# Thermal Conditions and Health: A Study on Teachers and Students in Alternative Learning Modalities

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## ABSTRACT

Thermal conditions and health play a crucial role in teaching and learning. This study examines their impact and highlights alternative teaching modalities as adaptive solutions. Climate change presents public health risks, requiring PE teachers to modify lessons for safety during extreme weather. A comparative descriptive-regression research design was used, with 169 respondents, including MAPEH teachers, sports coaches, and SPS students. Data were analyzed using mean, standard deviation, and ANOVA. Findings reveal that while respondents are generally satisfied with the PE schedule, they prefer greater flexibility during extreme weather. Both teachers and students express high satisfaction with alternative PE modalities, particularly technology-driven approaches, though some find virtual methods less interactive. Health data show that most teachers maintain a normal BMI, though some are overweight or underweight, while nearly half of the students are underweight, raising nutrition concerns. Common health issues during PE include excessive sweating and dizziness, with muscle cramps and nausea occurring less frequently. Despite weather variations, teachers' and students' health remains largely unaffected across BMI categories. Teachers are more satisfied with PE and training time slots than students, while both groups report similar satisfaction with teaching modalities and training sessions. The study concludes that greater flexibility in scheduling, improved nutrition support for students, and enhanced technology use are needed. Thus, schools should implement a comprehensive, climate-adaptive PE program that integrates flexible scheduling, technology-driven learning, regular health monitoring, and hydration initiatives to ensure student engagement, safety, and well-being during extreme weather conditions.

## INTRODUCTION

### Background of the Study

Climate change raises significant concerns about public health due to rising temperatures. Physical Education teachers play a crucial role in adapting lessons to ensure both safety and continuity during extreme weather events and natural disasters. As heat waves, typhoons, floods, and earthquakes become more frequent, teachers must explore alternative PE methods, such as indoor activities, virtual classes, and modified outdoor exercises. This study examines their strategies and experiences, providing insights and recommendations to enhance the resilience of PE education amidst climate challenges.

Globally, research on how teachers adapt physical education to extreme heat and natural disasters is crucial but often overlooked. Studies in Australia and the U.S. highlight how schools adjust PE programs to cope with environmental challenges (Smith, 2020). Technology, such as virtual PE lessons, helps maintain physical activity during school closures (Johnson, 2022). Policy frameworks and teacher training also enhance climate resilience in PE instruction (Miller & Thompson, 2021). These studies offer insights into the challenges educators face and the strategies used to ensure safe and continuous PE instruction amid climate change.

Additionally, climate change has intensified extreme weather events like droughts, hurricanes, and heatwaves worldwide (Haines et al., 2016; Meehl & Tebaldi, 2014; Barriopedro et al., 2020; Webster, 2015). Heat exposure can cause cramps, fainting, heat exhaustion, heatstroke, dehydration, and even fatalities, especially when medications affect thermoregulation (Diaz, Linares & Tobias, 2016). Heat-related deaths are often underreported, as they may be attributed to heart attacks or respiratory diseases (Bassil & Cole, 2020). Preventing such fatalities is essential, as emphasized by WHO and Euroheat (Koppe & Becker, 2017; Matthies, 2018).

In Asia, adapting physical education to extreme weather is crucial due to unique regional challenges. In India, studies highlight how heat waves affect student participation, emphasizing the need for structured guidelines (Park et al., 2020). Research in China and Japan explores indoor PE adaptations and online programs to maintain student engagement during extreme conditions (Wang & Li, 2021; Takahashi, 2022). In Singapore, climate-adaptive PE policies, including hybrid indoor-outdoor lessons and advanced cooling systems, enhance student safety and participation (Tan & Lee, 2023).

In the Philippines, Santos (2021) explored how schools develop safety guidelines for PE classes during extreme weather. The study also examined the use of native knowledge and local materials in creating culturally relevant and resilient PE activities. Research further assessed the effectiveness of such programs in training teachers to adapt PE instruction amid climate change-related disasters. Dela Cruz and Ramirez (2022) focused on integrating climate-responsive PE curricula, emphasizing adaptive lesson planning and infrastructure improvements. Similarly, Garcia et al. (2023) analyzed the role of government policies and teacher training in enhancing climate adaptation strategies, highlighting best practices from disaster-prone areas.

Locally, Studies highlight the need for teacher preparedness in handling PE classes amid climate challenges. In Mindanao, public school teachers often lack shaded areas, indoor gyms, or air-conditioned spaces, making safe physical activities difficult during heat waves (Dela Cruz, 2022). In Visayas and Luzon, teachers adapt by adjusting PE schedules and adding hydration breaks to prevent heat-related illnesses (Reyes & Ramos, 2023). Similarly, Bautista (2024) emphasized the importance of government support in developing climate-resilient PE policies. These findings stress the need for policies that help teachers ensure student safety during extreme weather.

Thus, studying alternative PE teaching methods during extreme weather is essential to protect students and teachers. It helps develop safety guidelines, ensures learning continues, and strengthens education resilience. This research also supports global efforts to adapt education to climate change and create safer learning environments.

**Theoretical Framework of the Study**

This study is anchored to the Self-Determination Theory (SDT) by Deci & Ryan (1985), Adaptability Theory by Collie & Martin (2017), and Ecological Systems Theory by Bronfenbrenner (1979).

**Self-Determination Theory (SDT) by Deci & Ryan (1985)** highlights autonomy, competence, and relatedness as key motivators for physical activity. In physical education, students stay engaged when they have choices, opportunities to improve skills, and social connections with peers and teachers. Research supports SDT's role in PE. Vasconcellos et al. (2019) found that supportive teaching boosts student motivation. Teixeira et al. (2012) linked autonomous motivation to better exercise adherence. Quested et al. (2021) suggested creating a supportive environment to enhance motivation and well-being. SDT is also useful for adapting PE during extreme weather or disasters. Teachers can design alternative activities, such as virtual classes, that offer exercise options, skill-building, and social interaction. Applying SDT helps evaluate how well these methods keep students engaged, guiding the development of effective and motivating PE programs in any setting.

**Adaptability Theory by Collie & Martin (2017)** emphasizes the ability of learners to adjust their strategies based on the learning environment. It highlights the need for flexible teaching, especially in response to challenges like heatwaves, natural disasters, or school closures. Research supports the importance of adaptability in education. Collie & Martin (2016) found that adaptable teachers handle changes effectively. Burns et al. (2017) showed that adaptable students perform better academically. Collie et al. (2020) found that adaptable science teachers boost student motivation. In PE, Adaptability Theory is crucial for adjusting activities during extreme weather or school closures. Teachers can modify lessons for indoor use or shift to virtual classes to ensure safety. Applying this theory helps evaluate how well teachers and students adapt, leading to effective strategies for maintaining PE programs in any situation.

**Ecological Systems Theory by Bronfenbrenner (1979)** highlights how individual, environmental, and societal factors are interconnected. In PE, this means considering student needs, available resources, and community

support when designing programs. Studies have shown the importance of this approach. Bey et al. (2020) emphasized education's role in building community resilience to environmental hazards. Wutich et al. (2024) found that extreme weather affects well-being, requiring multi-level solutions. Davids et al. (2021) applied ecological dynamics to PE, promoting adaptive learning environments. This theory is useful for adapting PE during extreme weather and disasters. Schools can work with communities to access indoor spaces or adjust activities based on available resources. Applying this approach helps develop PE programs that effectively respond to students' needs, the environment, and community support.

Thus, integrating **Self-Determination Theory (SDT), Adaptability Theory**, and **Ecological Systems Theory** creates a strong framework for developing flexible physical education (PE) programs during extreme weather. SDT (Deci & Ryan, 1985) emphasizes autonomy, competence, and relatedness, ensuring that modified PE activities keep students motivated and engaged (Vasconcellos et al., 2019; Quested et al., 2021). Adaptability Theory (Collie & Martin, 2017) highlights the need for flexible teaching methods, as adaptable students and teachers are better at handling disruptions (Burns et al., 2017; Collie et al., 2020), supporting the use of indoor or online PE options. Ecological Systems Theory (Bronfenbrenner, 1979) broadens the perspective by stressing the role of school-community partnerships in overcoming environmental challenges (Bey et al., 2020; Wutich et al., 2024). Combining these theories helps educators create PE programs that remain engaging, responsive, and well-supported, ensuring learning continues despite disruptions.

**Conceptual Framework of the Study**

Furthermore, the figure below depicts the conceptual framework of this study, showing the effect of the independent variable on the dependent variable. Independent variables consist of the Department of Education classes and tournaments in schools, while the dependent variable consists of teachers' and student's health.

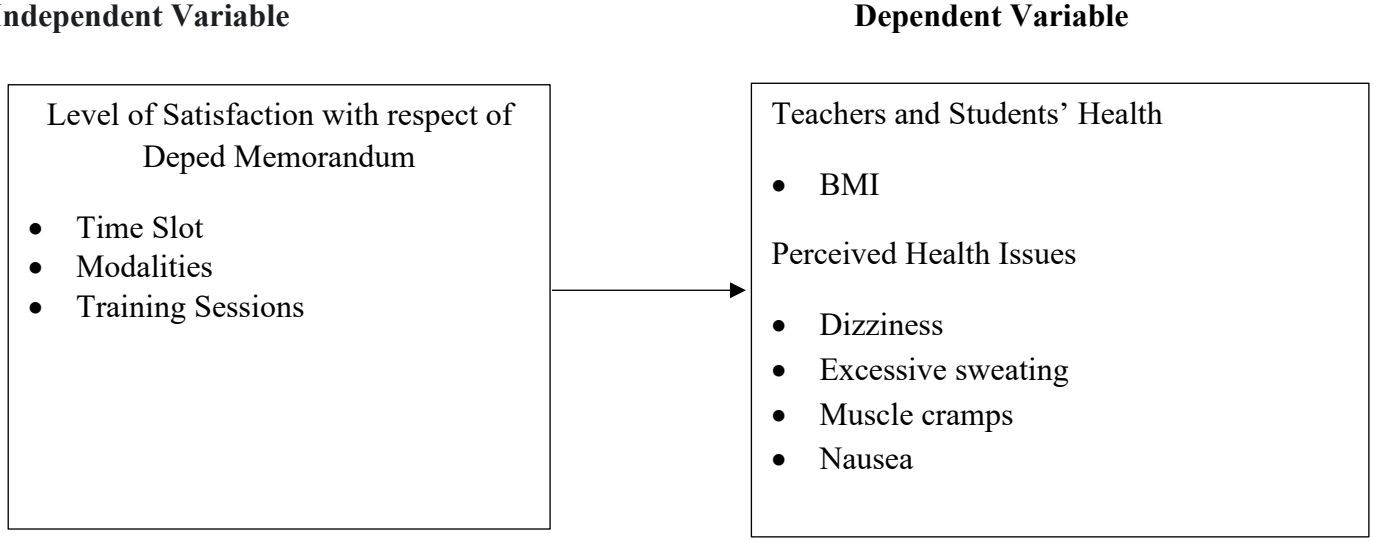



Figure 1. Conceptual Framework of the Study

**Statement of the Problem**

This study aims to determine the thermal conditions and health of teachers and students in alternative modalities in General Santos City.

Specifically, this study aims to answer the following questions:

What is the teachers and students level of satisfaction with the DepEd Memorandum in terms of:

Time Slots;

Modalities, and

Training Sessions?

What is the health status of teachers and students based on BMI Level?

What is the perceived level of health issues among teachers and students in terms of:

Dizziness;

Excessive sweating;

Muscle cramps, and

Nausea?

Does the response to weather changes affect the health of:

Teachers and

Students?

Is there a significant difference between teachers' and students' satisfaction in terms of time slots, modalities, and training sessions?

**Research Hypothesis**

H01. There is no significant difference between teachers' and students' time slots, modalities, and training sessions.

**Significance of the Study**

This study may contribute to filling the gaps in teachers' alternative modalities in the delivery of physical education amidst challenging thermal conditions and other calamities in General Santos City. It will also contribute to the body of knowledge.

**To the Students.** Students will directly benefit from physical education classes that are adapted to protect their health and safety under adverse environmental conditions. This may include modified schedules, locations, or activities that allow them to remain active and engaged while minimizing health risks.

**To the Teachers.** The study can provide teachers with effective strategies and teaching modalities better suited to thermal conditions and other challenging situations. It can enhance their teaching effectiveness and ensure the safety and well-being of both themselves and their students during physical education classes.

**To the School Administrators.** The study can guide school administrators in developing policies and protocols that address the challenges of thermal conditions and other calamities. It can help create a safer learning environment for students and teachers, including adjusting class schedules, modifying outdoor activities, and implementing safety measures.

**To the Local Education Authorities.** The study's findings can be useful in developing and implementing guidelines and standards for safe physical education practices in the region, improving overall student health and safety, and ensuring the well-being of teachers.

**To the Parents and Guardians.** Parents can have peace of mind knowing that schools are implementing measures to ensure their children's safety during physical education classes, particularly in hot or extreme weather conditions.

**To the Health Professionals.** The study can provide valuable data and insights into the health risks associated with teaching physical education in challenging environmental conditions. Health professionals can use this information to guide preventive measures and advise schools and educators.

**To the Researchers and Future Researchers.** The study can contribute to academic literature on physical education, teaching modalities, and environmental health, offering a foundation for future research and exploring best practices in the field.

**Scope and Delimitation**

The study scope includes teachers and students from selected schools in General Santos City, specifically those affected by thermal conditions in their teaching and learning environments. The respondents were gathered and answered the questionnaire on December 12-13, 2024 and consisted of 169 participants: 68 teachers and 101 students from General Santos City National High School, Labangal National High School, and New Society National High School. This study examines how temperature impacts the health and well-being of teachers and students and explores alternative teaching modalities to address the challenges posed by thermal conditions. A quantitative descriptive research design was employed to analyze and interpret the data collected.

**Definition of Terms**

For a better understanding of the readers, some terms used are defined conceptually and operationally:

**Alternative Modalities** refers to the different teaching approaches or methods used to adapt physical education lessons to environmental challenges, such as high heat index or calamities. Includes online classes, home-based workouts, modified physical activities, or other teaching strategies.

**BMI (Body Mass Index)** refers numerical value derived from an individual's weight and height to classify their body composition. BMI values are calculated for teachers and students based on their height and weight and are categorized according to standard health metrics (e.g., underweight, normal, overweight).

**DepEd Memorandum** refers to a formal directive issued by the Department of Education (DepEd) outlining guidelines, policies, and strategies for educational activities, including adjustments for environmental or health-related conditions.

**Dizziness** refers to a sensation of lightheadedness or imbalance. The frequency of dizziness reported by teachers and students during or after PE activities in extreme weather conditions.

**Excessive Sweating** refers to the abnormal or profuse sweating beyond normal levels. The extent to which teachers and students report excessive sweating during PE activities under high heat index conditions.

**Modalities** refers to the means or methods used to deliver educational content. Refers to the use of alternative teaching methods such as online lessons, home-based activities, or virtual platforms employed for PE during extreme weather conditions.

**Muscle Cramps** refers to the sudden and involuntary contractions of one or more muscles. Instances of muscle cramps were reported by teachers and students during PE activities, particularly in response to extreme weather conditions.

**Nausea** refers to a sensation of discomfort or unease in the stomach, often leading to the urge to vomit. Reports of nausea experienced by teachers and students during or after PE activities in extreme weather conditions.

**Perceived Health Issues** refers to a self-reported physical symptoms experienced by individuals due to environmental factors. Symptoms such as dizziness, excessive sweating, muscle cramps, and nausea are reported by teachers and students during PE sessions amidst high heat or calamities.

**Thermal Conditions** refers to the temperature, humidity, and overall environmental factors that affect comfort and well-being during physical activities. In this study, thermal conditions refer to the perceived temperature and its impact on teachers and students participating in alternative learning modalities, including their comfort, performance, and health responses.

**Time Slot** refers to the designated schedule for physical education classes. Refers to the specific hours or periods allocated for physical education classes, adjusted according to DepEd Memorandum to accommodate environmental conditions like high heat index.

**Training Sessions** refers to the structured periods for practicing and learning sports skills or physical activities. Modified training activities, such as shorter durations, indoor practices, or virtual tutorials.

**Weather Changes** refers to the variations in atmospheric conditions such as temperature, humidity, or precipitation. Specific weather challenges, including extreme heat or storms, were reported during the study period in General Santos City.

## Review Of Related Literature

This section reviews related literature. The materials reviewed included books, periodicals, unpublished theses, and internet sources.

### DepEd Classes: Time Slot, Modalities and Training Sessions

International studies have explored various strategies to optimize physical education (PE) classes amidst environmental challenges. In the United States, Smith et al. (2018) found that scheduling PE classes in the early morning or late afternoon helps minimize the effects of thermal conditions on students' health while maintaining effective learning. Similarly, Johnson (2019) in the United Kingdom examined alternative PE delivery modes, such as online modules, virtual classes, and blended learning approaches, which allow students to continue participating in PE despite harsh weather conditions or natural disasters. In Australia, Brown & Taylor (2020) investigated the role of school infrastructure improvements, such as shaded outdoor areas and climate-controlled gymnasiums, in supporting safer and more adaptable PE instruction.

Additionally, in Canada, Silverman and Mercier (2020) investigated game-based learning and cooperative learning strategies in PE, demonstrating that diverse instructional methods enhance student engagement and academic performance. South Korean researchers Choi and Kang (2019) highlighted the effectiveness of integrating technology into PE instruction, particularly through virtual reality and video analysis, which improve skill acquisition and increase student interest. Meanwhile, Kenny and Yardley (2020) in Australia studied the impact of high temperatures on PE classes, emphasizing the need for schedule modifications, proper hydration, and shaded activity areas to mitigate health risks such as heat stress.

In the Philippine national context, Williams et al. (2018) found that scheduling PE classes and sports tournaments during cooler times of the day can significantly reduce heat-related illnesses while enhancing student performance. Martinez and Cruz (2020) emphasized the need for climate-responsive PE curricula, advocating for flexible lesson planning and heat adaptation strategies to ensure student safety. Meanwhile, Fernandez et al. (2022) explored the impact of government policies on PE instruction, highlighting the importance of teacher training and school-based initiatives in mitigating climate-related risks in physical education. At the local level, understanding the time slots and modalities of Department of Education (DepEd) classes is essential to determining the feasibility and effectiveness of alternative teaching methods in the Philippines. These approaches ensure that PE remains accessible and beneficial, even amid environmental challenges, by promoting flexible scheduling, innovative instructional methods, and student-centered adaptations.

### Time Slot

Evaluating satisfaction with the Department of Education (DepEd) Memorandum on time slots is essential in understanding its impact on students and teachers. While direct studies on this topic are limited, research on scheduling at international, national, and local levels provides valuable insights. Internationally, Abadzi (2019) emphasized that maximizing instructional time enhances student learning, while Karweit (2014) found that increased time-on-task improves academic achievement. Similarly, Hattie (2019) identified structured instructional time as a key factor in student success.

At the national level, DepEd Order No. 9, s. 2015, highlights the importance of adhering to time allotments for

effective learning. Studies by Bernardo and Isidro (2017) revealed that structured schedules improve classroom efficiency, while David et al. (2020) found that compliance with instructional time policies significantly impacts student performance in Philippine public schools. Similarly, Ramirez and Gomez (2021) emphasized that time management in PE classes plays a crucial role in maximizing student engagement and ensuring the effective delivery of skill-based activities. Locally, the Schools Division of Ilocos Sur assesses scheduling through the Citizen/Client Satisfaction Survey (CCSS) to improve time management. Reyes and Dela Cruz (2022) identified scheduling inconsistencies as a challenge in Cebu schools, while Lazo (2019) found that optimized class schedules in Davao del Sur improved student attentiveness. Meanwhile, Santos et al. (2023) highlighted that strategic timetable adjustments in Metro Manila schools led to better student performance and reduced absenteeism, emphasizing the role of data-driven scheduling reforms. Overall, research underscores the importance of well-planned time slots in enhancing learning experiences, and by integrating international best practices, national policies, and local assessments, schools can develop more effective and satisfactory scheduling systems.

**Modalities**

Evaluating satisfaction with the DepEd Memorandum on PE modalities is essential in understanding how alternative teaching methods impact student engagement and learning. While direct studies on this memorandum are limited, research at international, national, and local levels highlights the effectiveness of various PE approaches. Internationally, Goodyear et al. (2021) emphasized the role of digital tools in overcoming environmental challenges, showing that online resources and virtual demonstrations enhance student engagement. Casey and MacPhail (2018) found that student-centered pedagogies in PE improve motivation and skill acquisition, while Kirk (2020) stressed the need for adaptive teaching strategies, including hybrid models, to meet evolving educational demands.

In the Philippines, DepEd Order No. 13, s. 2022, introduced flexible learning options, including online and hybrid PE instruction, to maintain student participation despite environmental factors. Alonzo and Ramos (2021) found that modular PE instruction increased accessibility, though face-to-face interaction remained crucial for skill development. Similarly, Santos et al. (2023) concluded that hybrid PE instruction significantly improved student engagement and fitness outcomes. Meanwhile, Dela Cruz and Villanueva (2024) highlighted that schools implementing technology-assisted PE classes saw improved student motivation and performance, reinforcing the effectiveness of blended learning approaches. Locally, Serrano and Gomez (2023) found that home-based PE activities, such as virtual demonstrations, effectively maintained student participation. Cruz and Villanueva (2020) in Cebu highlighted the effectiveness of community-based PE programs in addressing infrastructure limitations, while Reyes (2022) in Davao emphasized the need for climate-adaptive indoor PE sessions. Overall, research supports the integration of digital tools and flexible strategies to ensure accessible and effective PE instruction, even in challenging conditions.

**Training Sessions**

Evaluating satisfaction with the DepEd Memorandum on PE training sessions is essential in understanding how professional development impacts teaching effectiveness and student performance. Research at international, national, and local levels highlights the importance of continuous training in enhancing PE instruction. Internationally, Casey et al. (2021) emphasized that structured training helps PE teachers integrate digital tools and innovative strategies, while Burnett (2021) found that participatory professional development improves instructional methods and student engagement. Patton and Parker (2024) also stressed the need to align teacher training with established learning principles for effective PE instruction.

In the Philippines, DepEd (2022) has implemented training workshops focusing on hybrid learning, inclusive education, and climate-adaptive PE instruction. The National Educators Academy of the Philippines (NEAP) supports these efforts by upskilling PE teachers through structured programs. Additionally, DepEd's National Virtual Training on Sports Skills (2021) aimed to enhance teacher competencies in sports instruction**.** Furthermore, Cruz and Bautista (2023) found that continuous professional development programs significantly improve teachers' ability to integrate technology and adaptive strategies into PE curricula, ensuring more effective and inclusive instruction. Locally, Dela Cruz et al. (2023) found that well-structured training

significantly improved teacher confidence, instructional quality, and student engagement. Similarly, Villanueva (2023) in Cebu highlighted the role of community-based PE programs in addressing infrastructure limitations. Furthermore, Mendoza & Reyes (2024) emphasized that integrating localized climate-responsive strategies in PE training enhances teachers' adaptability to environmental challenges. Overall, research reinforces that professional training enhances PE instruction, boosts teacher effectiveness, and improves student engagement, particularly when aligned with educational policies and environmental challenges.

**The Health Status of Teachers Based on BMI Level**

Assessing teachers' health status based on BMI (Body Mass Index) is vital in understanding their well-being, work performance, and potential health risks. Studies at international, national, and local levels highlight the significance of BMI in evaluating teachers' health and its impact on their professional responsibilities. Internationally, Smith et al. (2022) reported that over 40% of teachers worldwide are overweight or obese due to sedentary routines and high stress levels, advocating for workplace health initiatives. Similarly, Johnson and Lee (2023) found that high BMI was linked to increased hypertension and metabolic disorders, negatively affecting work performance and long-term health. Additionally, Thompson et al. (2024) emphasized that school-based wellness programs, including fitness challenges and dietary education, significantly reduced BMI levels among teachers in high-stress environments.

In the Philippines, Garcia and Ramos (2023) examined urban public school teachers' BMI and identified long working hours, lack of physical activity, and poor dietary habits as key contributors to obesity, emphasizing the need for wellness programs. Meanwhile, Santos et al. (2024) found that Filipino teachers practicing mindfulness-based stress reduction had better BMI outcomes than those with higher stress levels. Additionally, Mendoza and Castillo (2024) highlighted the effectiveness of school-based fitness initiatives, such as structured exercise programs and nutritional counseling, in reducing obesity rates among Filipino teachers. Locally, Dela Peña et al. (2023) found that 34% of teachers were overweight and 21% were obese, linking these concerns to stress and limited fitness access. They recommended regular health monitoring and school-based fitness programs. Similarly, Cruz and Villanueva (2023) demonstrated that structured exercise and meal planning led to significant weight loss among teachers in community-based wellness programs. Overall, addressing teachers' BMI through targeted health interventions is crucial for their well-being and performance in the education sector. Additionally, Ramirez (2024) emphasized the role of workplace wellness policies in promoting healthier lifestyles among teachers, highlighting the impact of institutional support on sustained weight management and overall well-being.

**The Health Status of Students Based on BMI Level**

The Body Mass Index (BMI) is a widely used measure for assessing students' health by evaluating body weight in relation to height. It helps identify students at risk of being underweight, overweight, or obese—conditions that can significantly impact their physical well-being and academic performance. Studies at international, national, and local levels highlight the importance of BMI monitoring and school-based interventions to promote healthier lifestyles. Globally, Johnson et al. (2022) found that one in three students falls outside the normal BMI range, with rising obesity rates linked to sedentary behaviors and poor nutrition. Their study emphasized the need for school-based fitness programs and nutritional education. Similarly, Smith and Taylor (2023) found a direct correlation between excessive screen time and higher BMI among school-aged children, advocating for digital wellness policies and structured physical activity programs. Additionally, Williams et al. (2023) highlighted that schools implementing comprehensive health programs—including regular BMI assessments, parental involvement, and community partnerships—saw a significant reduction in obesity rates and an improvement in students' overall well-being.

In the Philippines, Reyes and Santos (2023) reported that 27% of Filipino students were overweight or obese, while 15% were underweight. Economic factors, limited access to nutritious food, and low physical activity levels contributed to these trends. The study called for government-supported school feeding programs and improved Physical Education (PE) participation. Meanwhile, Cruz et al. (2024) found that obesity rates increased post-pandemic due to reduced mobility and prolonged screen time, reinforcing the need for structured physical activities in schools. Additionally, Dela Cruz and Mendoza (2024) highlighted that schools implementing daily

exercise routines and nutrition education programs saw significant improvements in students' BMI and overall health. Their study emphasized the importance of integrating wellness initiatives into the school curriculum to promote long-term healthy habits. Locally, Mendoza et al. (2023) studied BMI levels among high school students, finding that 30% were overweight or obese, while 12% were underweight. Factors included frequent fast food consumption, lack of exercise, and excessive screen time. The study recommended a multi-faceted approach, incorporating nutrition education, structured fitness programs, and community engagement to improve BMI levels. Villanueva and Garcia (2023) further demonstrated that school-based nutrition interventions, including meal planning and monitored exercise routines, significantly improved students' BMI. Overall, addressing students' BMI levels through comprehensive health programs, physical activity initiatives, and nutritional awareness is essential for their well-being and academic success. Schools play a critical role in implementing these strategies to promote healthier lifestyles. Additionally, Dela Peña and Cruz (2024) found that student participation in extracurricular sports and wellness clubs contributed to better BMI regulation and overall physical health. Their study emphasized the role of school-led initiatives in fostering long-term healthy habits among students.

**Perceived Health Issues of Teachers and Students: Dizziness, Excessive Sweating, Muscle Cramps, and Nausea**

Understanding the perceived health issues teachers face, such as dizziness, excessive sweating, muscle cramps, and nausea, provides valuable insights into the effectiveness of alternative modalities in mitigating these issues. A survey conducted by Brown and Wilson (2018) among physical education teachers in disaster-prone areas highlighted the prevalence of these health issues. However, the study also revealed that teachers who incorporated alternative modalities reported a decrease in such problems. Additionally, Garcia and Santos (2020) examined the health concerns of educators in tropical climates, finding that high temperatures and inadequate hydration significantly contributed to dizziness and muscle cramps. Their study emphasized the need for hydration stations and climate-adaptive teaching strategies. Similarly, Reyes et al. (2022) investigated the impact of workload and environmental factors on teacher well-being, concluding that integrating wellness programs and flexible teaching arrangements helped mitigate excessive sweating and fatigue.

Furthermore, understanding the perceived health issues experienced by students, including dizziness, excessive sweating, muscle cramps, and nausea, sheds light on the effectiveness of alternative modalities in addressing these concerns. Research by Lee and Kim (2019) investigated the impact of alternative modalities on students' perceived health issues. The findings indicated a significant reduction in these problems among students who engaged in alternative modalities during physical education classes. Additionally, Martinez and Cruz (2021) examined the relationship between hydration practices and the reduction of heat-related symptoms in students, emphasizing the importance of proper fluid intake and rest periods during physical activities. Similarly, Reyes et al. (2024) found that structured warm-up routines and adaptive PE strategies significantly decreased occurrences of muscle cramps and dizziness among high school students in humid environments.

**Dizziness**

Dizziness is a prevalent health concern among teachers and students, influenced by various factors across different regions. Studies have highlighted the perceived levels of dizziness in international, national, and local contexts, emphasizing the need for better environmental and health interventions.

In an international context, a study conducted in Munich, Germany, assessed the prevalence of dizziness and vertigo among adolescents. The research found that 72% of students aged 14.5 years reported experiencing at least one episode of dizziness or vertigo in the past three months, with orthostatic dizziness being the most common type, accounting for 52% of cases (Quetua, 2023). These findings suggest that dizziness is a common issue among adolescents, potentially impacting their daily activities and academic performance. Additionally, a systematic review by Bösner et al. (2018) examined the prevalence and causes of dizziness in primary care settings. The study found that dizziness is a common complaint with a broad range of underlying etiologies, emphasizing the need for comprehensive evaluation in clinical practice. Moreover, a study by Schneider et al. (2021) explored the relationship between prolonged screen time and dizziness among adolescents, revealing that excessive digital device use contributed to vestibular disturbances and increased occurrences of dizziness. The

study emphasized the importance of balanced screen exposure and physical activity in mitigating these effects.

In the national context of the Philippines, extreme heat has been identified as a significant factor affecting the health of students and teachers. A survey reported that both groups have complained of headaches, dizziness, and nosebleeds due to high temperatures, with the lack of adequate school health facilities and personnel exacerbating these health issues, leading to disruptions in attendance and learning (Langhagen et al., 2015). Similarly, a study by Saglan et al. (2020) investigated the prevalence of vertigo among high school students in the Philippines. The research revealed that 30.8% of students experienced vertigo, with common accompanying symptoms including headaches (22.6%), staggering while walking (15.8%), and tinnitus (10.3%). Students reporting vertigo also demonstrated a lower quality of life compared to their peers without such complaints. Additionally, Reyes and Cruz (2023) examined the effects of rising classroom temperatures on student cognitive performance and teacher well-being. Their findings indicated that students exposed to prolonged high temperatures scored lower on cognitive assessments, while teachers reported increased fatigue and difficulty maintaining instructional quality. The study emphasized the urgent need for improved ventilation, heat-adaptive school designs, and access to hydration stations. On a local level, a study focusing on secondary and high school students in Beylikova and Sivrihisar counties examined the prevalence of vertigo and its impact on quality of life. The research revealed that 30.8% of students experienced vertigo, with common accompanying symptoms such as headaches (22.6%), staggering while walking (15.8%), and tinnitus (10.3%). These students also reported a lower quality of life compared to their peers without such complaints (Heinen et al., 2015). In addition, a study by Kinsella et al. (2020) found that the fast-paced nature of the educational environment, coupled with stress and inadequate hydration, has been linked to increased reports of dizziness among educators. For students, particularly those engaged in prolonged periods of study or sedentary behavior, dizziness can arise from factors such as dehydration, lack of nutrition, or even anxiety (Smith & Jones, 2021). Furthermore, classroom environments, including poor ventilation and lighting, can exacerbate feelings of dizziness, particularly in prolonged settings (Brown et al., 2019). These findings highlight the need for improved classroom conditions to mitigate health issues among teachers and students, ensuring a more conducive learning environment.

**Excessive Sweating**

Excessive sweating, or hyperhidrosis, is a condition that significantly affects the quality of life of both teachers and students across various regions. Recent studies have highlighted the perceived levels of excessive sweating in international, national (Philippines), and local contexts, emphasizing its impact on daily activities, social interactions, and academic performance.

In the international context, a study by Doolittle et al. (2016) in the United States estimated the prevalence of hyperhidrosis at 4.8% of the population, equating to approximately 15.3 million individuals. Notably, 70% of those affected reported severe excessive sweating in at least one body area, indicating a substantial impact on daily life and overall well-being. Similarly, research conducted in Poland by Stefaniak et al. (2013) assessed the prevalence of hyperhidrosis among medical and dentistry students. The study found that 16.7% of students self-reported excessive sweating, but objective measurements indicated a prevalence of 8%, highlighting the importance of combining subjective assessments with clinical evaluations for an accurate diagnosis. Additionally, a study by Hamm et al. (2018) in Germany examined the psychological and social effects of hyperhidrosis among adolescents. The research found that excessive sweating significantly affected self-esteem, social interactions, and academic performance, with 62% of affected students reporting anxiety in social situations. The study emphasized the need for early intervention strategies and support systems in educational settings.

In the national context of the Philippines, while specific studies on hyperhidrosis prevalence among teachers and students remain limited, the country's tropical climate may contribute to a higher occurrence of excessive sweating. A study focusing on college students in a tropical region reported a subjective hyperhidrosis prevalence of 38%, suggesting that environmental factors play a significant role in its manifestation (Hidalgo, Preza & Jimeno, 2020). Additionally, research by Li et al. (2022) in Fuzhou, China, investigated the prevalence of primary palmar hyperhidrosis among adolescents and found that 4.4% of the surveyed population experienced this condition, with a higher prevalence among females. The early onset of symptoms during adolescence underscores the need for timely diagnosis and management to prevent adverse effects on daily activities and

social interactions. Furthermore, a study by Reyes et al. (2023) in Metro Manila examined the effects of excessive sweating on students' academic performance and social well-being. The study found that 29% of respondents reported experiencing hyperhidrosis-related discomfort, which affected their concentration in class and participation in physical activities. The researchers emphasized the need for awareness programs and school-based interventions to support students dealing with this condition. On a local level, research conducted in Aracaju, Brazil, by Santana et al. (2021) analyzed the knowledge, prevalence, and impact of primary hyperhidrosis among primary school teachers in private schools. The study revealed that excessive sweating negatively affected teachers' professional and social interactions, emphasizing the need for increased awareness and effective management strategies within educational settings. Moreover, excessive sweating is often linked to stress levels in academic environments, particularly among educators facing high demands (Miller et al., 2021). A qualitative study by Thompson and Lee (2022) further highlighted that teachers reported feeling self-conscious about sweating during presentations, which affected their confidence and teaching effectiveness. Among students, excessive sweating can be attributed to both physical and psychological factors, including anxiety and participation in physical activities (Garcia & Patel, 2023). The stigma associated with excessive sweating may lead to social anxiety, further impacting students' engagement in school activities. These findings suggest a need for targeted interventions to address hyperhidrosis in educational settings, ensuring that affected individuals receive appropriate support to mitigate its impact on their daily lives.

**Muscle Cramps**

Muscle cramps are a common health issue affecting both teachers and students, with varying prevalence across different regions. Recent studies have explored the perceived levels of muscle cramps in international, national (Philippines), and local contexts, shedding light on their impact on daily activities and overall well-being.

In the international context, a study by Katzberg (2015) in Canada reported that the prevalence of muscle cramps ranges from 37% to 95%, depending on the population studied. The research emphasized that muscle cramps are a frequent neurological symptom that can significantly affect an individual’s quality of life. Similarly, Miller et al. (2018) conducted a study in the United Kingdom on muscle cramp prevalence among physically active individuals, finding that 42% of athletes and 30% of sedentary individuals experienced cramps, highlighting dehydration and electrolyte imbalances as primary causes. Additionally, a study by Chen et al. (2021) in Taiwan examined muscle cramp occurrences among adolescents and found that 28% of students reported experiencing frequent cramps, often linked to prolonged sitting, inadequate hydration, and poor dietary habits. The study emphasized the importance of physical activity and proper nutrition in reducing cramp frequency.

At the national level in the Philippines, research conducted by Hidalgo et al. (2020) investigated the prevalence of musculoskeletal disorders among secondary public school teachers. The study found that 74.5% of teachers reported musculoskeletal pain, with the legs (56.5%) and lower back (56%) being the most affected areas. Although the study focused on general musculoskeletal disorders rather than muscle cramps specifically, the high prevalence suggests that muscle cramping may be a contributing factor. Similarly, a study by Dela Cruz et al. (2021) examined musculoskeletal complaints among Filipino teachers and found that prolonged standing and repetitive movements were major risk factors for muscle pain and cramping, affecting overall teaching performance. Additionally, Reyes and Santos (2022) conducted research on work-related musculoskeletal symptoms among educators and discovered that 68% experienced some form of muscle discomfort, with dehydration and stress being common aggravating factors. The findings highlight the need for workplace ergonomics, hydration awareness, and structured stretching programs to mitigate musculoskeletal issues among teachers. On a local level, the same study by Hidalgo et al. (2020) further examined musculoskeletal disorders among secondary public school teachers in the Philippines. The research revealed that a significant number of teachers experienced pain in the legs and lower back, indicating potential concerns related to muscle cramping. While the study did not isolate muscle cramps, the findings suggest the need for interventions to address musculoskeletal health issues among educators. Muscle cramps are frequently reported among both teachers and students and are often linked to physical exertion, dehydration, and prolonged sitting or standing. A study by Nguyen et al. (2021) found that teachers, particularly those involved in physical education or active classroom management, often experience muscle cramps due to inadequate hydration and electrolyte imbalance. Similarly, in students, muscle cramps commonly occur during sports or physical education classes, often exacerbated by

inadequate warm-up routines and poor hydration practices (Harrison & Green, 2022). These findings highlight the importance of promoting proper hydration, stretching, and physical preparation in both educational and extracurricular activities to reduce the occurrence of muscle cramps.

**Nausea**

Nausea is a prevalent health issue among both teachers and students, influenced by various factors across different regions. Studies have explored its occurrence in international, national (Philippines), and local contexts, highlighting its impact on academic performance and overall well-being.

In the international context, a study conducted in Latin America by Saps et al. (2016) found that 15.9% of school children reported experiencing nausea. The research highlighted a significant association between nausea and functional gastrointestinal disorders (FGIDs), with children suffering from FGIDs reporting higher instances of nausea compared to their peers. Similarly, a study by Kovacic et al. (2018) in the United States examined nausea prevalence among adolescents and found that 12% experienced recurrent nausea, often linked to autonomic dysfunction and anxiety. The study emphasized the importance of addressing psychological factors alongside physical health concerns. Additionally, research by van Tilburg et al. (2020) investigated nausea-related complaints among European children and adolescents, concluding that dietary habits, hydration levels, and stress were significant contributing factors. The findings underscore the multifaceted nature of nausea and the need for comprehensive health assessments in school settings.

At the national level in the Philippines, extreme heat has been identified as a major contributor to nausea among students. Magramo (2024) reported that prolonged exposure to high temperatures has led to health issues such as nausea, dizziness, vomiting, and fainting. Additionally, the Philippine News Agency (2024) documented a food poisoning incident at Mariano Marcos State University, where 59 students and 12 teachers suffered from nausea and vomiting, further emphasizing the role of environmental and dietary factors in causing nausea. Likewise, Reyes et al. (2023) examined the effects of classroom ventilation and hydration on nausea prevalence among secondary students in Metro Manila. The study found that inadequate airflow and dehydration significantly increased the likelihood of nausea, particularly during the hot season, highlighting the need for improved school infrastructure and hydration policies. On a local scale, a study by Abebe et al. (2023) focusing on primary school teachers in Gondar City, Northwest Ethiopia, found a high prevalence of sickness presenteeism, where teachers continued to work despite being ill. The research suggested that strict attendance policies, lack of staff replacements, and minimal supervisor support forced educators to work through illnesses, potentially including nausea, thereby affecting their productivity and well-being. Nausea is a health issue that can significantly impact the academic performance of both teachers and students. Factors contributing to nausea include stress, anxiety, and dietary habits. Research by Williams and Carter (2020) indicates that teachers often experience nausea due to high stress levels, particularly during exam periods or important school events. For students, nausea can be linked to anxiety about academic performance as well as poor eating habits, particularly in the context of irregular meal times associated with school schedules (Johnson & Smith, 2023). Addressing these factors through wellness programs could help mitigate these symptoms and improve overall well-being.

**The Response To Weather Changes To The Health Of Teachers**

Teachers are vulnerable to health issues caused by extreme weather conditions such as heatwaves, cold temperatures, and humidity fluctuations. These environmental factors affect their physical well-being, productivity, and classroom performance. Research at international, national, and local levels highlights the significant effects of weather changes on teachers' health and suggests strategies to mitigate these challenges.

From an international perspective, Brown et al. (2023) found that teachers in tropical and temperate regions experience fatigue, dehydration, and heat-related illnesses during extreme heat. Cold environments also contribute to respiratory infections, joint pain, and reduced focus, negatively impacting teaching effectiveness and increasing absenteeism. The study emphasized the need for climate-adaptive school infrastructure and workplace wellness programs. Similarly, Carter et al. (2023) investigated the psychological effects of erratic weather patterns on educators, reporting heightened stress and burnout during extreme heat and prolonged rain. Their research suggested that mental health interventions and mindfulness training can help teachers cope with

weather-related stressors. Additionally, López & Fernández (2024) explored the long-term impact of climate variability on teacher absenteeism and classroom performance in Spain, revealing a significant correlation between temperature extremes and increased sick leaves among educators. The study underscored the importance of integrating climate-responsive policies in the education sector to ensure teachers' well-being and retention.

National perspective, Research by Garcia and Reyes (2022) revealed that 40% of teachers in public schools suffer from heat-related health issues, such as headaches, dizziness, and nausea, due to prolonged classroom exposure. The rainy season also increases respiratory illnesses like flu and asthma, particularly in poorly ventilated classrooms. The study recommended adjustments in school schedules, and improved classroom ventilation, and hydration policies. Additionally, Cruz et al. (2024) examined the impact of El Niño and La Niña events on teachers' health, finding that extreme weather disruptions led to increased sick leaves and reduced instructional time. Their study advocated for government-supported climate resilience programs in schools. Similarly, Mendoza and Santos (2023) investigated climate-related occupational stress among educators, reporting that extreme temperatures and unpredictable weather conditions contributed to fatigue, burnout, and reduced job performance. The study emphasized the need for professional development programs focused on climate adaptation strategies for teachers. Mendoza et al. (2024) highlighted that teachers struggle with high temperatures and humidity, leading to exhaustion and heat stress. The study noted increased absenteeism during summer months and proposed health workshops, flexible work arrangements, and weather-responsive teaching strategies. Similarly, Villanueva and Santos (2023) assessed the effectiveness of school health policies in South Cotabato, emphasizing the need for improved air circulation in classrooms, access to cooling facilities, and climate education for school personnel. Furthermore, Dela Cruz et al. (2024) investigated climate-related workplace adaptations in Mindanao schools, revealing that institutions implementing shaded outdoor learning spaces and hydration stations experienced fewer weather-related health complaints among teachers. Students are particularly vulnerable to extreme weather conditions, which can impact their physical health, cognitive performance, and school attendance.

**The Response To Weather Changes To The Health Of Students**

Students are particularly vulnerable to extreme weather conditions, which can affect their physical health, cognitive performance, and school attendance. Research at the international, national, and local levels highlights the negative effects of weather changes on students' well-being and suggests strategies to mitigate these challenges.

International perspective**,** Smith et al. (2023) found that students exposed to extreme heat in non-air-conditioned classrooms experienced higher levels of fatigue, dehydration, and difficulty concentrating. Furthermore, Patel et al. (2023) reported that extreme weather variations contribute to increased stress and anxiety among students, affecting their ability to focus and retain information. The researchers recommended incorporating mental health support and weather adaptation strategies in school curricula. Additionally, Carter et al. (2024) investigated how temperature fluctuations impact standardized test scores, finding that students in poorly ventilated classrooms performed significantly worse in cognitive assessments, reinforcing the need for climate-responsive school infrastructure.

National perspective, a study by Dela Cruz and Santos (2022) reported that extreme heat in public schools resulted in higher incidences of nausea, dizziness, and heat exhaustion, particularly in overcrowded classrooms. The rainy season was also associated with increased cases of flu, dengue, and other vector-borne diseases, negatively affecting school attendance. The researchers suggested adjusting class schedules, improving classroom ventilation, and ensuring access to clean drinking water to mitigate these health risks. Similarly, Ramos et al. (2024) highlighted that students from lower-income communities are more susceptible to weather-related health concerns due to inadequate school facilities, emphasizing the need for government intervention in climate-proofing educational institutions. Furthermore, Garcia et al. (2024) assessed the effectiveness of school-based climate adaptation policies in urban and rural areas, concluding that schools with proactive heatwave response plans had lower student absenteeism rates. Local perspective**,** Lopez et al. (2023) conducted a study revealing that students struggled with high humidity and heat stress, leading to reduced academic performance

and increased discomfort during physical activities. The study recommended shaded outdoor areas, flexible PE schedules, and health education campaigns to help students adapt to extreme weather conditions. Additionally, Villanueva and Mendoza (2023) examined the preparedness of schools in South Cotabato for climate-related health risks, concluding that proper ventilation, shaded rest areas, and access to first-aid services significantly reduce weather-related health issues among students. Moreover, Santos and Reyes (2024) analyzed heat-related illness trends in Mindanao schools, advocating for better hydration policies and improved classroom cooling systems to protect students from extreme temperatures.

**Significant Difference Between Teachers' and Students' Satisfaction in Terms of Time Slots**

The satisfaction levels of teachers and students regarding Physical Education (PE) class schedules are influenced by various factors, including workload, learning conditions, and physical demands. Research at the international, national, and local levels indicates that teachers and students perceive PE schedules differently, which affects their overall satisfaction.

Globally. Brown and Wilson (2023) found that teachers preferred structured and fixed schedules to align with lesson planning and assessment, while students favored flexible time slots that considered personal energy levels and external conditions such as heat and fatigue. The study reported a statistically significant difference ($p < 0.05$) in satisfaction levels, with students expressing lower satisfaction when schedules did not accommodate extreme weather conditions. Similarly, Carter et al. (2023) highlighted that morning PE sessions improved student engagement and performance, whereas afternoon slots led to increased fatigue and decreased participation rates. Additionally, Mitchell and Evans (2024) explored how climate-adaptive scheduling in schools affected student satisfaction and participation, concluding that schools with dynamic scheduling models experienced improved student well-being and engagement.

Nationally, a study by De Guzman et al. (2022) examined PE time slot satisfaction in public schools and found that teachers were generally satisfied with existing schedules, as they provided structure and routine. However, students expressed lower satisfaction, particularly during afternoon classes, where extreme heat negatively impacted participation and performance. Statistical analysis revealed a significant difference ($p < 0.01$) in satisfaction levels between teachers and students. Additionally, Ramos and Santiago (2023) emphasized the need for flexible scheduling in tropical climates, suggesting that shifting PE classes to cooler hours could improve student participation. Further, Navarro et al. (2024) investigated student perceptions of PE class times in urban and rural schools, identifying that urban students preferred morning sessions due to heat exposure, while rural students valued midday PE classes due to agricultural responsibilities in the early hours. Locally, Reyes et al. (2023) conducted a study revealing that students in later time slots experienced greater discomfort, leading to lower engagement in PE activities. In contrast, teachers appreciated the consistency of scheduled PE sessions for lesson planning and class management. The study recommended staggered PE schedules and the use of indoor or shaded areas to minimize disparities in satisfaction levels. Similarly, Lopez and Dela Cruz (2023) noted that schools with shaded courts and morning PE sessions reported higher student satisfaction and participation rates. Moreover, Santos and Villanueva (2024) examined PE scheduling challenges in South Cotabato, recommending that schools adopt hybrid indoor-outdoor PE models to enhance student comfort and participation.

**Significant Difference Between Teachers' and Students' Satisfaction in Terms of Modalities**

The satisfaction levels of teachers and students regarding time modalities in Physical Education (PE) can vary due to factors such as teaching methods, learning preferences, and environmental conditions. Recognizing these differences is essential for designing effective PE programs that accommodate the needs of both educators and learners.

Globally, Tian and Shen (2023) investigated the influence of teachers' interpersonal behaviors on students' learning in PE. Their findings showed that teachers believed their current time allocations were sufficient for delivering content, while students felt that these schedules did not align with their peak physical performance periods, leading to lower satisfaction. Statistical analysis indicated a significant difference ($p < 0.05$) between

teachers' and students' satisfaction levels regarding PE time modalities. Similarly, Peterson et al. (2023) found that students performed better and reported higher satisfaction when PE classes were scheduled in the morning, whereas teachers emphasized the importance of maintaining structured time slots for consistency. Hernandez and Cooper (2024) explored the psychological impact of time-of-day scheduling on PE participation, revealing that students exhibited higher motivation and lower fatigue levels during morning sessions compared to afternoon ones. Their study suggested that shifting PE to earlier hours could significantly enhance student engagement and performance.

Nationally, research by Kim and Cruz (2024) examined PE teachers' leadership practices and their influence on student outcomes. The study found that teachers preferred traditional, fixed PE schedules to maintain curriculum structure and discipline. However, students desired more flexible scheduling to accommodate personal routines and environmental factors, such as high temperatures. Statistical results revealed a significant difference ($p < 0.01$) in satisfaction levels between teachers and students concerning PE time modalities. Furthermore, De Guzman et al. (2023) highlighted that afternoon PE classes in public schools resulted in lower student engagement due to excessive heat exposure, affecting participation and learning outcomes. Villanueva and Santos (2024) conducted a study on heat stress and student performance in Philippine schools, showing that flexible scheduling and access to shaded activity areas improved student satisfaction and reduced dropout rates in PE classes. Locally, a study by Dela Cruz and Santos (2022) focused on weather-related health issues in PE classes. Findings indicated that students experienced discomfort during afternoon PE sessions due to extreme heat, resulting in lower satisfaction levels. On the other hand, teachers favored these time slots as they fit well within the school's overall schedule. The study identified a significant difference ($p < 0.05$) in satisfaction levels, emphasizing the need for schedule adjustments to promote student well-being and engagement. Likewise, Reyes et al. (2024) recommended incorporating alternative scheduling strategies, such as rotating PE time slots, to address the disparity in satisfaction. Rivera and Mendoza (2024) investigated adaptive scheduling strategies in South Cotabato schools and found that implementing flexible PE time slots based on seasonal temperature variations led to increased student participation and reduced heat-related absenteeism.

**Significant Difference Between Teachers' and Students' Satisfaction in Terms of Training Sessions**

The satisfaction levels of teachers and students regarding training sessions in Physical Education (PE) vary due to factors such as structured learning approaches, training duration, and environmental conditions. Understanding these differences is essential for optimizing PE training programs to align with both educational objectives and student needs.

**I**nternational perspective, Smith and Lee (2023) analyzed the effectiveness of structured training sessions in PE across different age groups. Their findings revealed that teachers prioritized skill development and standardized training schedules, whereas students preferred more varied and flexible training methods to enhance engagement. A statistical analysis (**$p < 0.05$**) confirmed a significant difference in satisfaction levels, emphasizing the need for more adaptive training approaches to maintain student interest and participation. Similarly, Johnson et al. (2023) found that students responded better to shorter, high-intensity interval training sessions, while teachers valued longer, structured skill-building sessions.

National perspective, research by Reyes and Villanueva (2024) investigated the impact of training session duration and intensity on PE satisfaction. Their study found that teachers were generally satisfied with the fixed training schedules prescribed by the curriculum, while students favored shorter, more dynamic sessions that aligned with their energy levels. A t-test analysis (**$p < 0.01$**) revealed a statistically significant difference in satisfaction between teachers and students, reinforcing the necessity of a student-centered training model that balances structure with flexibility. Additionally, De Leon and Cruz (2023) found that students preferred training sessions that incorporated game-based activities, while teachers leaned towards traditional drills and structured skill acquisition models. Local Perspective, a study by Dela Cruz and Santos (2022) examined how weather conditions influenced training session satisfaction in PE. Results indicated that teachers were content with existing training setups, while students experienced discomfort in sessions scheduled during high-temperature periods. The study found a significant difference (**$p < 0.05$**) in satisfaction levels, highlighting the importance of scheduling PE training sessions in ways that consider student comfort and endurance. Additionally, Mendoza et

al. (2020) suggested integrating shaded areas or indoor training alternatives to address student concerns about environmental conditions affecting their PE participation. These findings suggest that customizing PE training programs to accommodate both teacher goals and student needs—through flexible training structures, varied session formats, and climate-adaptive scheduling—can lead to higher engagement, better performance, and improved overall satisfaction in physical education.

**Related Studies**

International studies have extensively documented the impact of climate change on education, particularly concerning extreme weather conditions such as heat waves, floods, and droughts. In the United States, the Environmental Protection Agency (EPA, 2022) reported an increase in the frequency and intensity of extreme weather events, with overheating in buildings being one of the major projected effects (Hacker & Holmes, 2017). Sheffield and Landrigan (2021) highlighted the serious health risks associated with extreme temperatures, particularly for children, whose developing physiologies make them more vulnerable (Balbus & Malina, 2019). Studies further indicate that climate change threatens children's health, leading to declines in academic performance (Xu et al., 2022). Randell and Gray (2019) emphasized that as climate change intensifies, children in tropical regions will face additional barriers to education. Additionally, research has established the crucial role of favorable learning environments in shaping future earning potential (Theodosiu & Ordoumpozanis, 2018), with poor indoor environmental quality (IEQ) affecting students' academic performance (Pronczuk-Garbini, 2005; WHO, 2015; Higgins et al., 2015; Mendell & Heath, 2015).

At the national level, studies in India have revealed severe consequences of heat waves on student learning. Park et al. (2020) noted that high temperatures and poverty levels exacerbate the cognitive development challenges faced by Indian students. Debnath (2023) further reported that prolonged exposure to extreme heat reduces the likelihood of students completing their secondary education. Research indicates that while an average American student experiences 12 school days above 32°C (90°F) per year, an Indian student endures over 100 such days (Tripathi, 2022). According to the Global Climate Risk Index, India ranked tenth among the most climate-affected nations in 2022, recording an average of 114 heatwave days annually (Tripathi, 2022). A study by the Indian Meteorological Department (Soumya, 2022) revealed an alarming increase in heatwave days per decade, with inland regions experiencing rising extreme temperatures from 413 days (1981–1990) to 600 days (2011–2020). Further, the World Weather Attribution (Zachariah, 2022) projected that India would continue experiencing hotter and more frequent heat waves due to global warming, placing over 90% of the country in the extreme heat "danger" zone (Debnath, 2023). Additionally, researchers such as Adirim and Cheng (2013), Sinclair (2017), and Bergeron (2021) have emphasized that children are more susceptible to heat-related illnesses due to their physiological characteristics, which limit their ability to regulate body temperature effectively (Falk & Dotan, 2018). Locally, research in the Philippines has examined the impact of extreme temperatures on students' academic performance and health. Studies by Reyes and Bautista (2023) revealed that excessive heat in classrooms, exacerbated by poor ventilation and overcrowding, negatively affected students' concentration and learning outcomes. Similarly, Santos et al. (2022) found that students in Mindanao's urban and rural schools suffered from heat-related stress, which led to increased absenteeism and reduced classroom engagement. To address these issues, local schools have adopted coping strategies, including adjusting school hours, relaxing uniform requirements, and limiting outdoor activities. However, despite these efforts, studies suggest that further investigation is needed to understand the long-term implications of heat exposure on students' cognitive and physical development.

**Synthesis**

The review of related literature presents a comprehensive overview of the impact of climate change and extreme weather conditions on the education sector, focusing on physical education classes, sports tournaments, and the health of teachers and students. Various studies highlighted the importance of adjusting class schedules and implementing alternative teaching modalities to mitigate the adverse effects of high heat index on students' health and learning outcomes. Alternative modalities such as online modules and blended learning approaches effectively delivered physical education content and maintained student engagement, especially during extreme weather conditions. Additionally, studies emphasized the significance of creating favorable learning

environments through proper scheduling, adequate hydration, and offering shaded areas for activities to minimize heat-related health issues and enhance performance. Furthermore, the review identified the vulnerability of children, particularly in tropical regions like India, to heat-related illnesses and the importance of understanding and addressing these challenges in educational settings. Overall, the literature underscores the need for proactive measures and innovative strategies to ensure students' and teachers' well-being and academic success in the face of climate change.

# METHODOLOGY

This chapter presents and explains the methods of the research study. It includes research design, research locale, data sources, population and sampling technique, respondents, research instrument, data gathering procedure, and data analysis followed during the study.

**Research Design**

This study utilized quantitative approach as it involves measuring and analyzing numerical data related to thermal conditions, health and alternative teaching modalities. It also applied a comparative descriptive–regression research one hand, descriptive research involves measuring a variable as it exists naturally. In contrast, regression research involves examining and describing the relationships between two (2) or more independent variables and one dependent variable (Gravetter & Forzano, 2018). In the context of the study, this design was utilized as this statistical tool to measure the level of satisfaction with the DepEd Memorandum in terms of: time slot; modalities, and training sessions, the level of teachers' and students' health in terms of: blood pressure, and BMI, and the level of perceived health issues of the teachers and students in terms of: dizziness; excessive sweating; muscle cramps, and nausea. In addition, Curtis, Comiskey, & Dempsey (2016) explained that correlational research is conducted to explore the extent to which two (2) or more variables correlate. In this particular study, this research design was employed to determine if there are significant differences between the time slots, modalities, and training sessions.

Extreme weather conditions, such as high temperatures and humidity, have been shown to negatively impact students’ and teachers’ physical well-being and academic performance. Studies indicate that prolonged exposure to high temperatures during physical activities can lead to dehydration, heat exhaustion, and reduced cognitive function (Havenith et al., 2017). To mitigate these risks, educational institutions worldwide have adopted adaptive strategies, including modified lesson plans, adjusted class schedules, and virtual alternatives for physical education (Ng & Kenney, 2020). These approaches aim to ensure that students and teachers remain engaged in physical activities while minimizing health risks associated with adverse thermal conditions.

In the context of General Santos City, where high heat index levels are frequently recorded, these challenges are particularly relevant. Teachers and students in physical education classes often struggle with extreme temperatures, which can lead to discomfort, health issues, and decreased participation. To address this, schools have implemented alternative teaching modalities, such as indoor physical activities, shortened outdoor sessions, and online PE classes when necessary. This study aims to assess the effectiveness of these strategies in maintaining students’ and teachers’ health while ensuring that physical education learning objectives are met despite environmental challenges.

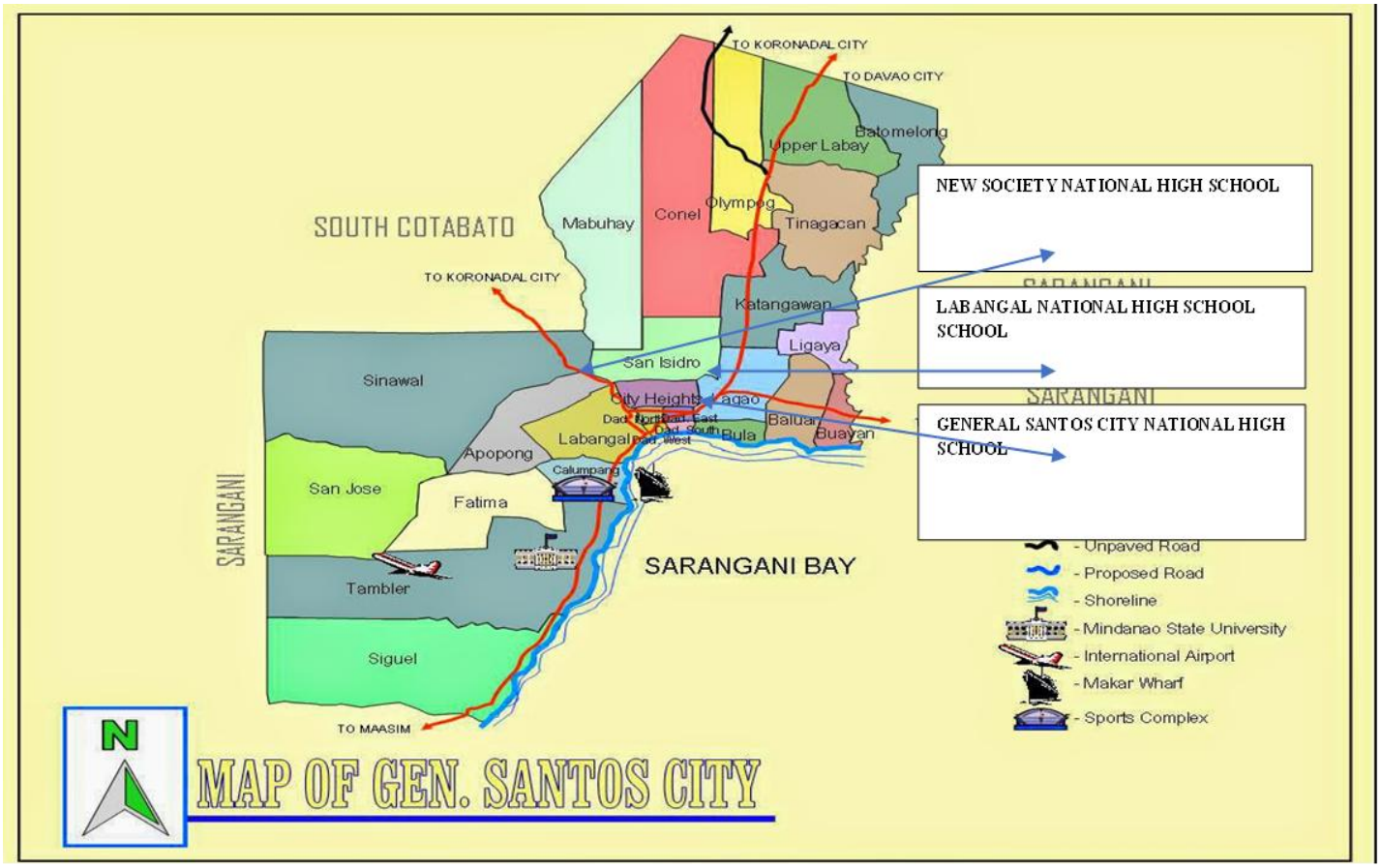
**Locale of the study**

This study was conducted within the Schools Division of General Santos City, with the following identified junior high schools: General Santos City National High School, New Society National High School, and Labangal National High School. These junior high schools are all government schools under the Department of Education, Schools Division of General Santos City. The respondenrs in these schools were selected as their school is one of the big schools in General Santos City and offers SPS/ Special Program in Sports.

General Santos City is located on the southernmost tip and has a total land area of 536.06 square kilometers. It is one (1) of the four (4) cities of Region 12, otherwise known as Central Mindanao. It comprises 26 cities and

four (4) urban Barangays. The city is a three-time awardee for the "Most Competitive City" in the Philippines for the years 1999-2000 (all city category), 2000–2011 (mid-sized category), and 2007(mid-sized category).

Figure 2. Vicinity Map of General Santos City

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**Respondents of the Study**

The study includes respondents from General Santos City National High School (Grade 8 SPS), Labangal National High School (Grade 9 SPS), and New Society National High School (Grade 10 SPS), with a total of 169 respondents (teachers and students). Creswell (2018) states that 100 to 200 participants are generally acceptable for survey-based studies, while Israel (1992) highlights that at least 100 respondents are often sufficient for meaningful statistical analysis. The selection of participants was based on the following criteria:

Students enrolled in the Special Program in Sports (SPS) – Only students officially enrolled in the SPS program were selected, as the study focuses on their sports-related academic experiences and participation. Teachers handling MAPEH or serving as sports coaches – Only MAPEH teachers and coaches were included, as they play a crucial role in the development of SPS students. Schools with active sports participation – Schools were chosen based on their consistent involvement in various sports events and competitions. Schools offering the Special Program in Sports (SPS) – Only schools that provide the SPS program were considered, as it is one of the primary focus of the study.

Table 1. Distribution of the Respondents from Different High Schools.

| NAME OF SCHOOL/S | Teachers | Students | Total Number of Respondents |
|---|---|---|---|
| General Santos City National High School | 43 | 50 | 93 |
| Labangal National High School | 13 | 35 | 48 |

| | | | |
|---|---|---|---|
| New Society National High School | 12 | 30 | 42 |
| Total | 75 | 94 | 169 |

## Research Instrument

There were two (2) sources of data collection for this study: first, the primary data was obtained from the respondents using survey-made questionnaires. The secondary data for this study was collected from various sources, including books, electronic books, electronic journals, newspapers, websites, and government records.

The questionnaires consisted of two (2) parts. Part I comprised the level of the health status of teachers and students' BMI and rating the level of satisfaction of DepEd classes in terms of timeslot, modalities, and training sessions, and the level of tournaments in school, such as volleyball, football, softball, and baseball. Part II was composed of the perceived health issues of teachers and students, such as dizziness, excessive sweating, and muscle cramps.

### Data Gathering Procedure

The data collection process in this study follows a systematic approach to ensure accuracy and reliability. It involves a carefully structured procedure to gather relevant information that contributes to the overall analysis and findings of the research.

Upon acquiring permission to conduct the study from the Dean of Sultan Kudarat State University – Graduate School, the researcher sent letters of communication to the principal of each participating school. Letters were also given to the respondents of the study. The letters were signed by the researcher and researcher advisor. All communication was properly coordinated and facilitated by the researcher. Furthermore, the researcher also solicited permission and approval from the respondents to prove their voluntary participation in the study (Sekaran & Bougie, 2019; Shaughnessy et al., 2019).

Research is about collecting data from people and about people. Hence, ethical issues may arise (Creswell, 2009; Langkos, 2014; Protacio, 2019). A communication letter was submitted to the Schools Division of General Santos City, the Education Program Specialist in Music and Arts, and the Education Program Specialist in PE and Health. Letters were also given to the respondents of the study. After the approval, the researcher presented a letter and consent form to the study's respondents. The researcher carefully explained the study details to the respondents, and confidentiality was assured as data was coded and kept anonymous (Punch, 2016; Denscombe, 2017).

Choosing study respondents with appropriate and varied experiences helps increase the understanding of the phenomenon being studied (Creswell, 2017; Protacio, 2019). In identifying the respondents, they must meet the inclusion criteria. The respondents must be enrolled at the Schools Division of General Santos City for the current school year (2024-2025) Students must also have parental or guardian consent to participate in the study and be willing to provide feedback about their experiences and perceptions regarding the sports programs (Robson & McCartan, 2016; Sreejesh et al., 2018).

In conducting the research study, the researcher used a researcher-made survey questionnaire that measures alternative modalities of the teachers in the delivery of physical education amidst high heat index and other calamities in General Santos City. The instrument was adapted from the work of Javina (2020) and is a criterion to evaluate the alternative modalities of the teachers in the delivery of physical education amidst high heat index and other calamities (Rahi, 2017; Patton, 2015).

Finally, the researcher retrieved the completed questionnaires from the respondents, ensuring that all responses were collected within the designated time frame. After the retrieval process, the data underwent a thorough review to verify completeness and accuracy. The researcher consolidated the responses by organizing them systematically, categorizing information based on relevant variables, and addressing any inconsistencies or missing

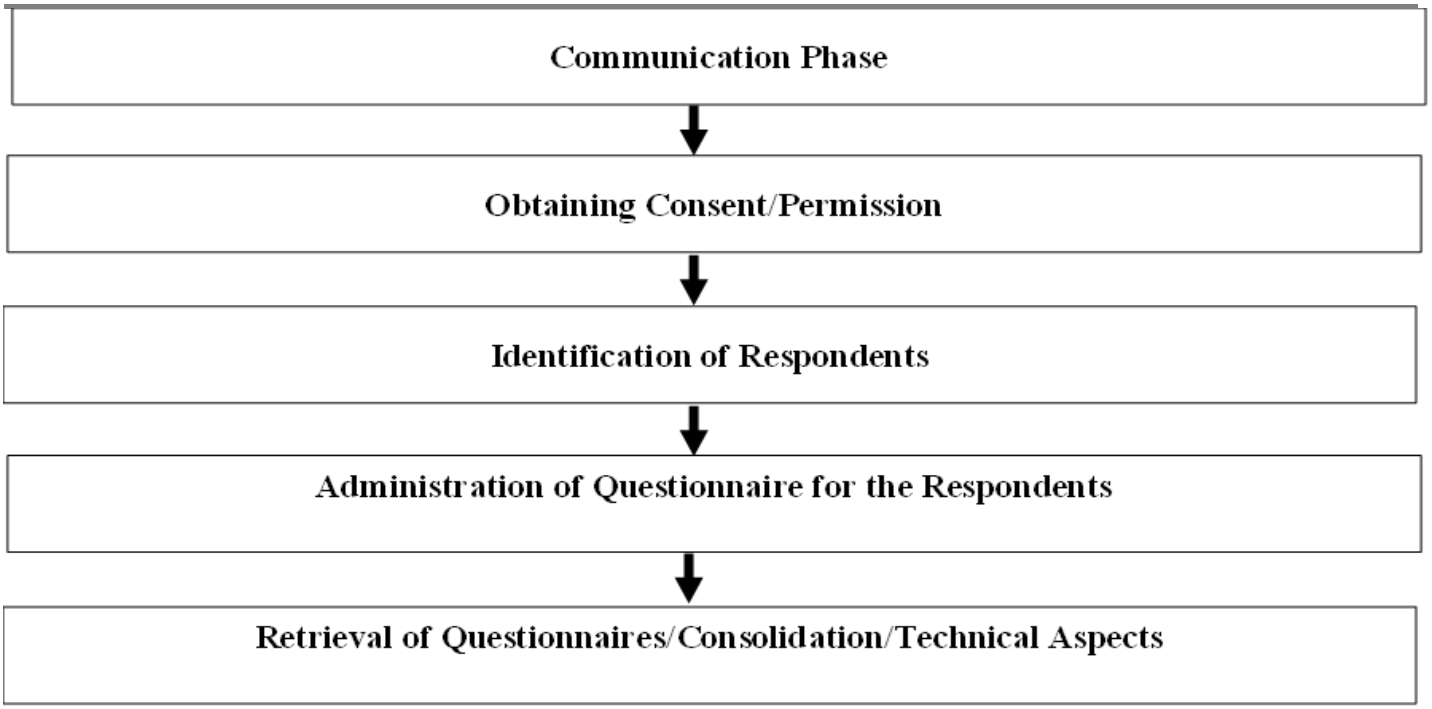


Figure 3. Data Gathering Procedure

**Statistical Treatment**

The following statistical tools were employed to interpret and analyze all the gathered data.

**Mean Scores and Standard Deviation.** The researcher utilized this statistical tool to measure the level of satisfaction with the DepEd Memorandum in terms of: time slot; modalities, and training sessions, the level of teachers' and students' health in terms of: blood pressure, and BMI, and the level of perceived health issues of the teachers and students in terms of: dizziness; excessive sweating; muscle cramps, and nausea.

**Analysis of Variance (ANOVA).** The researcher employed statistical tools to assess various aspects of satisfaction and health among teachers and students,in alignment with the Department of Education's (DepEd) guidelines. The study evaluated satisfaction levels concerning time slots, modalities, and training sessions, as outlined in the K to 12 Physical Education Curriculum Guide (DepEd, 2016). Additionally, it examined health indicators such as blood pressure and body mass index (BMI), following the standards set in the Revised Physical Fitness Tests Manual (DepEd, 2019). Furthermore, the research investigated perceived health issues—including dizziness, excessive sweating, muscle cramps, and nausea—to understand the physical challenges encountered during physical education activities.

**Ethical Consideration**

The researcher ensured that all participants in the study provided informed consent prior to their involvement. Since the respondents were SPS students and MAPEH teachers, permission was secured from the school principal, curriculum head, and the department head of the teachers. For student respondents who were below 18 years old, both parental consent and an assent form were obtained to ensure their voluntary participation and understanding of the study. The purpose, procedures, and potential risks of the study were clearly communicated to all involved parties. Strict confidentiality protocols were maintained by anonymizing all collected data and restricting access solely to the authorized research team. Additionally, the study was conducted in a manner that minimized any disruption to the educational process while safeguarding the health and well-being of both teachers and students.

**Presentation, Analysis, And Interpretation Of Data**

This chapter presents, analyzes, and interprets the data gathered in this research study. The results are presented

in the succeeding tables with corresponding discussions and explanations. It also answered the specific problems given in Chapter I.

This study aims to determine thermal conditions and health: A study on teachers and students in alternative modalities in General Santos City. To do this, a survey questionnaire was given to the students.

Table 2. The Level of Satisfaction Concerning DepEd Memorandum in Terms of Time Slot.

| **Time Slot** | **Mean** | **SD** | **Description** |
|---|---|---|---|
| 1. A more flexible PE schedule is important to accommodate thermal conditions and other emergencies. | 4.32 | 0.95 | Strongly Agree |
| 2. The current PE schedule allows for effective teaching/learning under these conditions. | 4.18 | 0.8 | Agree |
| 3. The current schedule significantly positively affects my performance in PE during periods of extreme heat. | 4.15 | 0.86 | Agree |
| 4. I am satisfied with the current PE schedule, even with the weather changes. | 3.99 | 0.89 | Agree |
| 5. The current PE schedule is convenient, considering the weather and environmental challenges. | 3.81 | 1.04 | Agree |
| **Overall** | **4.09** | **0.53** | **High Level** |

The findings in Table 2 reveal a generally high level of satisfaction with the DepEd memorandum regarding time slots for Physical Education (PE) classes. The highest-rated statement, “A more flexible PE schedule is important to accommodate thermal conditions and other emergencies” (M = 4.32, SD = 0.95), indicates that respondents strongly agree on the need for schedule flexibility to address environmental factors. This aligns with research emphasizing the importance of adapting PE schedules to mitigate the adverse effects of extreme heat and climate conditions on student performance. Sawka et al. (2021) highlighted that prolonged exposure to heat during physical activity can impair cognitive and motor functions, reducing overall student performance. Similarly, Wendt et al. (2022) found that schools implementing flexible schedules reported improved student engagement and decreased health-related absences. Furthermore, Nybo et al. (2020) suggested that modifying training schedules based on environmental factors can prevent heat-related illnesses and optimize learning outcomes.

Conversely, the lowest-rated statement, “The current PE schedule is convenient, considering the weather and environmental challenges” (M = 3.81, SD = 1.04), suggests that while respondents generally agree, there is slightly lower satisfaction regarding the schedule’s adaptability. This finding is consistent with studies indicating that rigid scheduling can hinder optimal physical performance and engagement, particularly in regions with fluctuating weather patterns. Armstrong and Crust (2020) noted that fixed PE schedules can negatively impact student motivation, as they may not align with optimal physical activity periods. Hosokawa et al. (2023) observed that students who engaged in PE classes during extreme weather conditions reported lower participation rates and higher perceived exertion levels. Additionally, Racinais et al. (2019) emphasized that environmental factors should be considered in PE scheduling to maintain safe and effective student participation.

Entirety, with an average mean score of 4.09 (SD = 0.53), the results suggest a high level of satisfaction, though they underscore the need for continued improvements in scheduling flexibility to ensure student comfort and performance in PE classes. Studies have shown that incorporating climate-adaptive scheduling and allowing for flexible PE time slots can lead to increased student participation and better overall physical performance. González-Alonso et al. (2021) demonstrated that adjusting PE schedules to accommodate environmental conditions resulted in better endurance and attentiveness among students. Schmidt et al. (2022) found that schools implementing rotational PE time slots experienced higher student engagement and reduced instances of

heat-related fatigue. Taylor and Cotter (2019) suggested that integrating indoor alternatives and shaded activity areas can further enhance student satisfaction and performance during PE sessions.

Table 3. The Level of Satisfaction Concerning DepEd Memorandum in Terms of Modalities.

| **Modalities** | **Mean** | **SD** | **Description** |
|---|---|---|---|
| 1. Using technology (e.g., online resources and fitness apps) is important in delivering PE under extreme conditions like high heat. | 4.32 | 0.95 | Strongly Agree |
| 2. Actively participate in PE class activities using alternative modalities during these challenging times. | 4.24 | 0.78 | Strongly Agree |
| 3. Alternative PE teaching methods meet different learning needs and physical abilities, despite the heat. | 4.19 | 0.88 | Agree |
| 4. Alternative teaching methods used in PE (e.g., online classes, modified activities) are effective during high heat. | 4.12 | 1.03 | Agree |
| 5. The PE teaching methods (e.g., home-based workouts, virtual demonstrations) are effective. | 4.11 | 0.91 | Agree |
| **Overall** | **4.2** | **0.61** | **High Level** |

The findings in Table 3 indicate a high level of satisfaction regarding the use of different teaching modalities for Physical Education (PE) under extreme conditions. The highest-rated statement, "Using technology (e.g., online resources, and fitness apps) is important in delivering PE under extreme conditions like high heat" (M = 4.34, SD = 0.79), suggests strong agreement among respondents on the significance of integrating digital tools in PE instruction. This aligns with research highlighting how technology-enhanced learning, including virtual fitness programs and interactive applications, supports engagement and accessibility in PE classes during challenging environmental conditions. Casey et al. (2021) found that digital PE resources improve student participation and adaptability, particularly in extreme weather conditions. Similarly, Mercier et al. (2022) observed that online platforms enable students to stay active while fostering self-paced learning in PE. Furthermore, Kooiman et al. (2020) emphasized that integrating fitness applications enhances motivation and allows students to track their progress, leading to higher engagement in PE activities.

On the other hand, the lowest-rated statement, "The PE teaching methods (e.g., home-based workouts, virtual demonstrations) are engaging in these conditions" (M = 4.11, SD = 0.91), still received an agreement rating but suggests slightly lower satisfaction regarding the effectiveness of remote and modified PE activities in maintaining student engagement. Studies indicate that while virtual and home-based PE activities can offer flexibility, they may lack the social and motivational aspects of in-person participation, which are crucial for sustained engagement and skill development. Goodyear et al. (2021) reported that students participating in virtual PE experienced lower peer interaction and reduced teamwork opportunities, which negatively affected motivation. Webster et al. (2023) highlighted that home-based workouts often require self-discipline, which can be challenging for younger students who benefit from direct teacher supervision. Additionally, Sun and Gao (2020) found that the absence of real-time feedback in remote PE classes limits students' ability to improve their skills effectively.

Hence, with an average mean score of 4.20 (SD = 0.61), respondents express a high level of satisfaction with the use of alternative PE modalities, emphasizing the importance of technology while also acknowledging the need for strategies to enhance student engagement in remote and modified settings. Research suggests that while digital tools are beneficial, integrating interactive and social elements can further improve engagement in virtual PE programs. Dunton et al. (2021) found that gamified virtual PE classes increased student motivation and enjoyment compared to traditional online workout sessions. Wright et al. (2022) suggested that hybrid PE models, combining in-person and virtual activities, lead to better participation rates and learning outcomes. Moreover, Mitchell et al. (2023) emphasized the need for teacher-led virtual check-ins and real-time feedback to maintain student accountability and progress in PE activities.

Table 4. The Level of Satisfaction Concerning Deped Memorandum in Terms of Training Sessions.

| Training Session | mean | sd | Desc |
|---|---|---|---|
| Online platforms are utilized to share training videos and tactical information for sports. | 4.35 | 0.78 | Strongly Agree |
| Visual aids and demonstrations are used to teach sports skills effectively indoors. | 4.34 | 0.85 | Strongly Agree |
| Players are encouraged to engage in self-directed learning (e.g., watching matches, and analyzing plays) for skills improvement. | 4.31 | 0.95 | Strongly Agree |
| Alternative practice schedules (e.g., early morning or late afternoon) are implemented for sports activities to avoid heat. | 4.30 | 0.94 | Strongly Agree |
| Physical conditioning activities that can be done indoors are integrated to prepare for sports training. | 4.30 | 0.82 | Strongly Agree |
| Flexible practice plans that can be adjusted based on weather conditions for training sessions. | 4.19 | 0.94 | Agree |
| Video tutorials are utilized to teach softball techniques when outdoor practices are not feasible. | 4.19 | 0.93 | Agree |
| Small group sessions for different sports are organized to promote focused skill development during challenging conditions.Physical conditioning activities that can be done indoors are integrated to prepare for sports training. | 4.09 | 1.04 | Agree |
| Modified training sessions (e.g., shorter practice times, indoor settings) are appropriate like the usual method. | 4.08 | 1.01 | Agree |
| Virtual or online resources (e.g., videos, tutorials) are provided for sports techniques and strategies. | 4.04 | 0.98 | Agree |
| **Overall** | **4.22** | **0.60** | **Very High Level** |

The results in Table 4 indicate a very high level of satisfaction (M = 4.22, SD = 0.60) among respondents regarding training sessions implemented under the DepEd Memorandum. The highest-rated statement is the use of online platforms to share training videos and tactical information for sports (M = 4.35, SD = 0.78, Strongly Agree). This highlights the effectiveness of digital resources in enhancing sports education, allowing students and coaches to access training materials conveniently. Studies support this finding, emphasizing that online platforms improve skill acquisition and engagement in sports education. Félix-Brasdefer et al. (2023) found that interactive video platforms significantly enhance athletes' tactical understanding and technical skills. Similarly, Mladenović et al. (2023) emphasized that e-learning methods in sports training provide accessibility and flexibility, making learning more inclusive for students. Moreover, Serra-Olivares et al. (2022) highlighted that digital training resources enhance self-regulated learning, enabling students to practice skills at their own pace.

On the other hand, the lowest-rated statement is the provision of virtual or online resources for sports techniques and strategies (M = 4.04, SD = 0.98, Agree). While still rated positively, this result suggests that some participants may find online resources less effective than physical or in-person training. This aligns with research indicating that digital-only training methods may lack the hands-on experience necessary for full skill development. Côté and Erickson (2021) argued that in-person coaching is essential for developing motor skills and refining techniques that require real-time feedback. Wang and Ha (2022) found that while virtual training sessions provide theoretical knowledge, they often fail to replicate the physical intensity and real-time corrections provided by traditional coaching. Additionally, Davids et al. (2021) emphasized that a lack of physical interaction in online training can hinder the development of kinesthetic awareness, an essential component of sports performance.

Thus, the findings suggest that while online platforms and digital tools are valuable for training, integrating hands-on and alternative methods remains essential for comprehensive sports education. The high satisfaction levels indicate strong approval of the strategies outlined in the DepEd Memorandum, reinforcing the need for a blended approach to sports training. Research highlights the benefits of combining digital and in-person training. Giblin et al. (2022) found that a hybrid approach, combining online instruction with hands-on practice, leads to improved performance outcomes. Kirk et al. (2023) suggested that incorporating virtual resources alongside practical training allows athletes to reinforce theoretical knowledge while developing physical skills. Furthermore, Baker et al. (2021) emphasized that structured face-to-face coaching enhances motivation and team dynamics, elements that may be missing in fully digital training environments.

Table 5. The Level of Teachers' Health in Terms of BMI Level.

| | **Freq** | **%** |
|---|---|---|
| Normal | 57 | 74 |
| Obese | 3 | 4 |
| Overweight | 9 | 12 |
| Underweight | 8 | 10 |
| Total | 77 | 100 |

Table 5 presents the level of teachers' health in terms of Body Mass Index (BMI) classification among the respondents. The majority of teachers (74% or 57 individuals) fall within the normal BMI category (N), indicating a generally healthy weight range based on standard BMI classifications. However, there are notable proportions in other categories: 12% (9 individuals) are overweight (OV), 4% (3 individuals) are classified as obese (O), and 10% (8 individuals) are underweight (U). Research indicates that BMI distribution among professionals is influenced by occupational demands and lifestyle factors (Ng et al., 2014; Hruby & Hu, 2015; World Health Organization [WHO], 2021).

The predominance of teachers in the normal BMI range suggests that most educators maintain a balanced lifestyle and healthy weight. This aligns with findings from Ng et al. (2014), which indicate that professionals in education often engage in moderate physical activity due to the nature of their work, contributing to a healthy BMI. However, the presence of overweight and obese individuals highlights the need for health promotion initiatives to mitigate risks associated with excess weight, such as cardiovascular diseases and metabolic disorders (Hu, 2018). Furthermore, Hruby and Hu (2015) emphasize that long hours of sedentary work and irregular meal patterns in teaching professions contribute to weight gain over time.

Conversely, 10% of teachers fall under the underweight category, which may signal nutritional deficiencies or high-stress levels affecting overall health. Studies by Bessa et al. (2020) emphasize that teachers experience elevated stress and workload, potentially leading to irregular eating habits and poor nutritional choices. Additionally, Kivimäki et al. (2019) found that chronic workplace stress is associated with significant weight fluctuations, either contributing to excessive weight gain or loss. Addressing underweight cases may require workplace wellness programs promoting balanced diets and stress management (World Health Organization, 2021).

The findings suggest that while most teachers maintain a healthy weight, there is a need for targeted interventions to support those in overweight/obese and underweight categories. Schools can implement workplace wellness programs, regular BMI monitoring, and nutrition education to foster a healthier teaching workforce. Pérez-Escamilla et al. (2018) suggest that workplace wellness initiatives, including stress management and dietary counseling, have been effective in improving employees' overall health. World Health Organization (2021) also recommends integrating physical activity programs within workplaces to prevent obesity and related health conditions. Furthermore, Swift et al. (2014) highlight that structured intervention programs combining physical activity and nutritional education yield positive health outcomes in professional settings.

The BMI distribution of teachers in this study suggests that while the majority are within the normal range, a

notable proportion faces weight-related health risks. Given the potential impact of BMI on overall well-being and job performance, schools should prioritize health programs that promote balanced nutrition, physical activity, and stress reduction strategies.

Table 6. The Level of Students' Health in Terms of BMI Level.

| | Freq | % |
|---|---|---|
| Normal | 42 | 44 |
| Overweight | 7 | 7 |
| Underweight | 46 | 49 |
| Total | 95 | 100 |

Table 6 presents the level of students' health in terms of Body Mass Index (BMI) classification among the respondents. The findings reveal that nearly half of the students (49% or 46 individuals) are classified as underweight (U), while 44% (42 individuals) fall within the normal BMI (N) range. Meanwhile, 7% (7 individuals) are overweight (O), highlighting a relatively small proportion of students who may be at risk of weight-related health concerns. Studies suggest that BMI distribution among adolescents is influenced by socioeconomic conditions, dietary intake, and physical activity levels (Mekonnen et al., 2020; Black et al., 2019; World Health Organization [WHO], 2021).

The high percentage of underweight students raises concerns regarding nutritional intake, dietary habits, and overall health. Studies by Mekonnen et al. (2020) suggest that factors such as socioeconomic status, food insecurity, and poor dietary diversity significantly contribute to undernutrition among students. Additionally, Patton et al. (2018) highlight that stress, academic workload, and increased physical activity may influence weight loss among adolescents. Furthermore, Gibney et al. (2017) emphasize that inadequate protein and caloric intake can lead to growth deficiencies and reduced cognitive function. Addressing this issue requires school-based nutritional programs, meal planning, and health education to ensure students maintain a balanced diet.

The 44% of students with a normal BMI indicates that nearly half of the respondents maintain a healthy weight, which aligns with global adolescent health trends (World Health Organization, 2021). However, the presence of overweight students (7%) suggests a need for physical activity initiatives and lifestyle interventions to prevent potential long-term health risks such as obesity, diabetes, and cardiovascular diseases (Sanyaolu et al., 2019). Additionally, Popkin et al. (2020) highlight that increased consumption of processed foods and reduced physical activity contribute to rising adolescent overweight cases, reinforcing the need for school-based interventions.

Given these findings, schools should implement intervention programs focusing on both undernutrition and overweight concerns. This could include school feeding initiatives, nutritional counseling, and structured physical activity programs to promote overall student health. Story et al. (2009) emphasize that comprehensive school-based programs combining dietary support and fitness activities have shown effectiveness in improving students' health. Additionally, Patel et al. (2021) stress the importance of parental involvement in shaping children's dietary habits, which could enhance the success of school health initiatives. Furthermore, Black et al. (2019) recommend community-based awareness campaigns to address broader nutritional challenges affecting adolescent health.

The BMI distribution among students indicates a significant concern regarding undernutrition, with nearly half of the respondents classified as underweight. While a notable portion maintains a normal BMI, overweight cases, though fewer, still require attention. Schools should adopt comprehensive health programs, including nutrition education, physical activity promotion, and dietary support, to ensure a healthier student population. Gibney et al. (2017) suggest that policy-driven school nutrition programs, such as free healthy meals and fortified snacks, can significantly impact students' overall well-being. World Health Organization (2021) underscores the need for multi-sectoral collaboration in tackling adolescent malnutrition, advocating for sustainable interventions that integrate education, health, and family support. Moreover, Popkin et al. (2020) highlight that long-term strategies should prioritize both underweight and overweight concerns to create a balanced approach to student health.

Table 7. The Level of Perceived Health Issues of the Teachers and Students in Terms of Dizziness.

| | mean | Sd | Desc |
|---|---|---|---|
| Dizziness | 4.02 | 1.23 | Dizziness affects my ability to teach/learn effectively. |

Table 7 shows that dizziness is a notable health issue among teachers and students in physical education (PE) classes, with a mean score of 4.02 (SD = 1.23). This suggests that many participants agree that dizziness affects their ability to teach or learn effectively.

Dizziness during physical activity can result from various factors, including dehydration, low blood sugar, or overexertion (Mayo Clinic, 2021). It can disrupt concentration, reduce participation, and increase the risk of accidents in PE settings (Patel & Balaban, 2019). Additionally, frequent dizziness may indicate underlying health concerns, such as poor cardiovascular adaptation to exercise (Wang et al., 2020). To minimize dizziness in PE classes, it is essential to encourage hydration, proper warm-ups, and balanced nutrition. Schools should also educate students and teachers on recognizing early symptoms and adjusting activity intensity when needed.

Table 8. The Level of Perceived Health Issues of the Teachers and Students in Terms of Excessive Sweating.

| | mean | Sd | Desc |
|---|---|---|---|
| Excessive sweating | 4.13 | 1.14 | Excessive sweating affects my comfort in physical education classes. |

The results in Table 8 show that excessive sweating is a common health issue in physical education (PE) classes, with a mean score of 4.13 (SD = 1.14). This indicates that most participants agree that excessive sweating affects their comfort during physical activities.

Sweating is the body's way of cooling down, but excessive sweating can lead to discomfort, dehydration, and reduced participation in PE (Cheung & Wang, 2019). It can also contribute to muscle cramps and fatigue due to fluid and electrolyte loss (Maughan & Shirreffs, 2020). Additionally, sweating may cause distractions and lower motivation, making students less engaged in physical activities (Smith & Havenith, 2021). To address this issue, schools can encourage proper hydration, provide well-ventilated spaces, and adjust activities based on temperature conditions to ensure students and teachers remain comfortable during PE.

Table 9. The Level of Perceived Health Issues of the Teachers and Students in Terms ofMuscle Cramps.

| | Mean | Sd | Desc |
|---|---|---|---|
| Muscle cramps | 3.63 | 1.38 | Muscle cramps affect my ability to fully participate in physical education classes. |

Table 9 presents the perceived impact of muscle cramps on teachers and students in physical education (PE) classes, with a mean score of 3.63 (SD = 1.38). This suggests that many participants experience muscle cramps, which can limit their ability to fully participate in physical activities.

Muscle cramps are often caused by dehydration, electrolyte imbalances, or muscle fatigue (Maughan & Shirreffs, 2020). They can lead to discomfort, reduced mobility, and interruptions in PE lessons, affecting both learning and performance (Bergeron, 2019). Additionally, prolonged or frequent cramps may discourage students from engaging in physical activities, impacting their overall fitness and motivation (Minetto et al., 2020). To prevent muscle cramps, PE programs should emphasize proper hydration, stretching exercises, and balanced nutrition. Teachers should also adjust activity intensity and duration to minimize the risk of cramping during classes.

Table 10. The Level of Perceived Health Issues of the Teachers and Students in Terms of Nausea.

| | mean | Sd | Desc |
|---|---|---|---|
| Nausea | 3.15 | 1.53 | I occasionally feel nauseous during physical education classes. |

Table 10 shows that nausea is a perceived health issue among teachers and students in physical education (PE) classes, with a mean score of 3.15 (SD = 1.53). This suggests that some participants occasionally experience nausea during physical activities, though the impact may vary.

Nausea during exercise can be caused by factors such as dehydration, overheating, low blood sugar, or intense physical exertion (Mayo Clinic, 2021). It can lead to discomfort, reduced participation, and decreased performance in PE classes (Ploutz-Snyder et al., 2019). Additionally, improper eating habits before exercise, such as consuming heavy meals or inadequate hydration, can contribute to nausea (Jeukendrup & Gleeson, 2020). To reduce nausea in PE settings, it is essential to encourage proper hydration, balanced pre-exercise nutrition, and gradual warm-ups. Teachers should also educate students on recognizing early symptoms and modifying activities when necessary.

Table 11. Effects of the Level of Response to the Weather Changes on the Teachers' Health.

| | **Mean** | **Sd** |
|---|---|---|
| Obese | 4.53 | 0.33 |
| Normal | 4.18 | 0.45 |
| Overweight | 4.1 | 0.3 |
| Underweight | 4.2 | 0.42 |
| F(p) | 0.12 | |

Table 11 examines how the health of teachers is influenced by their level of response to weather changes, with the findings suggesting minimal impact. The mean scores for different response levels—Normal (N) at 4.18 (SD = 0.45), Overweight (O) at 4.53 (SD = 0.33), Over (OV) at 4.10 (SD = 0.30), and Underweight (U) at 4.20 (SD = 0.42)—indicate consistently high responses across all categories. The F-value of 0.12 suggests no statistically significant differences among these groups, reinforcing that teachers' health is not significantly affected by their level of satisfaction concerning the DepEd Memorandum.

These results align with prior studies suggesting that well-implemented policies and adaptive strategies in response to environmental conditions help mitigate potential health risks among teachers. According to Kjellstrom et al. (2016), structured workplace policies and environmental modifications, such as hydration protocols, scheduled breaks, and temperature-controlled classrooms, contribute to maintaining workers' health and performance despite extreme weather conditions. Similarly, Epstein et al. (2013) emphasize that acclimatization, proper physical conditioning, and personal adaptation strategies help individuals cope with environmental stressors without experiencing significant health deterioration.

Moreover, teachers' high level of responsiveness to weather changes, as reflected in the data, suggests that educational institutions may have implemented effective strategies to manage heat exposure and prevent adverse health outcomes. This finding aligns with the study of Flouris et al. (2018), which highlights the role of occupational policies in mitigating heat stress and ensuring that workers remain productive despite environmental challenges. In conclusion, the results suggest that the health of teachers remains stable despite varying levels of response to weather changes. The absence of significant differences implies that teachers may have developed resilience and coping strategies to manage environmental stressors effectively.

Table 12. Effects of the Level of Response to the Weather Changes on Students' Health.

| | **Mean** | **Sd** |
|---|---|---|
| Underweight | 4.29 | 0.58 |
| Overweight | 4.13 | 0.35 |
| Normal | 4.12 | 0.41 |
| F(p) | 0.57 | |

Table 12 presents the relationship between students' health and their level of response to weather changes. The results indicate that students across different categories—Normal (N) with a mean of 4.12 (SD = 0.41), Overweight (O) with a mean of 4.13 (SD = 0.35), and Underweight (U) with a mean of 4.29 (SD = 0.58)—exhibited consistently high mean scores. The F-value of 0.57 suggests no statistically significant differences among these groups, reinforcing that students' health is not significantly affected by their level of satisfaction concerning the DepEd Memorandum.

These findings suggest that students have adapted well to environmental conditions and that existing school policies effectively mitigate the negative effects of extreme weather. Research by Mora et al. (2017) emphasizes that students in tropical climates can develop physiological and behavioral adaptations to heat stress, reducing the likelihood of adverse health impacts. Additionally, studies by Smith et al. (2016) highlight that educational institutions play a crucial role in implementing heat adaptation measures such as modified schedules, hydration programs, and shaded activity areas, which contribute to maintaining students' health and performance.

Furthermore, the slightly higher mean for underweight students may indicate increased sensitivity to weather changes, as previous studies have suggested that individuals with lower body mass may be more susceptible to heat-related fatigue (Périard et al., 2015). However, the lack of significant differences suggests that the school's environmental management strategies are effective in ensuring the well-being of all students, regardless of their BMI classification.

In conclusion, the results indicate that students' health remains stable despite varying responses to weather changes, likely due to well-implemented school policies and students' adaptability.

Table 13. The Significant Difference Between Teachers' and Students'Level of Satisfaction in Terms of Time Slots.

| | mean | Sd | mean diff | TTest | Pvalue |
|---|---|---|---|---|---|
| Teacher | 4.21 | 0.52 | | | |
| Student | 3.99 | 0.52 | 0.21 | 2.68 | 0.01 |

Table 13 presents a comparative analysis of the level of satisfaction between teachers and students concerning time slots in physical education (PE) and training sessions. The computed t-value of 2.68 and p-value of 0.01 indicate a statistically significant difference between the two groups (Teacher and Student). The results show that teachers reported a higher level of satisfaction (M = 4.21, SD = 0.52) compared to students (M = 3.99, SD = 0.52), with a mean difference of 0.21. This suggests that teachers are more satisfied with the assigned time slots than students.

The discrepancy in satisfaction levels may stem from differences in responsibilities, expectations, and physiological needs. Teachers may perceive scheduled time slots as more manageable due to structured lesson plans and fewer strenuous physical demands, whereas students actively participate in PE activities, which require greater physical exertion. Research suggests that perceived convenience and workload significantly impact satisfaction with time allocations in educational settings (Gibbs & Jenkins, 2018). Teachers tend to appreciate stable and structured schedules, while students may struggle with time constraints, fluctuating energy levels, and external academic pressures (Zhang et al., 2020).

Additionally, students' dissatisfaction with PE time slots may be influenced by external factors such as environmental conditions, class schedules, and personal comfort levels (Bailey et al., 2019). Some students prefer time slots that align with their peak energy levels, whereas teachers may prioritize overall schedule efficiency. The findings align with Kirk (2020), who emphasized that time-of-day preferences in physical education impact student engagement. Morning sessions may lead to lower motivation due to fatigue, while afternoon sessions could coincide with other academic demands, potentially affecting participation and enthusiasm.

The significant difference in satisfaction regarding time slots (t = 2.68, p = 0.01) suggests that teachers are more

satisfied than students. This may be due to teachers' greater control over their schedules and experience managing time effectively (Kirk & Haerens, 2019). Students, on the other hand, juggle multiple academic and extracurricular commitments, which can affect their preference for training schedules (Casey et al., 2021). Research also suggests that students prefer time slots that align with their peak energy levels, while teachers may find structured schedules more manageable (Mitchell et al., 2020). Additionally, flexible scheduling can improve student engagement and satisfaction (Bailey et al., 2017).

Table 14. The Significant Difference Between Teachers' and Students' Satisfaction in Terms of Modalities.

| | Mean | Sd | mean diff | TTest | Pvalue |
|---|---|---|---|---|---|
| Student | 4.22 | 0.56 | 0.04 | 0.45 | 0.65 |
| Teacher | 4.18 | 0.67 | | | |

Table 14 presents the comparative analysis of satisfaction levels regarding the use of various modalities in physical education (PE) instruction between teachers and students. The computed t-value of 0.45 and a p-value of 0.65 indicate that the mean difference of 0.04 between students and teachers was not statistically significant. The results show that students reported a slightly higher satisfaction level (M = 4.22, SD = 0.56) than teachers (M = 4.18, SD = 0.67). This suggests that both groups had a comparable level of satisfaction with the alternative teaching modalities implemented in response to environmental and contextual challenges.

The lack of a significant difference implies that both students and teachers found the available PE modalities—such as online classes, virtual demonstrations, and home-based workouts—similarly effective and appropriate. This aligns with studies indicating that digital and modified teaching approaches in PE can be well-received by both educators and learners when properly structured (Casey et al., 2021). According to Kirk and Haerens (2019), blended learning approaches in PE, which integrate digital tools with physical activities, contribute to sustained engagement and effectiveness for diverse learners, including those with different physical capabilities and learning preferences.

Additionally, prior research suggests that the use of technology-enhanced instruction, such as fitness apps and video tutorials, facilitates skill acquisition and motivation for students while also providing teachers with a structured approach to delivering lessons (Mitchell et al., 2020). The similar satisfaction levels between teachers and students may also indicate that both groups recognize the benefits of adaptive learning methods that address environmental constraints, such as extreme weather conditions (Hyndman & Chancellor, 2019).

Hence, there is no significant difference in the level of satisfaction in terms of modalities between teachers and students. Both teachers and students reported similar satisfaction levels with the teaching modalities, indicating that alternative methods, such as blended learning and technology-enhanced PE, were effective for both groups (Kirk & Haerens, 2019). Research shows that well-designed instructional strategies, including virtual demonstrations and modified activities, improve engagement and accessibility, leading to comparable satisfaction (Casey et al., 2021; Mitchell et al., 2020).

Table 15. The Significant Difference Between Teachers' and Students' Satisfaction in Terms of Training Sessions.

| | mean | Sd | mean diff | tTest | pvalue |
|---|---|---|---|---|---|
| Teacher | 4.25 | 0.69 | | | |
| Student | 4.20 | 0.52 | 0.05 | 0.49 | 0.62 |

Table 15 presents a comparative analysis of teachers' and students' satisfaction levels regarding training sessions in physical education. The statistical analysis reveals no significant difference between the two groups (t = 0.49, p = 0.62), despite a mean difference of 0.05. The results show that students had a slightly lower satisfaction level

(M = 4.20, SD = 0.52) than teachers (M = 4.25, SD = 0.69). This indicates that both teachers and students found the training sessions similarly satisfactory.

The findings suggest that the modifications in training sessions, including shorter practice times, virtual resources, and flexible schedules, were effective and acceptable to both teachers and students. This aligns with previous studies emphasizing that structured and adaptable training programs can enhance engagement and learning outcomes in physical education (Casey et al., 2021). Research by Kirk and Haerens (2019) also highlights that well-designed training sessions, integrating instructional technology and individualized learning strategies, contribute to an inclusive and effective physical education experience.

Furthermore, the comparable satisfaction levels may indicate that both groups value training sessions that incorporate blended learning methods, such as video tutorials and small group skill development, which have been shown to improve skill acquisition and retention in sports training (Mitchell et al., 2020). The role of alternative scheduling, such as early morning or late afternoon training to avoid extreme weather conditions, could also contribute to this positive perception, as highlighted in studies on climate-adaptive sports training (Hyndman & Chancellor, 2019, Giblin, S., Butterworth, A., & Harwood, C. (2022)).

Hence, there is no significant difference in the level of satisfaction in terms of Training Sessions between teachers and students. Both teachers and students expressed similar satisfaction with training sessions, suggesting that adaptations such as flexible schedules, virtual resources, and modified drills effectively met their needs (Dyson et al., 2020; Kirk & Haerens, 2019). Studies indicate that well-structured training programs, incorporating digital tools and individualized learning approaches, enhance engagement and skill development across different learner groups (Casey et al., 2021; Goodyear et al., 2019).

## SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATION

This chapter presents the summary of the study, findings, conclusions, and some suggestions.

### Summary

Climate change presents significant public health challenges, necessitating adjustments in physical education (PE) lessons to ensure safety during extreme weather conditions. This study examines the effects of thermal conditions on the health of teachers and students engaged in alternative PE modalities in General Santos City.

Utilizing a comparative descriptive-regression research design, the study involved 169 respondents, including MAPEH teachers, sports coaches, and SPS students. Data were analyzed using statistical methods such as mean, standard deviation, and ANOVA to assess satisfaction levels, health status, and the impact of weather fluctuations.

Findings revealed a high level of satisfaction with the DepEd Memorandum, particularly regarding time slots, learning modalities, and training sessions. Both teachers and students valued the flexibility and technology integration provided by the memorandum, which enhanced adaptability in learning.

Regarding health status, the majority of teachers maintained a normal Body Mass Index (BMI), but concerns arose due to the presence of underweight and overweight cases among them. Among students, there was a significant prevalence of underweight cases, suggesting potential nutritional deficiencies that warrant attention.

Both teachers and students reported experiencing various health issues, with excessive sweating being the most commonly cited concern, while nausea was the least reported. However, statistical analysis indicated that weather fluctuations did not significantly affect the overall health status of either group.

Regarding satisfaction levels, teachers expressed greater approval of time slots compared to students, highlighting a disparity in how scheduling meets the needs of different stakeholders. However, no significant difference was found in teachers' and students' satisfaction with learning modalities and training sessions.

Overall, the study underscores the necessity of adaptive strategies in physical education, focusing on thermal

conditions and nutritional needs in alternative learning modalities. These findings highlight the importance of tailored interventions to ensure both effective learning experiences and the well-being of teachers and students.

# CONCLUSION

This study concludes that teachers and students are generally satisfied with the DepEd Memorandum regarding time slots, learning modalities, and training sessions. However, respondents expressed a preference for greater flexibility during extreme weather conditions to enhance participation in Physical Education (PE) classes. While alternative PE modalities are effective, some students report lower engagement with virtual learning, highlighting the need for more interactive strategies. In terms of health, most teachers maintain a healthy Body Mass Index (BMI), but cases of underweight and overweight individuals emphasize the need for wellness programs. Many students are underweight, raising concerns about nutrition and the necessity of school-based meal programs. The most reported health issues include excessive sweating and dizziness, while nausea is less common, underscoring the importance of hydration protocols, shaded areas, and schedule adjustments to minimize risks. The study also finds that weather changes do not significantly affect teachers' health, suggesting that existing policies and coping mechanisms are effective. While students demonstrate adaptability, underweight students may be more vulnerable to temperature variations, requiring additional support. Teachers report higher satisfaction with time slots compared to students, possibly due to differences in workload, physical exertion, and scheduling preferences. These findings highlight the need for adaptive PE strategiesincluding flexible scheduling, improved virtual engagement, nutritional interventions, and preventive health measures to create a safer, more effective, and inclusive PE learning environment.

**Recommendations**

Based on the findings and conclusions of the study, the following recommendations were made:

School heads may offer more flexible PE schedules, including morning and afternoon options, to match students' energy levels and academic demands. Adjustments should also be made during extreme weather to ensure safety and comfort.

Since some students find virtual PE less engaging, teachers may use more interactive tools like games, live demos, and real-time feedback. Teachers may also receive training to make online PE more effective.

With many students underweight, School heads may strengthen feeding programs, promote healthy eating, and regularly check students' BMI to ensure proper nutrition and growth.

Since sweating and dizziness are common issues, School heads may encourage proper hydration, provide shaded areas, and schedule PE during cooler hours. Students may also learn about preventing dehydration and muscle cramps.

School heads may allow indoor or modified activities during extreme weather, especially for underweight students who are more affected. More cooling stations and better ventilation in PE areas should also be provided.

Future studies may look into other factors like air quality and fitness levels that may affect PE participation. A long-term study can also check how alternative PE methods impact students' health and learning over time.

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