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The effects of climate change on employee health and safety: Evidence of existing studies

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Abstract: An escalation in carbon dioxide emissions has increased greenhouse gases, directly influenced climate change and subsequently impacted the health and safety of employees. The objective of this review is to analyse the effects of climate change on employee H&S and propose strategies to alleviate these impacts. In line with the preceding assertion, an integrative literature review was conducted across multiple online research databases to consolidate findings from various studies. Databases utilised included Web of Science, Emerald, Science Direct, Google Scholar, Scopus, SpringerLink, and ResearchGate. Key information gathered includes publication year, title, study purpose, sample size, and findings. The conclusions drawn were based on a comprehensive review of available evidence. The study found that climate change poses significant risks to the H&S of employees, particularly about climate-related illnesses. The research has also indicated that preventative actions can be implemented to minimise these impacts. This study underscores the significance of addressing climate change to safeguard the welfare of employees.

Keywords: *Climate change, Employee health and safety, Health hazard.*

1. Introduction

Climate change is a significant global issue that has a profound impact on the global ecosystem and human life. While some factors contributing to climate change are natural, it is widely believed that human activities, particularly the burning of fossil fuels, are the primary drivers of this phenomenon. This swift release of carbon into the atmosphere over millions of years has had a profound impact on our environment. (Kemfert and Schmalz,2019). The rapid influx of carbon emissions into the atmosphere has resulted in a notable increase in carbon dioxide levels. Currently, the average monthly carbon dioxide concentration stands at 419.3 parts per million (ppm), a significant rise from the recorded 380 ppm in 2008 (Tang, 2019a). It is crucial to remember that human activities contribute to the heightened emissions of additional gases, including methane and nitrous oxide. These gases contribute significantly to global warming, surpassing the impact of carbon dioxide (Kuok Ho, 2022). Climate change has the potential to impact worker safety and health in various ways, including changes in temperature, exposure to electromagnetic radiation, indoor and outdoor weather conditions, and onshore winds. These changes may increase risks or introduce new risks, such as vector- and waterborne diseases, injuries, allergies, and air pollution. (ANSES, 2018). This can lead to higher medical costs, decreased quality of life, and loss of productivity (Kjellstrom et al., 2016; Dasgupta et al., 2021; Dasgupta and Robinson, 2023). As such, it is imperative to tailor risk mitigation strategies to account for the diverse needs of employees and varying regional circumstances. A deeper comprehension of the safety and health hazards posed by climate change is essential for effectively identifying and addressing associated risks (Occupational Safety and Health Wikipedia, 2023).

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1.1. Effect of Climate Change on Employees H&S

Premised on the ongoing assertion it is important to note that employees may be impacted by climate change in various ways, including through direct consequences such as heat stress, fatigue, and health issues, as well as indirectly through the effects on diseases, water quality, air quality, food supply, agriculture, and other factors (Schulte and Chune, 2009). Studies have also reinforced the fact that climate change can negatively affect workers' safety, Tang (2021b) reviewed articles published in the last 15 to 20 years and analysed them for relevance and recommendations. The findings show that outdoor workers are sensitive to heat and humidity from a warming world, and their work is often physically demanding and requires personal defence clothing that can cause thermal shock. Excessive heat can cause excessive sweating, which can lead to dehydration and kidney damage. In addition to increased breathing, heat can reduce work capacity and productivity, resulting in toxic effects from inhalation. Fires caused by bad weather conditions, especially drought and rising temperatures, cause a lot of heat and pollution, creating high occupational risks for firefighters and other outdoor workers in the area.

A study conducted by Athauda, Jayakodi, Asmone, and Conejos (2023) investigated the effects of climate change on H&S maintenance workers. The study included an extensive literature review and 12 semi-structured interviews with experts selected through judgmental sampling. Data analysis was performed using software-assisted thematic content analysis methodologies. The results indicate that climate change is significantly affecting workers responsible for maintaining buildings resulting in various risks that may impact workers Another study by Wuersch, Neher, Marino, Bamberry, and Pope (2023) conducted a scoping review to explore existing literature on the impacts of climate change on workplace H&S in Australia. The review highlighted the impact of climate change-induced extreme temperatures on workplace H&S, particularly in sectors such as agriculture and construction where safety concerns related to disease and decreased productivity were significant. The review also noted a lack of attention to important factors such as safety, labour, health, and socio-economic issues about workplace H&S. Overall, the study found that climate change has a significant impact on the health and safety of workers. Additionally, Ramazan and Mourad (2022) analysed various activities contributing to climate change and identified regions most vulnerable to its effects. The study also addressed necessary measures to protect workers from health hazards associated with climate change. This research aligns with efforts to understand the effects of climate change on occupational H&S and develop prevention strategies. The research indicates that climate change is linked to the proliferation of pathogenic bacteria, bacterial infections, wildfires, and workplace-related health risks. A recent study conducted by Ansah, Ankomah-Appiah, Amoadu, and Sarfo (2021) explored the effects of climate change on the H&S of workers through a review of credible databases such as PubMed and ScienceDirect, in addition to other sources. The results of the study indicate a noteworthy correlation between climate change and various adverse health impacts on employees, including increased risk of injuries, fatigue, stress, depression, stroke, respiratory and cardiovascular issues, chronic illnesses, and in extreme cases, fatalities. Despite growing concerns regarding the potential negative consequences of climate change on employee well-being, multiple studies have proposed strategies and interventions to mitigate these effects.

1.2. Strategies to Minimize the Impact of Climate Change on Employee H&S

Yovi, Nastiti, and Kuncahyo (2023) specifically examined the knowledge, risk perception, and precautionary behaviours related to heat exposure among forestry workers and farmers in Indonesia. Through structured interviews with 210 forestry workers and 215 paddy farmers, the research indicated that increased awareness of heat-related risks can lead to more careful behaviour, with risk perception playing a pivotal role in translating knowledge into action. Furthermore, emotional factors, particularly feelings of "dread," were identified as influential in heightening perceived risk and driving positive changes in behaviour. It is recommended to utilize a tone of "fear" to effectively communicate heat-related risks and promote proactive measures among forestry workers, especially manual labourers who may be more vulnerable to heat-related challenges compared to farmers. In conclusion, the implementation of comprehensive strategies aimed at raising awareness and promoting precautionary

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measures is essential to safeguard the health and safety of workers, particularly those in physically demanding roles exposed to environmental risks. In addressing occupational H&S concerns in Ghana and tactics for enhancing employee H&S in the workplace. Findings from a study by Asumeng, Asamani, Afful and Agyemang (2015) revealed that it is imperative that safety policies and guidelines are rigorously enforced and followed. Supervisors, with the backing of management, have the responsibility to ensure that individuals under their supervision adhere to safety protocols and procedures. Providing education and training to workers, along with clear communication on H&S matters in the workplace, are vital components of maintaining a safe work environment that helps in the mitigation of climate change impact. Considering the current conversation surrounding the impact of climate change on employee well-being, recent studies have also identified strategies to mitigate the effects of climate change on the H&S of organisational employees. Zurynski, Fisher, Wijekulasuriya, Leask, Dharmayani, Ellis, Smith and Braithwaite (2024) utilised a comprehensive review carried out by the procedural publication and registration protocol for systematic reviews and meta-analyses (PROSPERO registration number CRD42023433610) throughout May 2022 to June 2023, eight databases were thoroughly examined. This review focused on research, policy implications, planning, preparedness, and organisational capacity related to climate change and employee H&S, the data extracted were subjected to inductive thematic analysis. The research findings indicate that investing in education and skill development, promoting work readiness, fostering teamwork, allowing for job flexibility, providing role support, and offering psychological support are crucial factors in mitigating the effects of climate change on employee H&S.To gain a better understanding of mitigating the impacts of climate change on the health and safety of workers, a study conducted by Yovi, Nastiti, Kuncahyo (2023) highlights that knowledge, risk perception, and protective behaviour are key factors in reducing health risks related to heat exposure. The study emphasises the importance of awareness, attitudes towards risk, and adaptive practices in the context of climate change and employee health and safety, it also highlights the intricate relationship between these factors. The research reveals that raising awareness significantly contributes to promoting preventive behaviours and that knowledge directly influences individuals' risk perceptions. Furthermore, the study underscores the significance of risk perception in influencing behaviour modifications during disasters. Understanding the correlation between cognition and perceived risk is vital, as risk perception directly impacts protective behaviour.

2. Methodology

For this study, an integrative literature review was conducted across multiple online research databases to consolidate findings from various studies. Databases utilised included Web of Science, Emerald, Science Direct, Google Scholar, Scopus, SpringerLink, and ResearchGate. The study is centred on analysing the effect of climate change on employee H&S, followed by recommending measures to address these effects. Essential information includes the publication year, title, study title, purpose, sample size, and findings. The results were developed following integrated review standards that encompass the full range of available evidence, regardless of its level. This approach ensures thorough and comprehensive analysis (Whittemore and Knaff, 2005).

3. Discussion

The study provided valuable insights into the significant increase in carbon dioxide levels. It was determined from the literature review that human activities are major contributors to the rise in greenhouse gases, which in turn affects the climate. The literature also pointed out that climate change poses risks to workers' H&S by exposing them to climate-related diseases. The impact of climate change was found to affect a wide range of diseases and occupations. The findings from the literature review suggest that the adverse effects on employees' health and safety can be minimised through implementing safety policies and guidelines, providing education, and training to workers, and ensuring compliance with H&S protocols by organisational managers. Additionally, effective communication on health and safety matters and maintaining a safe work environment are crucial in mitigating the effects of climate change on employees. Additional strategies highlighted in the literature review encompass training and development, capacity planning, fostering collaborative partnerships, implementing role

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reversal, promoting accountability, and providing mental health support to mitigate the effects of climate change on the well-being and safety of workers. The study highlights the significance of awareness, risk attitudes, and adaptive practices about climate change and employee H&S. It also underscores the complex interplay between these factors. The research indicates that increasing awareness plays a crucial role in encouraging preventive actions and that knowledge plays a direct role in shaping individuals' perceptions of risk. Additionally, the study emphasises the importance of risk perception in driving behaviour changes during emergencies. Recognising the connection between cognition and perceived risk is essential, as risk perception directly influences protective behaviours in terms of climate change and employee health and safety.

4. Conclusion

This review delves into the impact of climate change on employee health and safety, recognising the role of human actions in contributing to this issue. The literature reviewed highlights diseases linked to climate change that may affect employees in the workplace. To address these challenges, it is recommended to implement and enforce safety protocols and guidelines. Managers should ensure that employees follow safety procedures, promote clear communication on health matters, and maintain a safe work environment. Moreover, important factors for consideration encompass training and development opportunities, employee career advancement strategies, organizational integration, job flexibility, and motivation techniques (including cognitive support). This research emphasizes the significance of promoting knowledge, understanding risk perception, and implementing preventative measures to address the effects of climate change on the H&S of workers. It also stresses the importance of raising awareness, cultivating positive risk attitudes, and implementing adaptive practices in the context of climate change and employee H&S.

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