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The impact of heat stress on teachers' well-being and job satisfaction in urban public schools: A mixed methods study

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Abstract

Aim: This study examined the impact of heat stress on the physical health, psychological well-being, job satisfaction, and teaching effectiveness of public school teachers in urban schools. It also explored teachers' heat index literacy, coping strategies, and perceptions of institutional support in managing heat-related challenges within educational environments.

Methodology: The study employed a convergent parallel mixed methods design. Quantitative data were gathered through structured questionnaires administered to 58 randomly selected public school teachers, while qualitative data were collected through semi-structured interviews with eight purposively selected participants. Quantitative data were analyzed using descriptive statistics, whereas qualitative responses were examined through thematic analysis. Findings from both data strands were integrated to obtain a comprehensive understanding of teachers' experiences with occupational heat stress.

Results: Findings revealed that teachers demonstrated high levels of heat index literacy and awareness of heat-related risks. Despite this awareness, participants frequently experienced fatigue, headaches, irritability, exhaustion, and decreased concentration associated with prolonged classroom heat exposure. Heat stress negatively affected teachers' motivation, job satisfaction, instructional engagement, and perceived teaching effectiveness. Qualitative findings further showed that teachers viewed classrooms as uncomfortable learning environments and expressed concerns regarding inadequate ventilation, limited cooling infrastructure, and insufficient institutional support.

Conclusion: The study concluded that heat stress is both an occupational and educational concern that significantly affects teacher well-being and instructional performance in urban public schools in Metro Manila. Existing coping mechanisms and institutional support systems were insufficient to sustain effective teaching conditions during extreme heat exposure. The findings provide empirical support for climate-responsive educational policies, teacher wellness initiatives, adaptive instructional practices, and school-based interventions that promote healthier and more sustainable teaching and learning environments amid increasing climate-related challenges.

Keywords: *heat stress, teacher well-being, teaching effectiveness, occupational health, climate-responsive education, public school teachers*

INTRODUCTION

Heat exposure has intensified globally due to climate change, creating significant occupational and environmental challenges, particularly in developing countries where protective measures and climate adaptation strategies remain limited (Wang et al., 2021). In the Philippines, extreme heat events have become increasingly frequent and severe, with several areas recording heat index levels exceeding 45°C during peak summer months (De Vera-Ruiz, 2024; Reganit, 2024). The heat index, which combines air temperature and humidity, reflects perceived temperature and serves as an important indicator of heat-related health risks (National Weather Service, 2021). Although heat stress has been widely studied among industrial and outdoor workers, limited educational research has examined how heat exposure influences teachers' work experiences and instructional practices. As teachers play a central role in facilitating learning and maintaining classroom engagement, understanding environmental conditions

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influencing teaching has become increasingly important in educational research (Chan & Yi, 2016; Al-Abbady et al., 2017).

Urban areas in the Philippines, particularly Metro Manila, experience intensified heat due to the urban heat island effect, wherein concrete structures, limited vegetation, and dense infrastructure trap and retain heat (Santamouris, 2020). Public schools in these urban settings often face overcrowding, inadequate ventilation, insufficient cooling facilities, and aging infrastructure, resulting in classroom temperatures reaching dangerous levels during hot seasons. In some schools, teachers and students experienced classroom temperatures in the high 30s to 40°C, with heat indices occasionally surpassing 45°C (Reganit, 2024). Such conditions create challenges not only for physical comfort and health but also for sustaining effective classroom environments. Prolonged exposure to excessive heat may reduce teachers' responsiveness, classroom interaction, and ability to maintain instructional engagement. Consequently, environmental conditions may become an overlooked determinant of educational quality and teacher effectiveness.

Heat stress has been associated with fatigue, dehydration, headaches, irritability, decreased concentration, and emotional exhaustion among individuals exposed to prolonged high temperatures (Kjellstrom et al., 2009; Amoadu et al., 2023). Among teachers, these effects may reduce attention, instructional delivery, classroom management, and sustained engagement with students. Such conditions may influence both teaching effectiveness and the overall learning environment, particularly in subjects that require active participation and higher-order thinking. In science education, where inquiry, sustained concentration, and interaction are essential, prolonged heat exposure may limit instructional effectiveness and classroom engagement. Furthermore, continuous exposure to uncomfortable classroom conditions may contribute to occupational stress, reduced job satisfaction, and increased vulnerability to burnout.

Despite growing attention to climate resilience and occupational well-being, limited educational research has examined how environmental heat exposure shapes teachers' instructional experiences and professional functioning in Philippine public schools. Existing studies have primarily emphasized physical health outcomes while giving limited attention to educational implications such as teaching effectiveness, classroom engagement, and institutional adaptation. Furthermore, few studies have adopted mixed methods approaches that capture both measurable outcomes and teachers' lived experiences. This study addresses these gaps through a convergent parallel mixed methods design that examines teachers' heat index literacy, physical and psychological experiences, coping strategies, job satisfaction, and perceptions of institutional support. By positioning heat stress as both an environmental and educational issue, the study contributes evidence that may inform climate-responsive educational planning, teacher wellness initiatives, and strategies for sustaining instructional quality in urban public schools. The findings of this study are expected to provide practical insights for educators in adapting instructional practices under extreme heat conditions, support school leaders in strengthening teacher wellness and climate-responsive policies, and contribute to creating healthier and more sustainable learning environments for school communities.

Review of Related Literature and Studies

Heat Stress and Occupational Health

Heat stress is recognized as a major occupational health concern worldwide, particularly in regions experiencing increasing temperatures due to climate change. According to the World Health Organization (2023), prolonged exposure to extreme heat may result in dehydration, heat exhaustion, cognitive impairment, and reduced workplace productivity. Occupational heat stress has been widely studied among industrial workers, construction workers, and healthcare professionals, with findings consistently showing negative impacts on physical and psychological well-being (Kjellstrom et al., 2009; Amoadu et al., 2023).

Studies suggest that rising temperatures significantly affect workplace performance and mental health. Ioannou et al. (2022) found that prolonged heat exposure contributes to fatigue, reduced concentration, emotional stress, and decreased productivity among employees working in poorly ventilated environments. Similarly, Flouris et al. (2018) emphasized that occupational heat stress increases risks of burnout and work-related stress, particularly among professions requiring prolonged cognitive engagement.

In educational settings, teachers were identified as a vulnerable workforce due to continuous exposure to crowded and poorly ventilated classrooms. However, compared to industrial occupations, fewer studies have explored heat stress among educators, particularly in developing countries.

Heat Stress in Educational Environments

Several studies have highlighted the relationship between classroom environmental conditions and educational performance. Smallcombe et al. (2022) reported that elevated classroom temperatures negatively affect cognitive

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performance, attention span, and emotional regulation among both teachers and students. Similarly, Vilella et al. (2021) found that high classroom temperatures significantly influence teachers' mood, motivation, and perception of student behavior.

Recent international studies further demonstrate the growing concern regarding heat stress in schools. A study by Lala and Hagishima (2023) revealed that teachers exposed to extreme heat conditions experienced increased fatigue, reduced teaching effectiveness, and emotional exhaustion. Their findings emphasized the need for climate-responsive school infrastructure and wellness interventions.

In Southeast Asia, schools located in densely populated urban areas face greater risks associated with heat exposure due to overcrowding and inadequate ventilation systems. Hoang et al. (2022) explained that urban heat island effects intensify classroom temperatures, thereby affecting the well-being and productivity of school communities. In the Philippine context, the Department of Education (DepEd) has recently acknowledged the growing impact of extreme heat on schools, resulting in temporary shifts to blended learning and class suspensions during severe heat index periods (DepEd, 2024).

Heat Stress, Teacher Well-being, and Job Satisfaction

Teacher well-being is strongly associated with workplace conditions, occupational stress, and organizational support. Environmental stressors such as excessive heat may negatively affect teachers' psychological health and professional satisfaction. According to Nwoko et al. (2023), teachers exposed to stressful physical environments are more likely to experience emotional exhaustion, decreased job satisfaction, and burnout symptoms.

Recent research further supports the relationship between environmental discomfort and occupational well-being. Nwoko et al. (2023) emphasized that workplace environmental stressors contribute significantly to teachers' occupational dissatisfaction and declining mental well-being. Likewise, Burke et al. (2023) found that teachers experiencing stressful work conditions demonstrated lower motivation, decreased resilience, and reduced teaching engagement.

Studies also suggest that inadequate institutional support aggravates occupational stress among teachers. Gu and Day (2013) explained that organizational resources, administrative support, and wellness programs play critical roles in strengthening teacher resilience and coping capacity. In schools lacking proper ventilation and cooling systems, teachers may struggle to maintain enthusiasm, concentration, and teaching effectiveness during periods of extreme heat.

Climate Change Adaptation and School Resilience

Climate change adaptation in educational settings is an emerging global concern. Educational institutions are increasingly encouraged to implement climate-responsive strategies to protect both learners and educators from environmental hazards. According to UNESCO (2021), schools must strengthen climate resilience by improving infrastructure, promoting occupational health programs, and integrating environmental sustainability into educational policies.

Studies emphasize the importance of adaptive school infrastructure in minimizing heat-related risks. Santamouris (2020) highlighted that improved ventilation systems, green spaces, and cooling technologies significantly reduce indoor heat exposure in urban schools. Flexible scheduling, hydration programs, and heat-awareness campaigns have also been identified as effective strategies for minimizing the adverse effects of extreme heat in educational environments.

In the Philippines, climate adaptation initiatives in schools remain limited despite increasing exposure to extreme weather conditions. Existing local studies primarily focus on student learning outcomes during heat waves, while limited attention has been given to teachers' occupational experiences and well-being under prolonged heat exposure. This highlighted the need for further research examining teachers as frontline educational workers affected by climate-related stressors.

Synthesis and Research Gap

Existing literature consistently demonstrates that heat stress negatively affects occupational health, cognitive functioning, emotional well-being, and workplace productivity. Studies conducted in occupational and educational settings reveal that prolonged exposure to extreme temperatures contributes to fatigue, irritability, reduced concentration, emotional exhaustion, and lower job satisfaction. Previous research also highlighted the importance of institutional support, climate-responsive infrastructure, and workplace adaptation strategies in mitigating heat-related risks.

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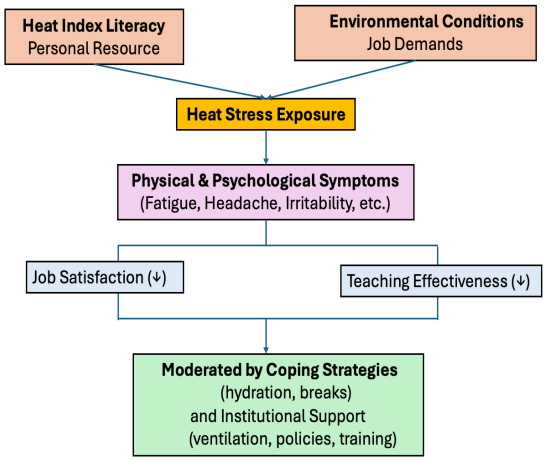
Despite the growing international literature on heat stress and occupational well-being, few studies have specifically examined the experiences of public school teachers in urban Philippine schools. Most existing studies focus on industrial workers, healthcare professionals, or students, leaving teachers relatively understudied despite their continuous exposure to poorly ventilated and overcrowded classroom environments. Furthermore, local research examining the relationship between heat stress, teacher well-being, job satisfaction, and teaching effectiveness remains scarce.

Another notable gap is the limited use of mixed methods approaches in investigating occupational heat stress among educators. Many previous studies rely solely on quantitative surveys, which may fail to capture teachers' lived experiences, coping strategies, and emotional challenges during extreme heat. Thus, there is a need for a more comprehensive investigation that integrates both quantitative and qualitative perspectives.

This study addresses these gaps by exploring the multidimensional impact of heat stress on public school teachers in urban Philippine schools, using a convergent parallel mixed-methods design. Specifically, the study examines teachers' heat index literacy, physical and psychological symptoms, job satisfaction, coping strategies, and perceptions of institutional support to provide evidence that may inform future climate resilience and teacher wellness policies.

Conceptual Framework

Figure 1.
Impact of Heat Stress on Teachers



The conceptual framework of this study is grounded in the Occupational Heat Stress Model integrated with Job Demand-Resources (JD-R) Theory (Bakker & Demerouti, 2007). Heat stress is conceptualized as an environmental job demand that places physical and psychological strain on teachers, potentially leading to reduced well-being and job satisfaction.

- Heat Index Literacy functions as a personal resource that may enhance teachers' capacity to recognize and mitigate heat-related risks.
- Environmental Conditions (e.g., classroom temperature, ventilation, infrastructure) represent external job demands influencing the degree of heat stress experienced.
- Physical and Psychological Symptoms (e.g., fatigue, irritability, decreased concentration) are manifestations of strain resulting from prolonged heat exposure.
- Job Satisfaction and Teaching Effectiveness are key outcomes affected by these demands and moderated by personal and organizational resources.
- Coping Strategies (e.g., hydration, breaks) and Institutional Support (e.g., ventilation, policy measures) serve as buffering factors that may alleviate adverse effects.

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This framework guides the examination of relationships among heat literacy, experienced stress, health outcomes, and job-related performance within the context of Philippine public schools. Through this framework, the study positions teacher well-being as an educational condition that shapes instructional performance and contributes to broader discussions on educational sustainability and climate-resilient pedagogy.

Statement of the Problem

Heat stress has emerged as a growing concern in educational settings, particularly in urban public schools, where overcrowded classrooms, inadequate ventilation, and extreme temperatures negatively affect the teaching and learning environment. In the Philippines, the growing intensity of climate-related heat exposure poses significant challenges to teachers' physical health, psychological well-being, instructional engagement, and overall job satisfaction. Prolonged exposure to elevated classroom temperatures may reduce teachers' concentration, motivation, classroom management, and teaching effectiveness, thereby affecting the quality of instruction and students' overall learning experience.

Despite the increasing attention given to climate resilience and occupational health, limited educational research has examined how heat stress influences teachers' professional functioning and instructional experiences in Philippine public schools. Existing studies have largely focused on industrial and outdoor occupations, with limited attention to educators as frontline professionals continuously exposed to heat-related stressors within classroom environments. Furthermore, few studies have explored teachers' coping strategies, heat index literacy, and perceptions of institutional support using a mixed methods approach.

Thus, this study seeks to examine the impact of heat stress on the well-being, job satisfaction, coping experiences, and teaching effectiveness of public school teachers in urban schools. Specifically, the study aims to generate evidence to support climate-responsive educational planning, teacher wellness initiatives, and sustainable teaching and learning environments amid increasing climate-related challenges.

General Objective

This study aims to examine the impact of heat stress on the well-being, job satisfaction, and teaching effectiveness of public school teachers in urban schools.

Specific Objectives

Specifically, this study aims to:

1. Assess teachers' understanding of the heat index and its implications for health and safety in school environments.
2. Examine teachers' perceptions and experiences of heat stress in classroom environments during periods of extreme heat.
3. Identify the common physical and psychological symptoms associated with heat stress among teachers.
4. Determine the influence of heat stress on teachers' job satisfaction, motivation, and teaching effectiveness.
5. Explore the coping strategies teachers employ and evaluate the adequacy of school administrations' institutional support in addressing heat-related challenges.

Research Questions

This study sought to answer the following research questions:

1. To what extent do teachers understand the concept of the heat index and its implications for health and safety in school environments?
2. How do teachers perceive and experience heat stress in their classroom environments during periods of extreme heat?
3. What common physical and psychological symptoms associated with heat stress are experienced by teachers?
4. How does heat stress influence teachers' job satisfaction, motivation, and teaching effectiveness?
5. What coping strategies do teachers employ, and how adequate is the institutional support provided by school administrations in addressing heat-related challenges?

Hypotheses

1. There is no significant relationship between heat stress and teachers' job satisfaction.
2. There is no significant relationship between heat stress and teachers' teaching effectiveness.
3. Heat stress does not significantly influence teachers' psychological well-being and occupational experiences.

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4. Institutional support does not significantly moderate the effects of heat stress on teachers' well-being and job satisfaction.

METHODOLOGY

Research Design

This study employed a convergent parallel mixed methods design to comprehensively investigate the impact of heat stress on public school teachers in urban public schools in Metro Manila. In this approach, quantitative and qualitative data were collected concurrently, analyzed separately, and then merged for integrated interpretation (Creswell & Plano Clark, 2018; Fetters et al., 2013). This design facilitated triangulation, allowing the strengths of each method to complement the other and providing a more nuanced understanding of complex phenomena such as occupational heat stress and its multifaceted effects on well-being and job satisfaction.

The quantitative component offered breadth by quantifying teachers' heat literacy, stress symptoms, and job satisfaction levels, while the qualitative interviews provided depth by capturing teachers' lived experiences, coping strategies, and perceptions of institutional support. Such integration is particularly valuable in occupational health research where both measurable outcomes and contextual factors influence employee well-being (Plano Clark & Ivankova, 2015).

Population and Sampling

The quantitative phase included 58 public school teachers selected through simple random sampling from selected urban public elementary and secondary schools in Metro Manila, Philippines. The target population consisted of teachers employed in public elementary and secondary schools located in highly urbanized areas of Metro Manila. Across the participating schools, the accessible teacher population was approximately 260 teachers at the time of data collection. Teachers were randomly selected from the participating schools and invited to participate; however, only those who voluntarily agreed and provided informed consent were included in the final sample.

Participants were identified through coordination with school administrators and were selected based on the following criteria: (1) location within urbanized areas of Metro Manila, (2) public school classification under the Philippine basic education system, and (3) willingness to participate in the study. Within participating schools, teachers were selected using simple random sampling to provide equal opportunity for participation and reduce selection bias.

Participants represented different grade levels and subject specializations to capture diverse teaching contexts and classroom environments. Teachers were eligible to participate if they were currently employed in public elementary or secondary schools and had experience teaching during periods of elevated heat conditions.

For the qualitative phase, 8 teachers were purposively selected to participate in semi-structured interviews. Selection was based on variation in teaching experience, school context, and reported experiences with heat exposure to obtain richer perspectives regarding the phenomenon under investigation (Patton, 2015).

The combination of random and purposive sampling supported both the breadth of quantitative findings and the depth of qualitative insights.

Research Instruments

This study utilized a researcher-developed structured questionnaire and a semi-structured interview guide as the primary instruments for data collection. The structured questionnaire was developed based on the existing literature on occupational heat stress, teacher well-being, job satisfaction, and institutional support. The instrument measured participants' demographic characteristics, heat index literacy, perceptions of heat stress, physical and psychological symptoms, coping practices, job satisfaction, and perceived institutional support using a 5-point Likert scale ranging from strongly disagree to agree strongly.

To establish content validity, the questionnaire and interview guide were expert-validated by specialists in science education, educational research, occupational health, and measurement and evaluation. The instruments were reviewed for clarity, relevance, appropriateness of language, organization, and alignment with the study objectives and research questions. Revisions were incorporated based on the validators' recommendations.

Prior to actual data collection, the questionnaire was pilot-tested among teachers with characteristics similar to those of the target population but not included in the final sample. Pilot testing was conducted to assess item clarity and internal consistency. Reliability analysis using Cronbach's alpha coefficient yielded an overall reliability index of $\alpha = 0.88$, indicating good internal consistency. Necessary revisions were implemented before final administration.

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The semi-structured interview guide was likewise refined following expert feedback to ensure alignment with the study objectives and facilitate deeper exploration of teachers' experiences with classroom heat exposure, coping mechanisms, perceived instructional impacts, and institutional support.

Data Collection Procedure

Data collection was conducted during May 2024 across selected urban public elementary and secondary schools in Metro Manila, Philippines. Schools were initially identified through coordination with school administrators and selected based on accessibility, urban location, and approval to participate in the study. After obtaining institutional permission, eligible teachers were invited to participate in the quantitative and qualitative phases of the research.

For the quantitative phase, the researchers administered printed or electronic structured questionnaires to 58 participating teachers following approval from the respective school administrators. Participants were provided with instructions on the study's purpose and the procedures for completing the questionnaire. Completed responses were collected within the designated data collection period and organized for subsequent quantitative analysis.

For the qualitative phase, semi-structured interviews were conducted with eight purposively selected teachers during the same data-collection period to maintain consistency with the convergent parallel mixed-methods design. Interviews were scheduled based on participant availability and were conducted in settings that ensured convenience and confidentiality. The interview sessions explored participants' experiences of heat stress, coping strategies, perceived effects on instructional practices, and perceptions of institutional support.

Quantitative and qualitative data were collected concurrently, analyzed separately, and subsequently integrated during interpretation to provide a more comprehensive understanding of the impact of heat stress on teachers' well-being and teaching effectiveness.

Data Integration and Analysis

Quantitative and qualitative data were analyzed separately and subsequently integrated using a convergent parallel mixed-methods approach.

For quantitative data, responses from the structured questionnaire were encoded and analyzed using descriptive statistics. Frequencies, percentages, means, and standard deviations were computed to describe teachers' heat index literacy, experiences of heat stress, physical and psychological symptoms, job satisfaction, coping strategies, and perceptions of institutional support. Mean scores were interpreted using the following scale: 1.00–1.80 = Strongly disagree; 1.81–2.60 = Disagree; 2.61–3.40 = Neutral; 3.41–4.20 = Agree; and 4.21–5.00 = Strongly agree.

For qualitative data, interview transcripts were analyzed using thematic analysis following the procedures outlined by Braun and Clarke (2006). The researchers first familiarized themselves with the interview transcripts through repeated reading. Initial codes were generated from meaningful segments of participant responses, after which related codes were grouped into broader categories. Themes were then developed, reviewed, refined, and interpreted in relation to the research questions and quantitative findings.

Findings from both strands were integrated during interpretation to identify areas of convergence, complementarity, and divergence in understanding teachers' experiences of heat stress.

Ethical Considerations

Ethical considerations were central to this study. Before participation, all teachers provided informed consent. They were fully informed about the purpose of the study, their right to participate voluntarily, and their right to withdraw at any time without consequence. Teachers were also assured that their identities would remain confidential and that the data collected would be used exclusively for research purposes.

Data privacy was strictly maintained throughout the study. Personal identifiers were removed from the survey and interview data, and all data were stored securely in password-protected files. Interviews were audio-recorded with participants' permission, and the recordings were transcribed and anonymized to protect participants' privacy.

RESULTS AND DISCUSSION

Heat Index Literacy

Understanding teachers' knowledge and awareness of the heat index is critical to evaluating their preparedness for managing heat stress in school environments. This section presents findings on teachers' familiarity with the heat index concept, awareness of associated health risks, and confidence in recognizing heat-related illness symptoms.

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Table 1
Heat Index Literacy

Items	M (n = 58)	Interpretation
I am familiar with the concept of the heat index and what it measures.	4.26	Strongly agree
I am aware of the potential health risks associated with high heat index values.	4.35	Strongly agree
I understand how high heat index values can affect student performance and behavior.	4.35	Strongly agree
I am knowledgeable about the strategies to mitigate the negative effects of high heat index in the classroom.	4.10	Agree
I believe that educating students about the impact of high heat index is important for their safety and well-being.	4.53	Strongly agree
I feel confident in my ability to recognize signs of heat- related illness in students and take appropriate action.	4.05	Agree
I receive sufficient guidance and support from my school administration regarding managing high heat index days.	4.00	Agree
I believe that awareness and preparation for high heat index days are important aspects of school safety.	4.48	Strongly agree
Overall Rating	**4.27**	Strongly agree

The findings indicate that teachers possess high levels of awareness regarding heat-related risks and the importance of climate-responsive safety measures in schools. However, comparatively lower ratings on confidence in recognizing heat-related illnesses and managing high heat index situations suggest that awareness does not automatically translate into practical preparedness. This gap may reflect limited training, insufficient institutional protocols, or inadequate exposure to occupational health management in educational settings.

Qualitative insights supported these findings, as several teachers expressed uncertainty regarding appropriate responses during extreme heat conditions despite being aware of the associated risks. This suggests that knowledge alone may be insufficient without applied preparedness and institutional guidance. Similar studies have shown that awareness of environmental risks does not necessarily result in effective adaptive practices (Chan & Yi, 2016; Kjellstrom et al., 2009).

The findings highlight the need for climate-responsive professional development programs focusing on heat-related illness recognition, emergency response, and adaptive classroom management strategies. They further suggest that educational leadership should strengthen school-based safety frameworks to support teacher and student well-being amid increasing environmental heat exposure.

Heat-Related Work Experiences and Job Satisfaction

Teachers' perceptions of heat-related workplace experiences and their influence on job satisfaction provide insight into how environmental conditions shape occupational well-being and instructional engagement.

Table 2
Teachers' Job Satisfaction and Heat-Related Work Experiences

Items	M (n = 58)	Interpretation
Overall, I am satisfied with my job as a teacher.	3.79	Agree
The workload in my teaching position is manageable.	3.98	Agree
I feel supported by the school administration in managing job-related challenges.	3.72	Agree
Heat-related factors (e.g., high temperatures) negatively impact my job satisfaction.	4.16	Agree
Overall Rating	**3.91**	Agree

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From Table 2, the findings show that although teachers generally remain satisfied with their profession, heat-related workplace conditions negatively influence their occupational experiences. This suggests that environmental stressors affect not only physical comfort but also motivation, morale, and instructional engagement.

Qualitative accounts revealed that teachers often continue fulfilling instructional responsibilities despite experiencing discomfort and exhaustion during periods of extreme heat. While this reflects professional commitment and resilience, prolonged exposure to unfavorable environmental conditions may contribute to occupational strain over time. Similar findings were reported in occupational health studies linking heat exposure to reduced workplace satisfaction and productivity (Vilella et al., 2021).

These findings imply that environmental conditions should be recognized as an important dimension of teacher welfare and workplace quality. Improving classroom ventilation and climate-responsive infrastructure may therefore support both teacher well-being and instructional effectiveness. These results further reinforce the broader argument that teacher well-being is closely linked to learning quality and institutional effectiveness, as healthier and more comfortable teaching environments enable educators to perform their roles more effectively and sustain positive learning experiences for students.

Perceived Stress Levels

The extent to which heat stress affects teachers' overall job satisfaction, motivation, and instructional performance is essential to understanding its broader implications on educational quality. Findings related to these outcomes, as well as perceived institutional support, are presented here.

Table 3

Perceived Stress Levels

Items	M (n = 58)	Interpretation
Overall, I experience high levels of stress during my workday.	3.69	Agree
Heat-related factors significantly contribute to my stress levels.	4.16	Agree
I have effective strategies for coping with stress in the workplace.	3.78	Agree
Heat stress affects my mental well-being (e.g., increases irritability, decreases concentration).	4.00	Agree
I experience fatigue or exhaustion more frequently on days with high heat index values.	4.50	Strongly agree
I find it challenging to maintain a positive mood and enthusiasm for teaching during hot weather.	4.17	Agree
High heat index values increase my stress levels during the workday.	4.22	Strongly agree
Overall Rating	**4.07**	Agree

Table 3 findings demonstrate that teachers experience elevated stress levels associated with prolonged heat exposure, particularly in relation to fatigue, irritability, reduced concentration, and emotional strain. The high ratings for exhaustion and increased stress during hot days suggest that heat stress significantly affects teachers' psychological and occupational functioning.

Qualitative narratives reinforced these findings, with teachers describing persistent exhaustion and difficulty maintaining classroom engagement during periods of excessive heat. One participant remarked, "Minsan, wala pa ring epekto, kahit may pamaypay," emphasizing the limited effectiveness of personal coping strategies under severe heat conditions. These experiences align with previous studies indicating that prolonged heat exposure may impair cognitive functioning, emotional regulation, and workplace productivity (Nwoko et al., 2023; Vilella et al., 2021).

The findings further imply that heat-related stress may influence classroom interaction and instructional responsiveness, potentially affecting the overall learning environment. Consequently, schools may benefit from implementing teacher wellness initiatives and climate-adaptive workplace interventions to mitigate occupational heat stress.

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Impact on Job Satisfaction

Beyond quantitative measures, teachers' personal narratives reveal the real-world challenges of coping with heat stress and highlight gaps in institutional support. This section summarizes thematic insights from interviews and contextualizes the survey data.

Table 4

Impact on Job Satisfaction

Items	M (n = 58)	Interpretation
High heat index values negatively affect my job satisfaction.	3.83	Agree
I feel less motivated to perform my best at work when faced with high heat index values.	3.86	Agree
I am satisfied with the support provided by my school administration in managing high heat index days.	3.67	Agree
I believe that addressing heat-related challenges in the workplace is essential for improving overall job satisfaction.	4.38	Strongly agree
Overall Rating	**3.94**	Agree

The findings indicate that excessive heat negatively affects teachers' motivation, job satisfaction, and instructional engagement. Teachers recognized that addressing heat-related challenges is essential for sustaining workplace well-being and teaching effectiveness.

Qualitative findings further revealed that teachers often modify instructional activities and classroom pacing during periods of extreme heat to manage physical exhaustion and maintain classroom functionality. Although these adaptations demonstrate resilience, they may also affect classroom interaction and student engagement. Participants likewise expressed dissatisfaction with existing institutional measures, particularly the limited effectiveness of electric fans and inadequate ventilation systems.

These findings support previous studies emphasizing the relationship between environmental stressors and occupational performance (Al-Abbady et al., 2017). The results suggest that climate-responsive interventions, including improved infrastructure, wellness programs, and adaptive scheduling, may help sustain teacher motivation, instructional quality, and continuity of learning.

Qualitative Insights on Coping Strategies, Teacher Resilience, and Institutional Support

The qualitative findings provided deeper insight into how teachers manage prolonged heat exposure in their daily work environments. Teachers reported using coping strategies such as hydration, electric fans, short breaks, and adjustments in classroom activities. However, many participants described these measures as insufficient during periods of extreme heat.

A recurring theme involved dissatisfaction with existing institutional support. Although schools implemented basic cooling measures, teachers emphasized the need for improved ventilation, air-conditioning systems, cooling spaces, and wellness-oriented interventions. One participant stated, "Fans are just decorations; what we really need are air conditioners and places to cool down during breaks." These narratives suggest that occupational resilience is influenced not only by personal coping capacity but also by the adequacy of institutional and environmental support systems.

The findings reinforce previous literature identifying workplace heat stress as both an occupational health and educational concern (Amoadu et al., 2023; Lala & Hagishima, 2023). They further highlight the role of educational leadership in developing climate-responsive policies and infrastructure that protect teacher well-being while sustaining instructional effectiveness and learning continuity.

Conclusions

This study provided compelling evidence that occupational heat stress poses a substantial threat to the well-being and professional efficacy of public school teachers in Metro Manila. Despite demonstrated high heat index literacy, teachers experienced persistent exposure to elevated temperatures in inadequately ventilated and poorly cooled classroom environments, resulting in pronounced physical symptoms, psychological distress, and diminished job satisfaction. The convergence of quantitative and qualitative data shows that current personal coping mechanisms and

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institutional support measures are insufficient to address these challenges, thereby exacerbating adverse effects on teachers' health and instructional performance.

These findings underscore the critical need for systemic, multi-level interventions that address both physical environmental conditions and organizational support structures. Without comprehensive and sustained strategies, the continued impact of heat stress may affect not only teacher retention and well-being but also broader goals of educational quality and equity amid intensifying climate change.

Moreover, the findings contribute to curriculum development by highlighting the need to strengthen the integration of environmental health, climate resilience, and adaptive learning practices within educational programs. The study also informs pedagogical innovation by emphasizing the importance of flexible, climate-responsive instructional approaches that sustain teaching effectiveness amid heat-related challenges. Regarding teacher professional development, the findings support the inclusion of occupational wellness, heat management awareness, and adaptive classroom strategies in teacher preparation and continuing education initiatives. Finally, the study contributes to educational leadership and policy development by providing evidence that may guide school leaders and decision-makers in designing climate-responsive policies, strengthening institutional support systems, and fostering healthier, more sustainable learning environments.

Recommendations

Based on the study's conclusions, the following recommendations are offered.

1. Strengthen Climate-Responsive School Infrastructure: Schools may improve classroom conditions by enhancing ventilation, implementing heat-reducing modifications, and designating cooling spaces to minimize heat exposure and support effective teaching and learning.
2. Implement Teacher Wellness and Heat Management Programs: Schools may provide structured wellness initiatives, including heat awareness training, hydration practices, recovery periods, and mental well-being support, to reduce heat-related stress and fatigue.
3. Develop a Flexible Heat-Adaptive Alternative Delivery Mode (ADM) Framework- Schools may establish clear guidelines for adjusting class schedules and delivery modalities during extreme heat conditions to maintain instructional continuity while protecting teacher well-being.
4. Integrate Heat Stress Management into Educational Policies: Educational policymakers may establish standards and school protocols to manage heat-related risks and support climate-resilient teaching environments.
5. Strengthen Teacher Education and Professional Development Programs- Teacher education institutions and professional development providers may integrate climate-responsive teaching strategies, occupational wellness awareness, and adaptive classroom management approaches into teacher preparation and continuing professional development programs.
6. Enhance Curriculum Integration of Climate and Environmental Health Education- Curriculum developers may strengthen the integration of environmental health awareness, climate resilience, and sustainable learning practices into classroom instruction to promote safer and more adaptive educational environments.

REFERENCES

Al-Abbady, K., Hessian, H. Y., & Alaam, M. W. (2017). Enrolment of school teachers in heat stress management plan targeting vulnerable Dubai schooling kids: An exercise in community engagement, empowerment and mobilization. *Journal of Environmental Research,* 4(1), Article 18. https://doi.org/10.21767/2574-2817.100018

Amoadu, M., Ansah, E. W., Sarfo, J. O., & Hormenu, T. (2023). Impact of climate change and heat stress on workers' health and productivity: A scoping review. *Journal of Climate Change and Health*, 12, 100249. https://doi.org/10.1016/j.joclim.2023.100249

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology,* 22(3), 309–328. https://doi.org/10.1108/02683940710733115

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Burke, P. F., Schuck, S., & Kearney, M. (2023). Teachers' experiences of emergency remote schooling during the pandemic: Drivers for student and teacher wellbeing. *Australian Journal of Education*, 67(2), 124–142. https://doi.org/10.1177/00049441231159666

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Chan, A. P. C., & Yi, W. (2016). Heat stress and its impacts on occupational health and performance. *Indoor and Built Environment*, 25(1), 3–5. https://doi.org/10.1177/1420326X15622724

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research (3rd ed.).* SAGE Publications.

De Vera-Ruiz, E. (2024, May 8). *18 areas may log 42°C to 45°C heat index on May 8. Manila Bulletin.* https://mb.com.ph/2024/5/7/18-areas-may-log-42-c-to-45-c-heat-index-on-may-8

Department of Education. (2024). *DepEd implements alternative delivery modes due to extreme heat conditions*. https://www.deped.gov.ph/2024/04/04/on-class-suspensions-and-shifting-to-adm-due-to-high-heat-index-other-calamities/

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs: Principles and practices. *Health Services Research*, 48(6 Pt 2), 2134–2156. https://doi.org/10.1111/1475-6773.12117

Flouris, A. D., Dinas, P. C., Ioannou, L. G., Nybo, L., Havenith, G., Kenny, G. P., & Kjellstrom, T. (2018). Workers' health and productivity under occupational heat strain: A systematic review and meta-analysis. *The Lancet Planetary Health*, 7(4), e271–e272. https://doi.org/10.1016/S2542-5196(18)30237-7

Gu, Q., & Day, C. (2013). Challenges to teacher resilience: Conditions count. *British Educational Research Journal*, 39(1), 22–44. https://doi.org/10.1080/01411926.2011.623152

Hoang, T. L. T., Dao, H. N., Cu, P. T., Tran, V. T. T., Tong, T. P., Hoang, S. T., Vuong, V. V., & Nguyen, T. N. (2022). Assessing heat index changes in the context of climate change: A case study of Hanoi, Vietnam. *Frontiers in Earth Science,* 10, Article 897601. https://doi.org/10.3389/feart.2022.897601

Ioannou, L. G., Mantzios, K., Tsoutsoubi, L., Notley, S. R., Dinas, P. C., Brearley, M., & Flouris, A. D. (2022). Indicators to assess physiological heat strain—Part 1: Systematic review. *Temperature*, 9(3), 227–262. https://doi.org/10.1080/23328940.2022.2037376

Kjellstrom, T., Holmer, I., & Lemke, B. (2009). Workplace heat stress, health and productivity: An increasing challenge for low- and middle-income countries during climate change. *Global Health Action,* 2(1), 2047. https://doi.org/10.3402/gha.v2i0.2047

Lala, B., & Hagishima, A. (2023). Impact of escalating heat waves on students' well-being and overall health: A survey of primary school teachers. *Climate,* 11(6), 126. https://doi.org/10.3390/cli11060126

National Weather Service. (2021). *Heat index.* National Oceanic and Atmospheric Administration. https://www.weather.gov/safety/heat-index

Nwoko, J. C., Emeto, T. I., Malau-Aduli, A., & Malau-Aduli, B. S. (2023). A systematic review of the factors that influence teachers' occupational wellbeing. *International Journal of Environmental Research and Public Health*, 20(12), 6070. https://doi.org/10.3390/ijerph20126070

Patton, M. Q. (2015). *Qualitative research & evaluation methods (4th ed.).* SAGE Publications.

Plano Clark, V. L., & Ivankova, N. V. (2015). *Mixed methods research: A guide to the field.* SAGE Publications.

Reganit, J. C. (2024, April 27). PAGASA warns of dangerous heat index in 44 areas. Philippine News Agency. https://www.pna.gov.ph/articles/1223557

Santamouris, M. (2020). Recent progress on urban overheating and heat island research: Integrated assessment of the energy, environmental, vulnerability and health impact. Synergies with the global climate change. *Energy and Buildings*, 207, 109482. https://doi.org/10.1016/j.enbuild.2019.109482

Smallcombe, J. W., Foster, J., Hodder, S. G., Jay, O., Flouris, A. D., & Havenith, G. (2022). Quantifying the impact of heat on human physical work capacity; Part IV: Interactions between work duration and heat stress severity. *International Journal of Biometeorology,* 66, 2463–2476. https://doi.org/10.1007/s00484-022-02370-7

UNESCO. (2021). *Getting every school climate-ready: How countries are integrating climate change issues in education.* https://www.unesco-floods.eu/wp-content/uploads/2021/12/379591eng.pdf

Vilella, S. B., Saiz-Clar, E., León-Zarceño, E., & Rosa, M. Á. S. (2021). Influence of air temperature on school teachers' mood and the perception of students' behavior. *Sustainability,* 13(17), 9707. https://doi.org/10.3390/su13179707

Wang, S., Wu, C. Y. H., Richardson, M. B., Zaitchik, B. F., & Gohlke, J. M. (2021). Characterization of heat index experienced by individuals residing in urban and rural settings. *Journal of Exposure Science & Environmental Epidemiology*, 31(4), 641–653. https://doi.org/10.1038/s41370-021-00303-x

World Health Organization. (2023). *Heat and health.* https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health