GLOBAL Political REVIEW
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p-ISSN: 2521-2982
e-ISSN: 2707-4587

GPR

GLOBAL POLITICAL REVIEW

HEC-RECOGNIZED CATEGORY-Y

VOL. X, ISSUE I, WINTER (MARCH-2025

DOI (Journal): 10.31703/gpr
DOI (Volume): 10.31703/gpr/.2025(X)
DOI (Issue): 10.31703/gpr.2025(X.I)

Double-blind Peer-review Research Journal
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Doi: https://dx.doi.org/10.31703

Article Title

Climate Change and Heat Exhaustion: A Study in Kahuta

Abstract

Heat exposure is a well-known health risk that impairs human performance and capacity to function at temperatures that are already typical in tropical and subtropical climates. Global climate change is characterized by increased exposure to heat throughout the year's warmest seasons. In health effect analyses of climate change, heat fatigue and diminished human performance are frequently disregarded. Due to climate change, people who live in hot regions of the world will have much less labor capability later this century. Thirty to forty percent of the yearly daylight hours will be too hot for employment in some places. The effects of the rapidly changing Earth's climate on the environment and human health have already been established. Heat stress in the workplace today and in the future is mostly caused by the urban "heat island effect," physical labor, individual variances, and the setting of developing nations, where technical solutions are sometimes inapplicable.

Keywords: Global Warming, Climate Change, Heat-Related Illness, Extreme Heat Events, Heat-Exhaustion, Heat Stress, Thermal Stress, Heatwaves

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Pages: 186-192
DOI:10.31703/gpr.2024(X-I).15
DOI link: https://dx.doi.org/10.31703/gpr.2025(X-I).15
Article link: http://www.gprjournal.com/article/climate-change-and-heat-exhaustion-a-study-in-kahuta
Full-text Link: https://gprjournal.com/article/climate-change-and-heat-exhaustion-a-study-in-kahuta
Pdf link: https://www.gprjournal.com/jadmin/Auther/31rvIolA2.pdf

Global Political Review
p-ISSN: 2521-2982 **e-ISSN:** 2707-4587
DOI (journal): 10.31703/gpr
Volume: X (2025)
DOI (volume): 10.31703/gpr.2025(X)
Issue: I Winter (March-2024)
DOI(Issue): 10.31703/gpr.2025(X-I)

Home Page
www.gprjournal.com

Volume: X (2025)
https://www.gprjournal.com/Current-issue

Issue: I-Winter (December-2025)
https://www.gprjournal.com/issue/10/1/2025

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Doi: https://dx.doi.org/10.31703

Citing this Article

15	Climate Change and Heat Exhaustion: A Study in Kahuta		
Authors	Momina Shewaz Abid Ghafoor Chaudhry	DOI	10.31703/gpr.2024(X-I).15
		Pages	186-192
		Year	2025
		Volume	X
		Issue	I

Referencing & Citing Styles	
APA	Shewaz, M., & Chaudhry, A. G. (2025). Climate Change and Heat Exhaustion: A Study in Kahuta. *Global Political Review*, *X*(I), 186-192. https://doi.org/10.31703/gpr.2025(X-I).15
CHICAGO	Shewaz, Momina, and Abid Ghafoor Chaudhry. 2025. "Climate Change and Heat Exhaustion: A Study in Kahuta." *Global Political Review* X (I):186-192. doi: 10.31703/gpr.2025(X-I).15.
HARVARD	SHEWAZ, M. & CHAUDHRY, A. G. 2025. Climate Change and Heat Exhaustion: A Study in Kahuta. *Global Political Review* X, 186-192.
MHRA	Shewaz, Momina, and Abid Ghafoor Chaudhry. 2025. 'Climate Change and Heat Exhaustion: A Study in Kahuta', *Global Political Review*, X: 186-92.
MLA	Shewaz, Momina, and Abid Ghafoor Chaudhry. "Climate Change and Heat Exhaustion: A Study in Kahuta." *Global Political Review* X.I (2025): 186-92. Print.
OXFORD	Shewaz, Momina and Chaudhry, Abid Ghafoor (2025), 'Climate Change and Heat Exhaustion: A Study in Kahuta', *Global Political Review* X(I), 186-92.
TURABIAN	Shewaz, Momina and Abid Ghafoor Chaudhry. "Climate Change and Heat Exhaustion: A Study in Kahuta." *Global Political Review* X, no. I (2025): 186-92. https://dx.doi.org/10.31703/gpr.2025(X-I).15.

Pages: 186-192 **e-ISSN:** 2707-4587 **p-ISSN:** 2521-2982 **Doi:** 10.31703/gpr.2024(X-I).15

Global Political Review
www.gprjournal.com
DOI: http://dx.doi.org/10.31703/gpr

Volume: I (2025) **URL:** https://doi.org/10.31703/gpr.2025(X-I).15 **Issue:** I-Winter (March-2025)

Title

Climate Change and Heat Exhaustion: A Study in Kahuta

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Contents

Abstract

Heat exposure is a well-known health risk that impairs human performance and capacity to function at temperatures that are already typical in tropical and subtropical climates. Global climate change is characterized by increased exposure to heat throughout the year's warmest seasons. In health effect analyses of climate change, heat fatigue and diminished human performance are frequently disregarded. Due to climate change, people who live in hot regions of the world will have much less labor capability later this century. Thirty to forty percent of the yearly daylight hours will be too hot for employment in some places. The effects of the rapidly changing Earth's climate on the environment and human health have already been established. Heat stress in the workplace today and in the future is mostly caused by the urban "heat island effect," physical labor, individual variances, and the setting of developing nations, where technical solutions are sometimes inapplicable.

Keywords:

Global Warming, Climate Change, Heat-Related Illness, Extreme Heat Events, Heat-Exhaustion, Heat Stress, Thermal Stress, Heatwaves

Introduction

A direct and evident consequence of climate change would be the increase in Regularity and intensity of heat waves. Hot waves are more prevalent and exceptionally lengthy globally due to the increased worldwide temperatures, which are predominantly caused by the emission of greenhouse gases brought about by human actions. This situation poses a significant threat to human health, particularly in the case of heat-related diseases such as heat exhaustion. Some of the symptoms of this heat exhaustion, which is a life-threatening medical condition caused by heat exposure in the body and the absence of water, are fatigue, feeling lightheaded, vomiting, and excessive sweating. Heat stroke is a potentially fatal disease that may appear if the patient does not receive treatment. Due to the increasing effect of urbanization and global warming, the most vulnerable populations are elderly people, children, outdoor workers, and inhabitants of underserved neighborhoods or low-income regions. Climate change is experiencing an

accelerating rate, and its impacts are being experienced on the environment and human health. As a climate adaptation strategy, there is an increasing concern about how workers and workplaces would be affected by the increasing temperatures and, more so, heat stress. The effects of heat exposure in workplaces have been carefully explored in the past, but modern information that takes into account the new context brought about by global warming is limited. During Hajj, 1301 people died who experienced extreme heat while walking a short distance. Over three-quarters of the victims were not licensed to be there and were walking without proper sun protection. During hot weather, it is easy to overheat, which can lead to heat stroke. At times, heat exhaustion is not a serious condition as you cool down. Being overweight or obese can also make it difficult to cool down. While adults have the ability to regulate temperature but some groups, including older adults and children with mental health problems, have a higher risk of heat exhaustion. They need immediate treatment.

The predicted rise in the number and severity of extreme heat events caused by global climate change is one of the biggest threats to human health in the twenty-first century.

For those who are especially vulnerable to heat, such as the elderly and people in physically demanding jobs, this hazard is especially serious. Therefore, in order to safeguard human health, suitable heat action measures must be established immediately. Additionally, we look at how behavioral changes, physiological adaptations, and the application of heat management and monitoring techniques can all limit an individual's vulnerability to heat exposure and function. After extended exposure to high temperatures, particularly in humid conditions and during physical effort, heat exhaustion, a mild heat-related disease, may develop. If it is not treated right away, it can develop into heat stroke, a potentially fatal condition. Climate change is causing heatwaves to occur more frequently, be more intense, and last longer globally because of: Growing emissions of greenhouse gases, Weather patterns that are changing effects of urban heat islands in crowded places. Climate change is now recognized as a major threat to public health. The Intergovernmental Panel on Climate Change, or IPCC, has documented the health risks associated with rising global temperatures, particularly in tropical and subtropical regions. Heat stress among workers in Thailand is predicted to worsen due to increased temperatures and humidity, particularly for those performing manual and outdoor tasks. Also, through the focus on the potential increase in the occurrence of heat-related diseases and subsequent impacts on the working capacity, this research paper tries to assess the impact of climate change on occupational health and productivity in Pakistan. Existing in the context of a large number of occupational safety and health implications, climate change is an important global health care issue that is increasingly becoming recognized. Extreme weather events, heatwave frequency and severity, as well as ambient temperature increments, impact the working conditions directly, particularly those workers operating in lands or outdoor areas with poor or no ventilation. Such changes in the atmosphere may affect the productivity of the workers, reduce physical ability to work, and increase the incidence of heat-related illnesses. Vulnerable groups, including residents of low- and middle-income countries, construction and agricultural workers, present the greatest danger because they are less likely to receive the support of protective infrastructure and healthcare services.

Problem Statement

The climate change in the world is also characterized by increasing frequencies and intensities of extreme heat events. This poses a severe threat to public health, particularly in regions that lack appropriate adaptive infrastructure. Heat exhaustion, a disease brought on by extended exposure to high temperatures and dehydration, is one of the most acute and harmful health effects of rising temperatures. Risks are higher for vulnerable groups, particularly those who work outside, live in low-income areas, are old, or have pre-existing medical disorders. Even though the problem is becoming more widely recognized, there is a dearth of thorough information and legislative solutions that address the local and occupational health effects of climate-induced heat. Economic productivity is weakened, and health inequities are made worse by this readiness and mitigation gap. Consequently, it is imperative to look into the relationship.

Research Objectives

1. To identify the key environmental and social factors contributing to heat exhaustion during extreme heat events.
2. To evaluate the effectiveness of current public health responses and climate adaptation strategies in reducing the incidence of heat exhaustion.

Research Questions

1. Which environmental factors (e.g., temperature, humidity, lack of green cover) contribute most to heat exhaustion in the region?
2. What public health measures have been implemented in Kahuta to prevent or manage heat exhaustion?

Importance of Study

Climate Change is a serious issue in today's life. Due to Climate Change Weather is getting hotter, heat can cause many diseases, like feeling sick or tired. They are facing these problems while they are working outside in the sun. Mostly, it affected the people who have professions like farm labor or driving. When local people stay in the sun without shade, water, and protection, they suffer from heat exhaustion. By studying how heat affects people's health and understanding the problems that people face during heat stroke. If we understand the problem, we can help people by introducing the precautions.

Review of Literature

An increasing number of studies have looked at the connection between heat-related disorders, especially heat exhaustion, and climate change. The growing prevalence of heat-related illnesses is directly correlated with rising global temperatures, according to a number of studies. In recent decades, extreme heat events have become more frequent and intense due to anthropogenic climate change, posing serious health risks to people (IPCC, 2021).

In the medical literature that heat stroke occurs when the body overheats as a result of physical exercise, high ambient temperatures, and dehydration (CDC, 2020). Heat exhaustion has been found to be a precursor to heat stroke by researchers like Bouchama and Knochel (2002).

The literature frequently focuses on vulnerable populations. Hajat et al. (2010) discovered that heatwaves disproportionately impact low-income groups, the elderly, and people with previous medical issues. Similarly, there are World Health Organization (WHO, 2018) campaigns on health and early warning systems to minimize these risks.

Techniques of adaptation and mitigation are also well documented. The findings of the study by Kovats and Hajat (2008) demonstrate that inserting green spaces in cities, educating people, and developing heat-health action plans are crucial to reducing heat-related morbidity and mortality. The efficacy of the climate resilience solutions, which consider the use of shades, water, and cooling infrastructures (Stone et al., 2012). The issue of climate change has become increasingly relevant to occupational health, particularly in applications where the work is physically hard or outdoors. The productivity, health, and safety of the workers are directly affected by the increasing temperatures all over the globe, heatwaves, and unpredictable weather.

Various studies demonstrate that heat stress is an occupational health threat that is exacerbated by climate change. Industrial, construction, and agricultural workers are particularly vulnerable. Kjellstrom et al. (2016) identified that high temperatures may lead to heat-related disorders, such as heat exhaustion, heat stroke, and even mortality. Because heat exposure impairs both physical and cognitive function, it also raises the risk of accidents (Flouris et al., 2018). Climate-induced heat stress has negative health impacts as well as a major negative impact on worker productivity. Dunne et al. (2013) calculate that for every degree Celsius that temperatures rise, there is a 2% loss in global productivity. On days with high heat, outdoor workers in Australia could lose up to 20% of their output Zander et al., 2015). Heat stress is more likely to affect some populations than others. These comprise migrant workers, expectant women, the elderly, and people with underlying medical disorders (Schulte & Chun, 2009). The lack of protective legislation and inadequate infrastructure in many low- and middle-income nations make these vulnerabilities worse (Kjellstrom et al., 2009).

Training and awareness initiatives can enhance worker behavior in response to heat hazards in addition to making physical adjustments (Flouris et

al., 2018). Climate change is becoming more widely recognized as a significant factor influencing occupational and public health, with broad ramifications for employees exposed to harsh environmental circumstances. According to McMichael et al. (2008), the health, safety, and productivity of workers around the world are starting to be directly affected by Climate Change, which includes rising temperatures, extended heatwaves, and unpredictable weather events.

The possible effects on the health of the workplace include higher exposure to heat. Long-term working in a hot environment may lead to heat stroke, dehydration, heat exhaustion, and other diseases that are associated with heat (Kjellstrom et al., 2009). The studies revealed that the ability of the body to regulate its internal temperature is destroyed by high temperatures, especially when the work is physically demanding (Flouris et al., 2018. Heat stress also decreases the capacity for physical work, besides affecting individual wellness. Dunne et al. (2013) note that once the temperatures exceed the levels of safety, workers will reduce their effectiveness sharply, especially those who are involved in highly metabolic processes. As Zander et al. (2015) admit, even in Australia on the hottest days, the productivity of labor lost to the heat might amount to more than 20%, which would affect not only such economic output but also the welfare of workers.

Adaptation measures are important to reduce the impacts of occupational heat stress. It is recommended that one should work during cooler hours of the day, ensure there are air-conditioned or shaded restrooms, ensure workers are well hydrated, and have work-rest schedules (Parsons, 2014). According to the study, increasingly frequent and intense heatwaves brought on by climate change present serious health risks to workers, particularly those doing manual labor or working outside.

Heat-related illnesses are more common in several groups, including the elderly, pregnant women, and people with underlying medical disorders. Because they have less access to safety gear and medical care, workers in poor nations are especially vulnerable.

Due to human activity and infrastructure, urban regions face higher temperatures than their rural counterparts, which makes heat stress worse for city workers and residents.

Reduced work capacity and productivity due to heat stress might result in financial losses. A large percentage of the workforce in developing nations works outside, hence they are disproportionately impacted. Human thermoregulation systems have been thoroughly examined in the past, with a focus on the vital function that sweating plays in evaporative cooling. A crucial measure is the idea of "wet-bulb temperature" (Tw), which is the point at which the body is unable to adequately disperse heat and may become hyperthermic.

The authors cite climate models that predict rising global temperatures under several scenarios of greenhouse gas emissions. According to these projections, some areas would see temperature increases that would test human adaptation if substantial mitigation measures are not taken.

ICS at Purdue University

Empirical data on the mortality and morbidity linked to extreme heat events have been supplied by historical investigations of heatwaves, underscoring the susceptibility of populations to high temperatures.

Materials and Methods:

Locale

The study will be carried out in Pakistan's Kahuta region. About 45 kilometers from the capital city of Islamabad, Kahuta is a tiny but important town in Punjab, Pakistan's northern region. It is situated in the Pathohar Plateau, which is renowned for its unique combination of a semi-arid climate and varied topography, on the foothills of the Margalla Hills. The village is surrounded by both rough hill terrain and agricultural plains, creating a region of glaringly severe contrasts. The majority of Kahuta 's 75,000 residents live in rural areas, where agriculture is their main source of income.

Data Collection

The research will use the semi-structured interview to gain a deeper understanding of the topic from Kahuta. There will be open-ended questions, and data will be collected through face-to-face interviews and with the help of voice recorders.

Methodology

An exploratory study will use qualitative approaches to research heat exhaustion and climate change.

Method

In-depth interviewing: To be used for collecting data from neighborhood households, with an understanding of their experience, perception, and adaptation behaviors for Heat Exhaustion

Tool

Semi-structured interview guide: To be utilized to steer in-depth interviewing.

Sample Size

The sample size for this research will be 40 participants. The sample will comprise Patients, Doctors, & Other Staff from Kahuta (THQ) Hospital. There will be open-ended questions to know about the different views and experiences of the respondents.

Data Analysis

An exploratory methodology will be used in this study to gain a deeper understanding of Heat Exhaustion and Climate Change. The locale of my research will be Kahuta, Rawalpindi. Semi semi-structured interview as a tool will be used to collect the data. Interviews will be recorded and transcribed to analyze the data.

Results and Findings

Information for this study was gathered from 20 participants in Kahuta, including 15 patients who had suffered from heat exhaustion and 5 doctors. The majority of respondents said they experienced severe headaches and profuse perspiration in extreme temperatures, two of the main signs of heat exhaustion. These are typical heat-related complaints in the region, according to doctors.

Many participants claimed that their homes, particularly older homes with thick walls, offer some protection from the heat. But they also pointed out that it's hard to stay cool at work because there isn't enough shade. Workers said that during periods of intense heat, they are not given safety gear or adequate rest periods. Most workplaces lack explicit heat protection policies.

While people have access to shade and drinking water at home, they do not have these amenities in public or at work. This raises the possibility of heat exhaustion, particularly for outdoor and manual occupations.

The temperature in Kahuta has risen in recent years, as almost all participants observed. The summers are longer and hotter now.

People think that because of the loss of greenery and deforestation, the place feels significantly hotter. The situation becomes worse by the fact that there is less water available.

Although doctors are aware of the dangers that heat poses to health, many members of the general population are not well-informed about the signs and symptoms of heat exhaustion.

Conclusion

This study on climate change and heat exhaustion in Kahuta emphasizes the growing health hazards brought on by warming temperatures, especially for vulnerable groups, including low-income families, outdoor laborers, and those without proper infrastructure. According to the data, people frequently suffer from severe headaches and excessive sweating during periods of intense heat, which are obvious signs of heat exhaustion. Workplaces lack adequate heat protection measures like covered areas, water access, and safety apparel, even though traditional housing structures offer some respite.

The study also discovered that the deteriorating heat conditions in Kahuta have been largely caused by deforestation and a reduction in the amount of water available.

The majority of people, particularly those who are not in the medical field, are not aware of the signs of heat exhaustion or how to react to them, making the temperature increase not just an environmental problem but also a major public health matter.

In Kahuta, the impacts of climate change are already affecting daily living circumstances, productivity, and health, based on patterns that have been noticed. The most vulnerable members of society will be most severely impacted by the hazards, which will continue to rise in the absence of immediate action.

Recommendation

Increase Public Awareness. Start neighborhood-based awareness programs to inform people about

the signs, dangers, and preventative actions for heat exhaustion and heat stroke. Enhance the Working Environment

During the hot months, employers should put in place heat protection measures, including shaded work areas, planned rest periods, and access to potable water. Present Safety Equipment: Provide outdoor workers with caps and lightweight, breathable apparel, particularly during the hottest summer months. Encourage Urban Greening and Reforestation. To counteract the heat island effect and encourage long-term environmental cooling, start local tree-planting efforts. Improve the Public Infrastructure. Provide water and shaded seating in public areas, bus stations, and marketplaces, particularly in the heat. Adopt Housing Designs That Are Heat-Resilient

Promote the adoption of climate-smart building techniques, including insulation and ventilation.

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