

# Mapali: Analyzing the Influence of Heat Stress on the Job Satisfaction, Performance, and Occupational Stress of Faculty and Staff of the College of Engineering and Architecture at a State University in Pampanga

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**Abstract:** - Heat stress is a significant factor that affects people's level of performance and is a serious issue for many professions, notably those in the education sector that operate in tropical nations like the Philippines. Heat stress in the workplace is a well-known occupational health risk, and dangers have been worse and more widespread due to climate change, which is characterized by a rise in the frequency and intensity of extreme heat events. The Department of Education (DepEd) has reminded heads of public and private schools nationwide that they have the authority to suspend or cancel in-person classes and instead implement modular distance learning (MDL) modes amid extreme heat during summer months. Heat provides some job problems and increases the risk of accidents. The study will focus on understanding how heat stress affects employees' physical and mental well-being, their job satisfaction, and their ability to perform their work tasks effectively. The study aims to identify the factors that contribute to heat stress in the workplace, including work demands, physical conditions, and organizational policies, and their impact on employee performance.

**Key Words:** — *State universities, Heat Stress, Employee Performance, and Academic Instructor.*

## I. INTRODUCTION

Climate change poses a fundamental threat to a wide range of sustainable development matters, particularly relating to health equity, food security, employment, gender equality, education, and housing, among others [1]. The ongoing socio-economic challenges have been found to worsen the interdisciplinary facets of extreme heat vulnerabilities stemming from the changing climate [2]. One of the important variables that affect people's level of performance is heat stress, which is a major problem for many occupations [3].

Workplace heat stress is a well-known occupational health hazard, and climate change characterized by the increased frequency and intensity of extreme heat events has made risks more severe and widespread. Heat stress is prevalent in numerous industrial and commercial occupational settings, either outdoors or indoors [4]. Heat stress is one of the major burdens to human beings in the current scenario. Researchers and professionals have looked at the relationship of occupational heat stress and its health impacts. The workers face many health problems because of high heat exposure. Research in occupational heat stress is much needed to find out the health impacts and suitable intervention to protect worker's health which subsequently reduces the morbidity [5]. As the country transitions from cold and rainy weather to the warm and dry season, the temperature increases again, and so do risks tied to hot and sunny days—such as its impact on people's health and the economy. Last week, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (Pagasa) officially declared the start of the

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warm and dry season, which is expected to last until May [6]. Extreme heat is most dangerous to young children, the elderly, and people with medical conditions like heart disease. Also at higher risk are people who work outdoors, people with no access to air conditioning or other ways to cool down, and people in dense cities, where the urban heat island effect raises temperatures. These factors mean that the rise in extreme heat, like other effects of climate change, is likely to fall hardest on already vulnerable populations, especially in the developing world [7]. Today, many schools have reduced that break by ending the school year a bit later in June and resuming in August to curb summer learning loss. But the general practice of a summer break continues. For many schools, the lack of air conditioning has also been a factor [8]. The Department of Education (DepEd) has reminded heads of public and private schools nationwide that they have the authority to suspend or cancel in-person classes and instead implement modular distance learning (MDL) modes amid extreme heat during summer months. The DepEd acknowledged that extreme heat can “considerably affect the conduct of classroom learning and put the learners’ health and well-being at risk”[9]. Most teachers report that students are struggling to concentrate in class and are not showing up to school due to “intolerable” heat in classrooms, a survey conducted by the country’s largest organization of teachers showed. Quetua said that students and teachers have complained of headaches, dizziness, and nose bleeding due to the heat, which is made worse by the lack of school health facilities and personnel [10].

The study will focus on understanding how heat stress affects employees' physical and mental well-being, their job satisfaction, and their ability to perform their work tasks effectively. The study aims to identify the factors that contribute to heat stress in the workplace, including work demands, physical conditions, and organizational policies, and their impact on employee performance.

## II. LITERATURE REVIEW

Globally, hot days are increasing hotter and more frequent, whereas cold days are becoming less frequent. Climate change is happening now. Evidences being seen support the fact that the change cannot simply be explained by natural variation. The most recent scientific assessments have confirmed that this warming of the climate system since the mid-20th century is most likely to be due to human activities; and thus, is due to the

observed increase in greenhouse gas concentrations from human activities, such as the burning of fossil fuels and land use change. Current warming has increasingly posed quite considerable challenges to man and the environment, and will continue to do so in the future [18]. After two school years without face-to-face classes, public schools’ empty rooms and corridors in the Philippines will once again be filled with students as the Department of Education (DepEd) formally opens the School Year 2022-2023 on Monday, August 22, 2022 [19]. School safety is the prevention of incidents and reduction of injury or damage in properties [11]. Safety plays a vital role in academic institutions. Just like other public sectors, schools and colleges are adapting to changes and continuously meeting existing challenges as well [12]. Schools are expected to provide safe and healthy environments for children to learn and grow. Yet many are ill-equipped to protect them from the heatwaves, floods, wildfires, and droughts that are happening in increasing number and severity across the nation [13].

Heat is particularly a threat to those who already have health complications, such as heart disease. Very high levels of heat stress and soaring humidity can stymie the body’s natural cooling system—sweating—a disruption that can cause heat exhaustion and heat stroke [14]. Today, many schools have reduced that break by ending the school year a bit later in June and resuming in August to curb summer learning loss. But the general practice of a summer break continues. For many schools, the lack of air conditioning has also been a factor [8]. As climate change accelerates, temperatures will continue to rise well into the school year, including in regions that aren’t used to hot weather. Many schools don’t have air conditioning units that are equipped to cope with sweltering heat. And a body of research shows that hot classrooms are detrimental to student learning. Educators say students can be unmotivated and distracted when sitting in a hot classroom. And other research shows that cognitive function declines during excessive heat, leading to slower reaction times on assessments. [15]. The Department of Education (DepEd) in the Philippines has authorized schools to shift to remote learning when the weather becomes too hot and potentially harmful to students and staff [16]. Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress. Exposure to extreme heat can result in occupational illnesses and injuries. Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also increase the risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and

dizziness. Burns may also occur as a result of accidental contact with hot surfaces or steam. Prevention of heat stress in workers is important. Employers should provide training to workers so they understand what heat stress is, how it affects their health and safety, and how it can be prevented [17].

### III. RESEARCH METHODOLOGY

In this study, a mixed-method approach was employed to gather data from the faculty and staff of the College of Engineering and Architecture at a state university in Pampanga. The research measured self-assessed job satisfaction, job performance, and occupational stress among the faculty members and staff and a separate questionnaire was provided to the supervisor to assess the job performance of the faculty members and staff from different perspective. The questionnaire was developed based on the Minnesota Satisfaction Questionnaire (MSQ) as a benchmark for its relevance and validity.

The total population of the staff, both teaching and non-teaching, at the College of Engineering and Architecture was determined to be one hundred and fifty-four (154) individuals. To ensure an appropriate sample size for the study, a sample size calculation was performed using the Raosoft sample size calculator with a 5% margin of error and a 95% confidence level, the minimum required sample size was determined to be one hundred eleven (111) participants.

For this study, a total of one hundred twenty-eight (128) responses were collected, exceeding the minimum required sample size. This sample size provides a higher level of confidence and strengthens the representativeness of the findings. Having a larger sample can enhance the statistical accuracy of the study and increase the precision of the results.

Descriptive statistics was used to summarize the collected data, providing measures such as mean, median, and standard deviation to describe the levels of job satisfaction, job performance, and occupational stress among the faculty members. These statistics provided an overall understanding of the distribution and central tendencies of the variables of interest.

For the reliability of the questionnaire, Cronbach's alpha test was used. Cronbach's alpha values will be calculated for each construct (job satisfaction, job performance, and occupational

stress). A high Cronbach's alpha value, typically above 0.70, indicates a higher level of internal consistency and reliability of the questionnaire.

To organize and summarize data gathered from the study, the researchers used descriptive statistics. The results were organized and presented in tables, charts, and graphs to provide a clear summary of the faculty members' job satisfaction, job performance, and occupational stress. Descriptive statistics is used to provide and describe the summary of the data collected [20].

### IV. RESULT AND DISCUSSION

This chapters presents the analysis and discussion of the findings of this study. The presentations are done according to the specific objectives and hypothesis. Results were presented using tables, charts, and graphs for ease of looking and texts to explain the values for easier comprehensions.

#### 4.1 Job Satisfaction

Respondents from the College of Engineering and Architecture at a state university in Pampanga agrees in job satisfaction considering heat stress with an average mean of 3.09 (See Table.1.).

Table.1. Job Satisfaction Considering Heat Stress

Item Statement	Mean	Std. Deviation	Verbal Interpretation
1. I find real enjoyment in my work.	3.14	.771	Agree
2. I feel fairly satisfied with my present job.	3.07	.723	Agree
3. Most days, I am enthusiastic about my work.	3.05	.797	Agree
4. The measures in place to mitigate heat stress in workplace are effective and satisfactory.	2.94	.867	Agree
5. The support and understanding I receive from supervisors and colleagues are satisfactory.	3.28	.752	Strongly Agree
6. The working conditions in my job are satisfactory.	3.12	.810	Agree
7. The resources provided to manage heat stress in my workplace are adequate.	3.00	.878	Agree
8. Overall, I am satisfied with my job.	3.13	.736	Agree
<b>JOB SATISFACTION</b>	<b>3.09</b>	<b>.659</b>	<b>Agree</b>

Note: Scale: 1.00 - 1.75 (Strongly Disagree); 1.76 - 2.50 (Disagree); 2.51 - 3.25 (Agree); 3.26 - 4.00 (Strongly Agree)

Faculty and staff are agreeing that they find enjoyment in their work with a mean score of 3.14, the measures in place to mitigate heat stress in their workplace are effective and satisfactory with a mean score of 2.94, and the working conditions in their job are satisfactory with a mean score of 3.12. This shows that the faculty and staff of the College of Engineering and Architecture at a state university in Pampanga are satisfied with their job considering the heat stress in their workplace.

#### 4.2 Occupational Stress

Most of the faculty and staff of the College of Engineering and Architecture at state university in Pampanga shows that they agree that the heat stress at work significantly contributes to their overall level of occupational stress. with the mean score of 3.23 (See Table.2.). The data exhibits that most of the respondents strongly agrees that the heat stress in their workplace affects the level of occupational stress with mean score of 3.32. The respondents revealed that they feel the tension and anxiety due to heat stress in the work with the mean score of 3.26. The data also shows that the respondents find it challenging to manage their occupational stress, particularly when heat stress is present with mean score of 3.27.

Table.2. Occupational Stress Considering Heat Stress

Item Statement	Mean	Std. Deviation	Verbal Interpretation
1. The heat stress in my workplace affects my level of occupational stress.	3.32	.763	Strongly Agree
2. I feel overwhelmed by the demands of my job, especially when dealing with heat stress.	3.13	.736	Agree
3. The heat stress at work often contributes to feeling of tension and anxiety.	3.26	.701	Strongly Agree
4. I find it challenging to manage my occupational stress, particularly when heat stress is present.	3.27	.726	Strongly Agree
5. The heat stress in my workplace negatively impacts my overall well-being and job satisfactions.	3.17	.764	Agree
6. I experience increased in job strain and pressure due to the heat stress in my work environment.	3.23	.678	Agree
7. The heat stress at work significantly contributes to my over all level of occupational stress.	3.20	.699	Agree
8. Coping with heat stress in my job adds to the challenges and stressors I face in the workplace.	3.24	.707	Agree
<b>OCCUPATIONAL STRESS</b>	<b>3.23</b>	<b>.620</b>	<b>Agree</b>

Note: Scale: 1.00 - 1.75 (Strongly Disagree); 1.76 - 2.50 (Disagree); 2.51 - 3.25 (Agree); 3.26 - 4.00 (Strongly Agree)

#### 4.3 Job Performance

Table.3. Job Performance Considering Heat stress

Item Statement	Mean	Std. Deviation	Verbal Interpretation
1. Heat stress has a negative impact on my overall job performance.	3.27	.760	Strongly Agree
2. Heat stress affects my productivity and efficiency at work.	3.32	.687	Strongly Agree
3. Heat stress hinders my ability to meet the standards and expectations set for my job performance.	3.27	.658	Strongly Agree
4. Heat stress decreases my motivation and engagement in performing job tasks.	3.27	.634	Strongly Agree
5. Heat stress makes it challenging to maintain focus, concentration, and attention to detail in my work.	3.32	.698	Strongly Agree
6. Heat stress impairs my decision making, problem-solving, and critical thinking abilities at work.	3.17	.733	Agree
7. Heat stress contributes to errors, mistakes, or rework that affect my job performance.	3.16	.747	Agree
8. Heat stress interferes with my ability to work effectively with colleagues and collaborate as a team.	3.12	.770	Agree
9. Heat stress necessitates adjustments to my work strategies or routines to maintain job performance.	3.16	.707	Agree
10. Overall, heat stress has a significant impact on my job performance.	3.29	.666	Strongly Agree
	<b>3.23</b>	<b>0.581</b>	<b>Agree</b>

Note: Scale: 1.00 - 1.75 (Strongly Disagree); 1.76 - 2.50 (Disagree); 2.51 - 3.25 (Agree); 3.26 - 4.00 (Strongly Agree)

The table.3. Shows that heat stress has a significant impact on their job performance with a mean score of 3.29. The faculty and staff of the College of Engineering and Architecture at a State University in Pampanga strongly agree that heat stress has a negative impact on my overall job performance with mean score of 3.27. With the same mean score, the data shows also that heat stress hinder the ability of the respondents to meet the standard and expectations set for their job performance that would lead in decreases on their motivation and engagement in performing their job tasks.

#### V. CONCLUSION

In conclusion, it is clear that heat stress negatively impacts job satisfaction, occupational stress, and job performance. It is

impossible to disregard the negative effects of heat stress on people who work in hot surroundings. High temperatures and intense heat have been linked in numerous studies to lower levels of job satisfaction, greater levels of occupational stress, and poorer job performance.

Workplace conditions that are uncomfortable and physically taxing due to heat stress might lower overall job satisfaction. When working in hot conditions, employees frequently feel uncomfortable, exhausted, and unmotivated, which lowers their levels of job satisfaction. The unpleasant working conditions brought on by heat stress can also be detrimental to a person's mental health and level of job engagement.

Additionally, workers who experience heat stress report higher levels of occupational stress. High temperatures can strain the body and mind physically and mentally by causing dehydration, heat-related diseases, and physical strain. This additional stress may impair decision-making, cognitive functioning, and concentration, which could ultimately hinder job performance.

Heat stress has been shown to impair cognitive function, increase errors, and decrease productivity when it comes to work performance. An individual's cognitive function, attention span, and memory may be affected by the physiological and psychological impacts of heat stress, making it challenging to complete activities effectively and efficiently. For both individuals and businesses, this decline in job performance may have substantial repercussions, including lower productivity, increased costs, and severe safety issues.

Given these results, it is critical for businesses to understand how heat stress affects job satisfaction, occupational stress, and job performance. Ample ventilation, hydration, rest breaks, and the use of personal protection equipment are just a few of the techniques that may be put into place to lessen the impacts of heat stress. These measures can also assist enhance employee wellbeing, job satisfaction, and general job performance. Additionally, increasing people's knowledge, training, and ability to manage heat stress might help them deal with hot working circumstances better.

In conclusion, heat stress has been shown to negatively impact job satisfaction, occupational stress, and job performance. For the purpose of fostering healthier and more effective working environments, heat stress in the workplace must be addressed

and managed. Organizations can improve job satisfaction, lower occupational stress, and maximize job performance even in demanding hot conditions by prioritizing employee well-being and putting in place the necessary measures.

## REFERENCES

- [1]. K. Lundgren, K. Kuklane, C. Gao, and I. Holmér, "Effects of Heat Stress on Working Populations when Facing Climate Change," *Ind Health*, vol. 51, no. 1, pp. 3–15, 2013.
- [2]. K. P. Ncongwane, J. O. Botai, V. Sivakumar, and C. M. Botai, "A Literature Review of the Impacts of Heat Stress on Human Health across Africa," *Sustainability 2021*, Vol. 13, Page 5312, vol. 13, no. 9, p. 5312, May 2021.
- [3]. Z. Rastegar, M. R. Ghotbi Ravandi, S. Zare, N. Khanjani, and R. Esmaeili, "Evaluating the effect of heat stress on cognitive performance of petrochemical workers: A field study," *Heliyon*, vol. 8, no. 1, p. e08698, Jan. 2022.
- [4]. A. P. C. Chan and W. Yi, "Heat stress and its impacts on occupational health and performance," *Indoor and Built Environment*, vol. 25, no. 1, pp. 3–5, Feb. 2016.
- [5]. K. Srinivasan, K. N. Maruthy, V. Venugopal, and P. Ramaswamy, "Research in occupational heat stress in India: Challenges and opportunities," *Indian J Occup Environ Med*, vol. 20, no. 2, p. 73, May 2016.
- [6]. "Extreme heat in PH: Health risks, economic impact | Inquirer News."
- [7]. K. P. Ncongwane, J. O. Botai, V. Sivakumar, and C. M. Botai, "A Literature Review of the Impacts of Heat Stress on Human Health across Africa," *Sustainability 2021*, Vol. 13, Page 5312, vol. 13, no. 9, p. 5312, May 2021.
- [8]. U. Haverinen-Shaughnessy and R. J. Shaughnessy, "Effects of classroom ventilation rate and temperature on students' test scores," *PLoS One*, vol. 10, no. 8, Aug. 2015.
- [9]. "DepEd allows distance learning amid extreme heat | Philstar.com."
- [10]. "Teacher survey finds 'intolerable' summer heat affecting attendance, learning | Philstar.com."
- [11]. K. Redican, L. Olsen, and C. Baffi, "Organization of School Health Programs," 1992.
- [12]. F. Foreword, "Managing Safety in Schools and Colleges".
- [13]. "Climate Change Affects Students' Well-Being: Case Study of Extreme Heat in San Joaquin Valley and Need for Climate-Smart Schools - Union of Concerned Scientists."
- [14]. "Risk of Dangerous Heat Exposure Is Growing Quickly in Cities - Scientific American."
- [15]. "The School Year Is Getting Hotter. How Does Heat Affect Student Learning and Well-Being?"
- [16]. "Extreme heat: 403 Central Luzon schools suspend face-to-face classes | Philstar.com."
- [17]. "Heat Stress | NIOSH | CDC."

- [18]. "Climate Change in the Philippines," Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).
- [19]. "Face-to-face classes resume in the Philippines for SY 2022-2023 - cue media."
- [20]. "Descriptive Statistics - Research Methods Knowledge Base."