Objectives To enumerate and characterize HR-AKI cases among U.S. workers in a range of industries.

Methods Two data sources were analyzed: (1) archived case files of the Occupational Safety and Health Administration's (OSHA) Directorate of Technical Support and Emergency Management's Office of Occupational Medicine and Nursing from 2010 through 2020, and (2) the Severe Injury Reports database of work-related hospitalizations that employers reported to OSHA as required by regulation from 2015 to 2020. Confirmed cases of HR-AKI were ascertained by serum creatinine measurements. When creatinine measurements were unavailable, probable and possible cases of HR-AKI were ascertained from narrative incident descriptions. Industry-specific incidence rates of HR-AKI were computed. Capture-recapture methods assessed underreporting.

Results There were 607 cases of HR-AKI, including 22 confirmed cases and 585 probable or possible cases. HR-AKI occurred in a variety of indoor and outdoor industries including manufacturing, construction, mail and package delivery, and solid waste collection. Among the confirmed cases, 95.2% were male, 50.0% had hypertension, and 40.9% were newly hired workers. Incidence rates from 1.0 to 2.5 HR-AKI hospitalizations per 100,000 workers per year were observed in high-risk industries. The capture-recapture analysis suggested that employers accurately reported only 41.2% of eligible HR-AKI hospitalizations.

Conclusions Workers experienced HR-AKI in a diverse range of industries, including indoor facilities. Because of underreporting, data on work-related hospitalizations likely underestimate the true burden of occupational HR-AKI. Clinicians should be aware of kidney risk from recurrent heat stress. Employers should provide interventions to prevent kidney injury in heat-exposed workers.

O-163

PROTECTION, RESILIENCE, EFFICIENCY AND PREVENTION (PREP), PREPARING WORKERS AND EMPLOYERS FOR A CHANGING CLIMATE

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Introduction Chronic kidney disease of nontraditional cause (CKDnt), is a risk for millions of workers in Latin America and Asia. Treatment is expensive, resulting in early death for those affected. Strenuous work in extreme heat without sufficient rest and hydration is an important driver. Without prevention, this epidemic will likely accelerate due to climate change.

Objectives We established the Adelante Initiative, a workplace intervention focusing on heat stress mitigation, together with improved ergonomics, and organizational assessment designed to prevent CKDnt among workers at a sugarcane mill in Nicaragua. We aim to adapt the program to other geographies and industries.

Methods PREP builds on Adelante, investigating the following: 1) immediate and long-term impact of the intervention has on workforce health and productivity; 2) economic and social impacts on those affected by CKDnt and whether intervention promotes resilience 3) the economic burden on health systems treating CKDnt; 4) analysis of public and private policies to understand what policy factors (present or absent), have

contributed to the disease and what policies are required to address it.

Preliminary observations Despite the inconsistent implementation of intervention there is a 72% reduction of kidney injury. The economic burden in households with CKDnt is dire. CKDnt is depleting health systems. Current public and private policies are insufficient to address CKDnt though signs are encouraging within the development sector and some industries.

Conclusions Knowledge gained will create the groundwork to expand to other sugarcane mills and eventually other industries at-risk for heat stress and CKDnt. Climate change means more extreme temperatures in already impacted regions and the likelihood that regions further north and south of the equator will also be impacted by CKDnt. It is essential to develop a model to protect worker health and productivity. Occupational heat stress and resulting CKDnt require increased attention and resources.

O-370

HOT AMBIENT TEMPERATURE AND ITS IMPACTS ON ADVERSE PREGNANCY OUTCOME (APO) -A SYSTEMATIC REVIEW

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Introduction Exposures to hot ambient temperature have been associated with pregnancy complications and congenital abnormalities among working pregnant women. Workplace heat is likely to exacerbate the Adverse Pregnancy Outcomes (APO) especially with rising temperatures in tropical countries. Research evidence that associates occupational heat stress and APO are scarce and there is a need for new types of knowledge in this research area.

Objective Review the evidence from published literature on the association between exposure to hot ambient temperature and APOs.

Methods We conducted a systematic literature review of the published literature on the effects of hot ambient/occupational temperature and its impacts on pregnancy outcomes from databases such as Pub Med, Cochrane, Web of Science, and Science direct. We searched more than 500 related original & review articles, short communications, dissertations, newsletters, and book chapters. We systematically grouped the reviewed literature into the following categories: Heat stress/strain, adverse maternal, fetal outcome, and interventions. The categorized literature was then analyzed and examined the principal findings of the studies.

Results This review found a convincing association between heat stress and APOs among the exposed pregnant women, including miscarriages, preterm birth, stillbirth, low birth weight (LBW), and congenital anomalies. Furthermore, few articles found occupational heat may intensify the complications, an anticipated risk, which may trigger APOs during all the trimesters. Our review informs the magnitude and significance of the impacts of heat stress on pregnant women's health, providing useful information for exploring the biological mechanisms of APOs and also outlines various interventions to prevent heat-related APOs.

Conclusions The limited quantity of existing review gave us key insights and reemphasized the need for more extensive

cohort studies, and strong evidence to design robust policies to protect pregnant women from heat stress risks in developing countries for improved reproductive health.

0-371

OCCUPATIONAL HEAT EXPOSURES AND RENAL HEALTH IMPLICATIONS – A CROSS-SECTIONAL STUDY AMONG COMMERCIAL KITCHEN WORKERS IN SOUTH INDIA

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Introduction Strenuous jobs in hot working environments, such as in commercial kitchens, are proven risk factors for adverse renal implications for workers working without adequate interventions. Evidence is scarce on the heat exposures and their impacts on commercial kitchen workers' renal health.

Objectives To investigate the renal health implications due to the workers' exposures to heat stress and exertion in commercial kitchens.

Methods We conducted a cross-sectional study among 266 workers in 7-commercial kitchens in the summer and winter of 2018. We monitored the Wet Bulb Globe Temperatures (WBGT), the physiological indicators of heat strain viz., rise in Core Body Temperature (CBT), Sweat Rate (SwR), and Urine specific gravity (USG) and analyzed the post-shift serum creatinine to calculate the estimated Glomerular Filtration Rate (eGFR). We administered a validated questionnaire to capture the workers' self-reported renal health symptoms of heat stress.

Results About 66% of workers were exposed to WBGTs levels higher than the safer Threshold Limit Value (TLV) with an average exposure of $30.1^{\circ}\text{C} \pm 2.7^{\circ}\text{C}$. Among the exposed workers, 82% reported experiencing heat strain symptoms such as excessive sweating, exhaustion, headache irrespective of the season. Above TLV-WBGT exposures were significantly associated with self-reported symptoms of dehydration (Adjusted Odds Ratio (AOR):2.3; 95% CI:1.2–4.3) and measured heat strain indicators (AOR: 2.9; 95% CI:1.6–5.1). Prevalence of heat strain indicators viz., rise in CBT (9.1%), SwR (17%), USG (75%), was observed among heat-exposed workers. Heat-exposed workers had a 2.8-fold higher risk of reduced kidney function (eGFR of $< 90 \text{ mL/min/1.73 m}^2$) even after adjusting for the potential confounders (AOR:2.8; 95% CI:1.1–6.9).

Conclusion The preliminary study results show adverse renal impacts of heat exposures among commercial kitchen workers that warrant further investigation to arrive at conclusive results. A need for adaptation and interventions is imperative to protect few million kitchen workers from hazards of occupational heat stress.

0-418

OCCUPATIONAL HEAT EXPOSURES, PHYSIOLOGICAL RESPONSES AND RENAL HEALTH OUTCOMES AMONG BRICK WORKERS IN SOUTH INDIA

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Introduction Rising temperature with consequent heat stress is likely to subject millions of workers exerting outdoors at risk of heat-related illnesses and adverse renal health outcomes. Need for such research evidence is urgently needed to address this issue especially in the changing climate scenario.

Objective To investigate the relationship between occupational heat stress, physiological indicators of heat strain, and associated renal health outcomes among brick workers in South India.

Methods We conducted a cross-sectional survey with 327 brick workers during the summer of 2017 & 2018. We collected Wet Bulb Globe Temperatures (WBGT $^{\circ}\text{C}$), pre-and post-shift Core Body Temperature (CBT), Urine Specific Gravity (USG), and post-shift Sweat rate (SwR), and serum creatinine/uric acid for calculating eGFR (estimated Glomerular Filtration Rate), a kidney function indicator.

Results Workers were exposed to an average WBGT of $27.7^{\circ}\text{C} \pm 2.2$ with more than 51% of measurements above the ACGIH-Threshold Limit Value (TLV). 69% of the workers reported heat-strain symptoms such as excessive sweating, exhaustion, and headaches. The workers exposed to above TLV-WBGT had 1.8-fold higher risk of dehydration (Adjusted Odds Ratio (AOR):1.8; 95%CI: 1.0–3.0, $p=0.03$), rise in CBT (AOR=2.2, CI: 1.0–4.7, $p=0.02$) and measured heat-related symptoms (AOR=2.5, 95%CI: 1.5–4.2, $p=0.0001$). Heat-exposed workers had CBT $>1^{\circ}\text{C}$ (14%), SwR $>1\text{lit/hr}$ (24%), and USG >1.020 (35%). The prevalence of low eGFR (; 95%CI: 1.6–4.2) compared to workers exposed to WBGT below TLV.

Conclusion The preliminary study results only give a clue to the impacts of occupational heat stress on renal health. To have conclusive results, further epidemiological investigations are warranted with stratification for various personal and exposure factors that determine the disease etiology. With or without evidence, the drive for precautionary protective labor policies/welfare measures does not diminish for better occupational health outcomes.

0-427

RISK FACTORS FOR ELEVATED CORE BODY TEMPERATURE IN FARMWORKERS

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Introduction Heat-related illness (HRI) poses a serious occupational health risk for farmworkers, particularly considering harvest season corresponds to peak summertime heat. The California Heat Illness Prevention Study (CHIPS) collected objective data on the physiological responses of farmworkers to environmental heat, covering a wide range of crops and working conditions.

Objectives The primary objective of this analysis is to identify risk factors for elevated core body temperature (CBT).

Methods A convenience sample of farmworkers was recruited through farms and farm labor contractors. Bilingual researchers administered questionnaires pre- and post-shift. CBT and work rate were measured using an ingestible wireless thermistor and an accelerometer, respectively. Ambient weather conditions, including wet bulb globe temperature (WBGT), were recorded using two weather stations at the work site. Multiple