), 81-101. https://dx.doi.org/10.25074/rantros.v9i17.2315

Castillo Salas, M. F, Ramírez de la Cruz, E., & Smith, H. J. (2021). Políticas prodensi ficación y cambio climático: Los desafíos de las ciudades mexicanas. *Sobre México Temas de Economía*, 1(3), 5–33. https://doi.org/10.48102/rsm.vi3.79

CEPAL. (2019). *Cambio climático y derechos humanos: contribuciones desde y para América Latina y el Caribe*. https://repositorio.cepal.org/entities/publication/505e7068-9d10-4e82-8a6b-ce8100936710

CSI. (2023). *Reforzar El Poder De Los Trabajadores*. https://www.ituc-csi.org/just-transition-centre?lang=es

Cuadrado Sánchez, G. P, Rodríguez García, M. del P., & Cortez Alejandro, K. A. (2023). Responsabilidad Social Empresarial y Desempeño Financiero: Revisión sistemática, Scopus 2015-2023. *Revista Venezolana de Gerencia*, 28(103), 983-1000. https://doi.org/10.52080/rvgluz.28.103.5

Cuesta, H. Á. (2021). La transición justa en la Ley de Cambio Climático. *Noticias CIELO*, (9), 2. https://www.cielolaboral.com/wpcontent/uploads/2021/09/alvarez_noticias_cielo_n9_2021.pdf

European Climate and Health Observatory. (2023). *Efectos sobre la salud y la seguridad en el trabajo*. https://climate-adapt.eea.europa.eu/es/observatory/evidence/health-effects/occupational-health-safety/effects-on-occupational-health-and-safety

Ferreira, M. A. M., Velandia, L. N. G., & y Márquez, M. C. J. (2021). Convergencia de saberes en la formación del trabajo social contemporáneo. *Boletín Redipe*, 10(12), 561–568. https://doi.org/10.36260/rbr.v10i12.1611

Fortoul Van Der Goes, T. I. (2022). El ambiente, la salud y nuestro planeta. *Revista de la Facultad de Medicina*. 65(3), 3-7. https://doi.org/10.22201/fm.24484865e.2022.65.3.01

García Rico, L. (2024). Dimensión geopolítica y de seguridad del cambio climático: una perspectiva climática de la gobernanza global. *ICE Revista De Economía*, (935). https://doi.org/10.32796/ice.2024.935.7792

ICLEI. (2021). *Camino hacia una ciudad verde*. https://americadosul.iclei.org/es/quem-somos/

González Gaudiano, E. J., & y Meira Cartea, P. Á. (2020). Educación para el cambio climático: ¿educar sobre el clima o para el cambio? *Perfiles Educativos*, 42(168), 157–174. https://doi.org/10.22201/iisue.24486167e.2020.168.59464

Heras Hernández, F. (2022). El Plan Nacional de Adaptación al Cambio Climático 2021-2030. *Revista de Salud Ambiental*, 22(Especial Congreso), 82–85. https://ojs.diffundit.com/index.php/rsa/article/view/1195

Igartua Miró, M. T. (2022). Prevención de riesgos laborales y cambio climático. *Revista de Trabajo y Seguridad Social CEF*, (469), 47–87. https://doi.org/10.51302/rtss.2022.3487

Intergovernmental Panel on Climate Change. (2023). Sections. In H. Lee y J. Romero (Eds.), *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 35-115). AR6 Synthesis Report. https://doi.org/10.59327/IPCC/AR6-9789291691647

Janqui Esquivel, M., & Segundo Valencia, W. (2022). Importancia de la ecoeficiencia en las organizaciones empresariales en Latinoamérica. *Ciencia Latina Revista Científica Multidisciplinar*, 6(2), 2281-2297. https://doi.org/10.37811/cl_rcm.v6i2.2024

López Zambrano, A. J., & Piñón Gámez, A. (2023). Estrategia para disminuir afecciones de salud producidas por la contaminación del aire en la ciudad de Milagro, Ecuador. *MQRInvestigar*, 7(4), 1549–1570. https://doi.org/10.56048/MQR20225.7.4.2023.1549-1570

Lotero, D. F., Garrido, D., & Ramírez, M. (2022). Seguridad y salud en el trabajo, perspectivas metodológicas de investigación. *Gaceta Médica de Caracas*, 130(4). https://doi.org/10.47307/GMC.2022.130.4.13

Lozada Contreras, J. D., & Bautista España, A. D. (2024). Sistema IoT para el monitoreo de variables ambientales en un ambiente laboral. *Revista Social Fronteriza*, 4(1), e41117. https://doi.org/10.59814/resofro.2024.4(1)117

Mertz Domecq, W. (2021). El efecto de la contaminación del aire sobre la oferta laboral [Trabajo de grado, Universidad del Pacífico]. Repositorio Institucional Universidad del Pacífico. https://repositorio.up.edu.pe/handle/11354/3046

Moreno Martín, G., & Inglés Torruella, J. (2023). Impacto en la salud laboral de la exposición al calor extremo: una revisión sistemática. *Revista Habanera de Ciencias Médicas*, 22(3), e5328. https://revhabanera.sld.cu/index.php/rhab/article/view/5328

Munera Peña, G. (2023). *Cambio climático y sus implicaciones en la salud y seguridad del trabajador en obras de construcción en los últimos 10 años* [Trabajo de grado, Corporación Universitaria Minuto de Dios]. Repositorio Uniminuto. https://repository.uniminuto.edu/bitstream/10656/18284/1/TE.RLA_MuneraPe%c3%b1aGisellAndrea_2023

Naciones Unidas. (2018). *Apoyar el desarrollo sostenible y la acción climática.* https://www.un.org/es/our-work/support-sustainable-development-and-climate-action

Naciones Unidas. (2023). *Un climate change conferences.* https://www.un.org/es/climatechange/un-climate-conferences

Observatorio Regional Planificación para el Desarrollo. (2020). *Una mirada regional a la acción por el clima en los Planes Nacionales de Desarrollo de América Latina y El Caribe.* https://observatorioplanificacion.cepal.org/es/nota/una-mirada-regional-la-accion-por-el-clima-en-los-planes-nacionales-de-desarrollo-de-america

Oller Alonso, M. (2022). *La responsabilidad social corporativa de las empresas del mármol en la comarca del Almanzora, Almería (2019-2021): Análisis de sus estrategias de comunicación integral*. https://digitum.um.es/digitum/handle/10201/117824

ONU. (2021). *Programa de las Naciones Unidas para el Ambiente.* https://agenda2030lac.org/es/organizaciones/pnuma

IOE. (2024). *A powerful and balanced voice for business.* https://www.ioe-emp.org/

OIT. (2023). *Cambio climático y empleo (Empleos verdes*). https://www.ilo.org/global/topics/green-jobs/areas-of-work/climate-change/lang--es/index.htm

OIT. (2024). *Un nuevo informe de la OIT revela los graves efectos del cambio climático sobre la salud y la seguridad de los trabajadores.* https://www.ilo.org/global/abouttheilo/newsroom/news/WCMS_923199/lang--es/index.htm

OMS. (2010). *Entornos laborales saludables: fundamentos y modelo de la OMS: Contextualización, prácticas y literatura de apoyo*. https://iris.who.int/handle/10665/44466

OECD. (2019). *Estrategia de Competencias de la OCDE 2019: Competencias para construir un futuro mejor.* OECD Publishing. https://doi.org/10.1787/e3527cfb-es .

Pertuz Meza, Y., Rebolledo Castillo, M. V., Vásquez Brochero, H. Y., & Gil Escamilla, M. J. (2022). Efectos para la salud respiratoria de los trabajadores que usan sustancias químicas en su medio laboral: Una revisión sistemática. *Revista Salud Uninorte*, 38(2), 560-585. https://doi.org/10.14482/sun.38.2.616.2

Portador García, T. de J. (2020). Los retos de la seguridad humana frente al cambio climático. *Relaciones Internacionales*, (43), 189–207. https://revistas.uam.es/relacionesinternacionales/article/view/11446

Predassi, S., & Fernández, J. B. (2024). Implementación de economía circular en la industria: El diseño circular como herramienta estratégica. *Innovación y Desarrollo Tecnológico y Social*, 5, 037. https://doi.org/10.24215/26838559e037

Rettberg Beil, B., Arreaza, C., Castillejo Cuéllar, A., Ceballos Medina, M., Chaux Torres, J., Cheng-Hopkins, J., Ciurlizza, J., García Gómez, A., Llinás Rocha, G., Llorente Sardi, M., Mason, A., Méndez, M., Nasi Lignarolo, C., Palou Trias, J.,

Pizarro Leongómez, E., Prieto Sanabria, J., Rivas Gamboa, A., Rojas, C., Schultze-Kraft, M., Vargas Duque, J., & Vranckx, A. (2018). *Gobernanza y gerencia del desarrollo sostenible*. Universidad de los Andes. http://hdl.handle.net/1992/46643

Revueltas Agüero, M., Betancourt Bethencourt, J., del Toro Ramírez, R., & Martínez García, Y. (2023). Caracterización del ambiente térmico laboral y su relación con la salud de los trabajadores expuestos. *Revista Cubana de Salud y Trabajo*, 16(2). https://revsaludtrabajo.sld.cu/index.php/revsyt/article/view/471

Santos Sarmiento, L. F. (2019). *La gobernanza ambiental y su aplicación en mecanismos de integración regionales y gabinetes binacionales del Perú para su adaptación a los efectos del cambio climático.* http://repositorio.adp.edu.pe/handle/ADP/111

Stuhldreher, A. M., & Olmos, V. M. (2020). Energía y cambio climático en el Mercosur: desafíos de la articulación de políticas de desarrollo sostenible*. Análisis Político*, 33(99), 41–60. https://doi.org/10.15446/anpol.v33n99.90937

Urrútia, G., & Bonfill, X. (2010). Declaración PRISMA: Una propuesta para mejorar la publicación de revisiones sistemáticas y metaanálisis. *Medicina Clínica*, 135(11), 507-511. https://doi.org/10.1016/j.medcli.2010.01.015

Varini, C. (2022). *El diseño sostenible de la envolvente tropical en los tiempos del cambio climático*. Universidad Católica de Colombia. https://doi.org/10.14718/9786287554030.2022

Vega Artavia, N. I. (2022). El trabajo decente, la calidad de vida en el trabajo y sostenibilidad laboral. *Cuadernos de Administración*, 2(1), 169–177. https://revistasecauned.com/index.php/cda/article/view/50