Issued: 29 March 2024

ADVISORY ON SEASONAL HEAT STRESS MANAGEMENT FOR OUTDOOR ADVENTURE EDUCATION PROGRAMME PROVIDERS

1. This advisory provides guidelines on seasonal heat stress management for Outdoor Adventure Education (OAE) providers delivering OAE programmes in Singapore.

BACKGROUND

2. Singapore's annual mean temperature has been increasing at a rate of 0.25°C per decade since 1948[1]. The upward trend of temperature has become more pronounced, with eight of the 10 recorded warmest years in Singapore occurring from 2001 onwards. Singapore is expected to become warmer, with annual mean temperatures rising between 0.6 and 5°C by end century[2].

3. In July 2023, the Ministry of Sustainability and the Environment (MSE) and the National Environment Agency (NEA) jointly launched a Heat Stress Advisory based on the Wet Bulb Globe Temperature (WBGT)[3]. It provides guidance to the public on making informed decisions related to prolonged exposure to hot weather [4].

4. Due to the outdoor nature of OAE programmes and diverse health and fitness levels of participants, it is imperative for OAE programme providers to establish a readily-implemented and comprehensive heat stress management plan for their activities.

5. Referencing NEA heat advisory guidelines, the OAE Council advises that OAE programme providers take precautionary measures when the WBGT level exceeds 30°C and above. This threshold is aligned to regions with similar climatic patterns in the United States of America[5] and Japan[6], as well as the Singapore Armed Forces, which enforces a more stringent work rest cycle for when WBGT exceeds 30°C[7]. Other considerations include the different intensity of outdoor activities within OAE programmes and the varying health conditions of youth participants. The advised

[1] Metrological Service Singapore (2023, Aug 1), Past Climate Trends
[2] Metrological Service Singapore and National Environment Agency, (2024, Jan 5), Latest Climate Projections For Singapore Show Intensifying Urban Heat And More Wet & Dry Extremes
[3] National Environment Agency utilises WBGT as the indicator to assess heat stress. It encompasses the combined impact of humidity, solar radiation, and wind exposure in direct sunlight. For more information, please visit NEA Learn About Heat Stress
[4] National Environment Agency (2023, Jul 24), New Heat Stress Advisory Launched To Guide Public On Minimising Risk Of Heat-Related Illnesses
[5] Grundstein, A., Williams, C., Phan, M., & Cooper, E. (2015). Regional heat safety thresholds for athletics in the contiguous United States. *Applied Geography*, *56*, 55-60.
[6] Oka, K., Honda, Y., & Hijioka, Y. (2023). Launching criteria of 'Heatstroke Alert' in Japan according to regionality and age group. *Environmental Research Communications*, *5*(2), 025002.
[7] Leong,M., Ong, M., Chew, K., Teoh, C.S., Lee, J. (2018). Heat Injury management in the SAF: A Report by the External Review Panel on Heat Injury Management

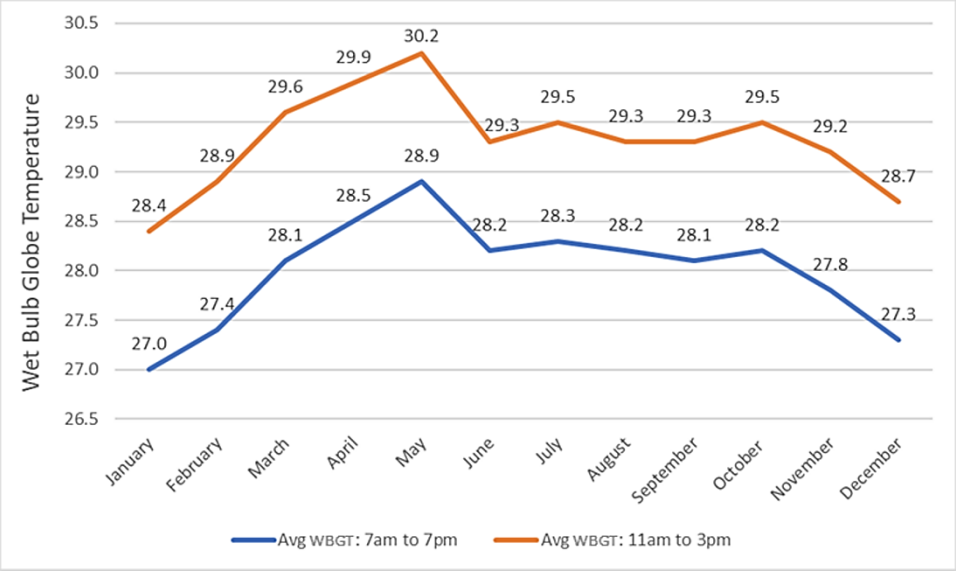
WBGT level provides a conservative yet practical threshold for OAE activities, ensuring a balance between promoting outdoor experiences and safeguarding the well-being of all participants.

MEASURING HEAT STRESS AND PROMINENT PERIODS WITH INCREASED RISK OF HEAT STRESS

6. Aggregated WBGT data from January 2018 to December 2023 reveals that average daytime (7am to 7pm) WBGT between the months of March to October are higher than 28ºC, with April and May having the highest average WBGT levels during daytime.

7. Notably, the period between 11am to 3pm recorded higher average WBGT levels, particularly in April (29.9ºC) and May (30.2ºC). OAE programme providers are advised to increase heat stress monitoring efforts during this period[8].

Figure 1: Average daytime WBGT (blue line) and average WBGT between 11am to 3pm (orange line), Singapore - 2018 to 2023



MITIGATING HEAT STRESS IN OAE PROGRAMMES

8. The OAE Council strongly encourages all OAE programme providers to adopt the following, particularly during prominent periods with increased risk of heat stress between 11am to 3pm, and particularly in April and May:

[8] Please note that the average values provided are generally lower than the daily recorded values. OAE providers are advised to use the NEA myENV app for real-time WBGT readings.

a. Monitor closely and respond proactively to changes to WBGT and Heat Stress Level through NEA's real-time website or myENV mobile app. Develop and implement practical plans through a thorough risk assessment and by referencing the Heat Stress Advisory by MSE and NEA.

b. Monitor participants closely and introduce preemptive heat mitigation initiatives. Demonstrate duty of care and support all participants by recognising their non-verbal cues, providing constant reminders and enforcing initiatives such as routine hydration.

c. Have an emergency action plan (EAP) in place in preparation for any heat-related emergency. This should include pre, during and post-emergency procedures. Programme providers should reference the EAP Best Practice Guide (https://go.gov.sg/eapguide) published by the OAE Council.

d. Adapt and adopt innovative yet practical ideas to continue providing participants quality outdoor adventure experiences. Industries such as construction, sports and food delivery have implemented ideas which OAE providers can adapt. They include maximising early morning and evenings, wetting down, providing electrolyte drinks and issuing regular reminders on heat advisory risks[9].

e. Amplify training and education on heat-related injuries. Ensure practitioners and supporting staff are aware of early signs of heat injuries, such as dizziness, cramps, or confusion. It is the provider's responsibility to ensure staff are competent in preventing, identifying and handling heat injuries.

9. OAE Programme providers can refer to Annex A for a list of resources on heat stress.

CONCLUSION

10. The OAE Council urges OAE programme providers to remain vigilant in preventing heat-related injuries. OAE programme providers should consider the impact of increased temperatures when designing their programmes and establish a comprehensive heat stress management plan to ensure a safe and positive programme experience for all participants.

11. For queries, please email the OAE Council at OAE_Council@mccy.gov.sg.

[9] Channel NewsAsia (2023, Aug 14), Stay hydrated, avoid afternoons: Heat stress measures in place even before advisory, outdoor groups say

Annex A – Resources for Heat Stress

Agency	Guideline	Link
Metrological Service Singapore (MSS)	Heat Stress Map and Heat Stress Advisory	MSS Advisory
	Learn about Heat Stress	Learn about Heat Stress
Workplace Safety and Health Council (WSHC)	Heat Stress Management	TAL Heat Stress Management
	Heat Stress Management Compliance Checklist (Construction)	TAL Heat Stress Management Compliance Checklist
	WSH Guidelines on Managing Heat Stress in the Workplace	WSH Guidelines on Managing Heat Stress
National Environment Agency (NEA)	Local weather statistics	NEA Weather
Ministry of Manpower (MOM)	FAQ on Heat Stress measures for Outdoor Work	MOM Heat Stress for Outdoor Work
Sport Singapore (SportSG)	Heat Disorder Prevention & UV Protection Guide	SportSG Heat-related Guide
	Heat Stress Management Plan for Sport Fraternity	SportSG Heat Stress Management

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