

A Social Ecological Model of On-Farm Heat Safety

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Introduction

Climate change will increase the already disproportionate heat risk that farm workers face. Individual behavior change interventions like heat safety training—while essential—will likely not be enough to mitigate this risk [1]. The below adaptation of Ramos's [2] Social Ecological Model of Migrant Farmworker Health is a tool for extension professionals to communicate the need for multi-level heat safety interventions that equitably disperse responsibility for farm worker safety between workers, companies, industry leaders, and policymakers.

Conceptual Framework

Public Policy

Migration & trade policies, minimum wage, H-2A program, work safety regulation and enforcement

Heat risk charts like this are widely used in sports and military

Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work	
		Work/Rest (min)	Water intake (qt/hr)	Work/Rest (min)	Water intake (qt/hr)	Work/Rest (min)	Water intake (qt/hr)
1 (green)	78° - 81.9°	NL	%	NL	%	40:20 min	%
2 (yellow)	82° - 84.9°	NL	%	50:10 min	%	30:30 min	%
3 (orange)	85° - 87.9°	NL	%	40:20 min	%	30:30 min	%
4 (red)	88° - 89.9°	NL	%	30:30 min	%	20:40 min	%
5 (dark red)	> 90°	50:10 min	1	20:40 min	1	10:50 min	1

Company

Company-provided training, emergency protocols, regulation compliance, provision of water and bathrooms



Farm Worker

Personal risk factors, role within crew, knowledge, attitudes, behaviors

Public Policy

Industry

Company

Crew

Farm Worker

Crop(s), payment method, piece rates [3], geographic location, required work effort [4]



Industry

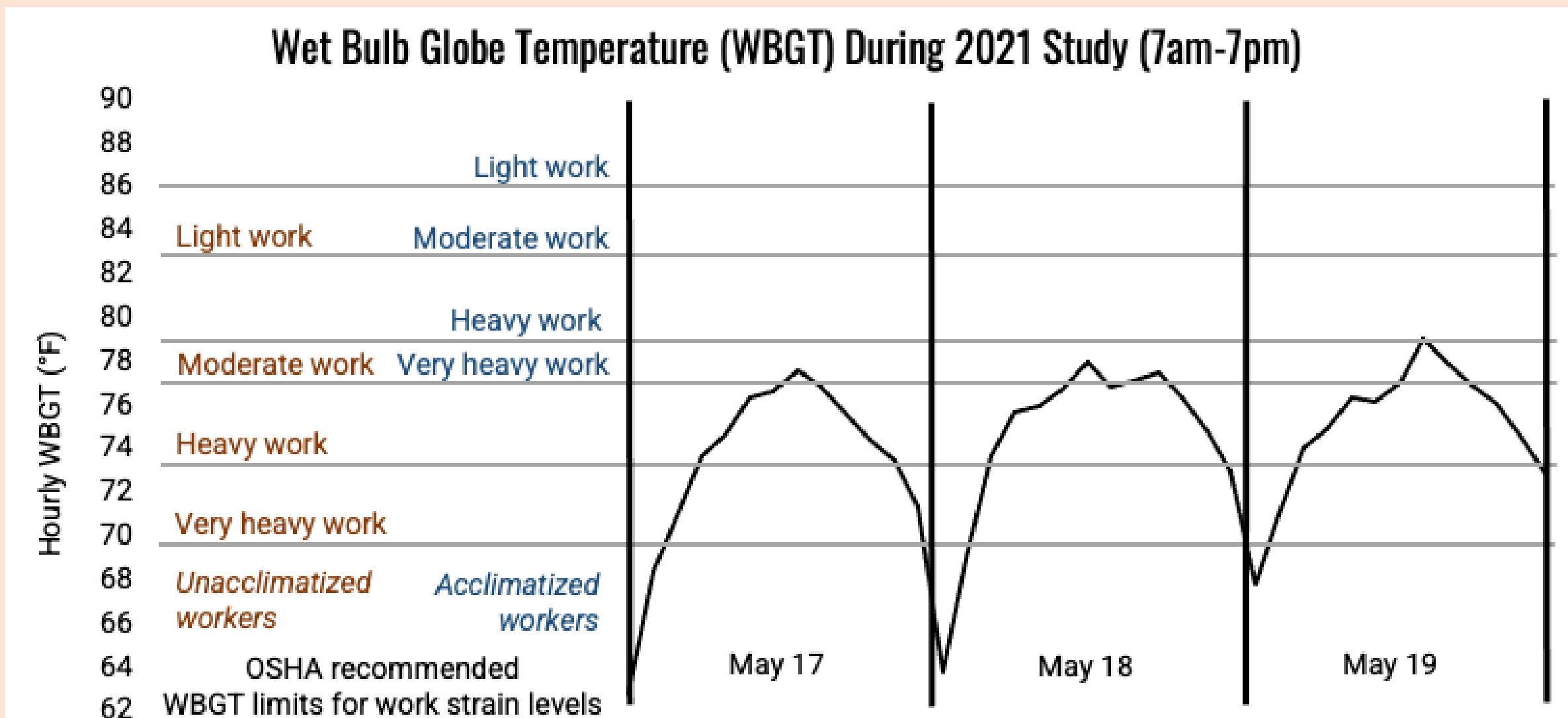
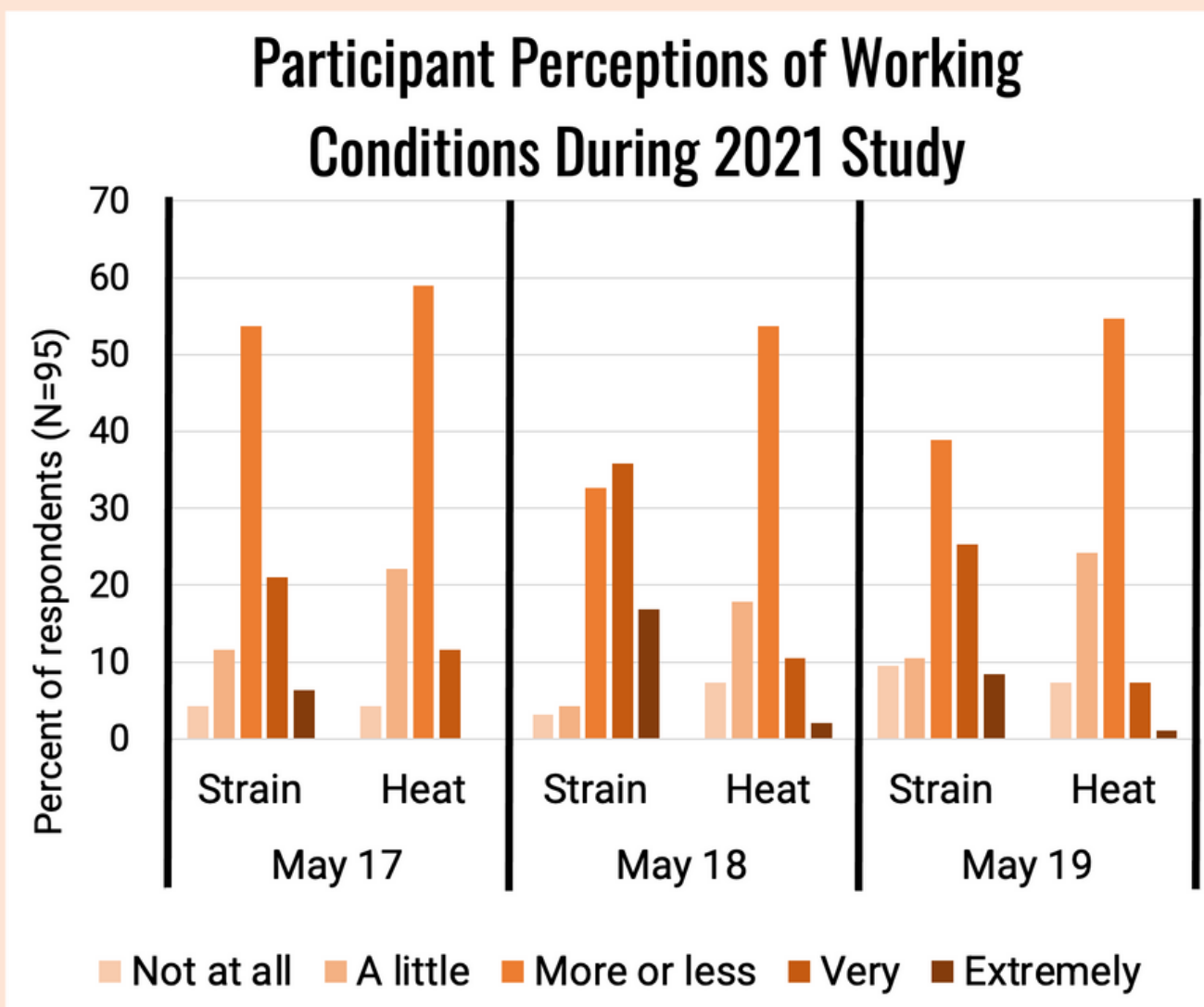
Crew

Safety culture, supervisor preventive or risk-increasing behaviors, task specialization

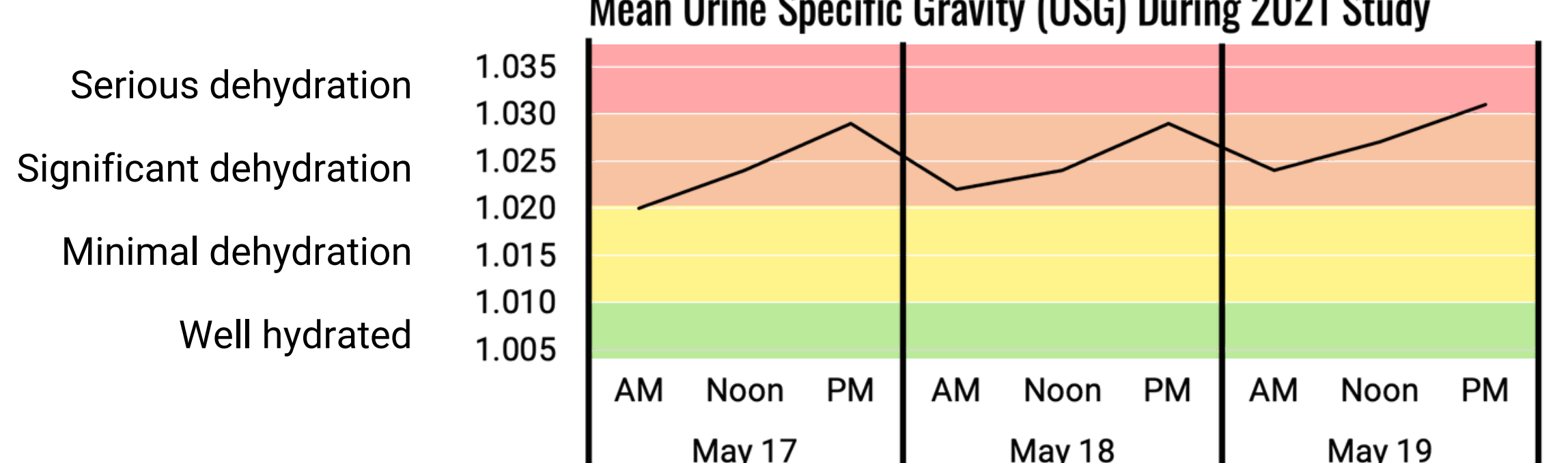


Evidence Base

During a May 2021 study, workers typically rated their work as moderately to very strenuous. Despite hot and sometimes risky weather, workers typically rated conditions as 'more or less' hot. Yet, mean urine specific gravity (USG) indicated consistently significant levels of dehydration.



Refractometers were used to measure urine specific gravity, an indicator of hydration status.



Implications

Workers cope with hot conditions and often consider heat risk as just 'part of the job' [3]. Agriculture needs better tools to measure farm worker-specific heat risks and supporting workers and supervisors in mitigating them.



Future interventions should focus on safety culture in addition to knowledge gain. Companies must prioritize adequate hydration at the start of the day, scheduled rest and water breaks, more readily available liquids (including electrolytes), and increased caution during high heat and humidity conditions.



Screenshot of WhatsApp group with peer health promoters

References

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- [3] Morera, M. C., Gusto, C., Monaghan, P. F., Tovar-Aguilar, J. A., & Roka, F. M. (2020). "We force ourselves": Productivity, workplace culture, and HRI prevention in Florida's citrus groves. *Safety*, 6(3). <https://doi.org/10.3390/safety6030041>
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