

# Climate, Work & Health

## Ensuring a Sustainable Workforce

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*This session's contents are solely the responsibility of the speakers and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.*



# Who We Are Center for Health, Work & Environment

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- NIOSH Mountain and Plains Education and Research Center
- NIOSH Total Worker Health® Center of Excellence
- Based at the Colorado School of Public Health – est. 2008, collaborative (UNC, CSU, UCD), five departments

# Our Mission

Our mission is to advance worker health, safety, and well-being.

We do this through educating future leaders, conducting rigorous research, and designing practical solutions to occupational health and safety challenges with our partners.

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# Our Research

Our research focuses on testing new methodologies and implementing practical solutions to advance worker health, safety, and wellbeing. The research is interdisciplinary, international, and designed to impact workplaces in greatest need, including small and medium sized businesses, construction, energy, healthcare, manufacturing, and agriculture.

# Our Approach

Total Worker Health® is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with the promotion of injury and illness-prevention efforts to advance worker well-being.





To collaborate with employers to build a culture of health and safety in the workplace. We aim to help organizations by offering assessment, advising and certification to improve the health, safety and well-being of all workers.

# Big Picture Vulnerabilities (Heat stress), Worker Health, World Commodities

## The Intersection Between Sustainability & Health







total worker health  
[GUATEMALA]

# Overview

- Background on Chronic Kidney Disease of Unknown Origin (CKDu)
- Epidemiologic and intervention studies in Guatemala
- Employer perspective
- Sustainability
- Implications for occupational health, occupational medicine, community health, in planetary context

# Banana: Agro-America-Banasa

## Focus on Corporate Social Responsibility

- Private family-owned Guatemalan banana and palm oil agro-business employing 3,000 workers
- Existing Corporate Social Responsibility (CSR) program - *Mis Mejores Familias*, high wages, company-built school and clinic
- Extremely poor, rural region in southwest part of country
- Investing to improve community health outcomes
- Center-to-Center Collaboration integrating community health and worker health



# Current Research with Sugarcane Workers

Prospective Renal Screening (2015-16)

Prospective Renal Study + Intervention (2016-17)

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All photos courtesy of Amanda Walker

# Sugarcane Work

- Heavy exertion, long work hours (6+)
- Exposed to intense sunlight and heat
- Manually use machetes
- Paid by amount of cane cut (average 6 tons/day)



# Leading hypotheses for CDKu epidemic

## 1. Working conditions

- Heat stress with repeat dehydration
- Hot climates
- Heavy labor occupations
- Related to climate change?

## 2. Environmental exposures

- Nephrotoxic heavy metals and agrochemicals
- Bioaccumulation of chronic low exposures
- Contaminated drinking well water
- Misuse/overuse of agrochemicals



# Sugarcane Plantation

- 4,000 field workers hired annually
  - Local and migrant
- 6-month season
- Water, rest and shade guidelines
  - $\geq 2.5$  L electrolyte solution
  - $\geq 16$  L water
  - Breaks: 3 x 30 min and 1 x 60 min
- Pre-employment screenings
  - Hiring cut-off:  $< 60$  eGFR



# Renal Function Screening (2015-16)

## Objectives:

1. Describe epi of reduced kidney function among workers
2. Examine risk factors & kidney function across harvest

All field workers (n=4000)

- Pre-employment Screening
- Creatinine

Screening participants (n=407)

- Survey and clinical data
- Creatinine

November 2015

May 2016





# Results of Screening

## Univariate Risk Factors

- Occupational
  - ↓ cane cut
  - ↓ water intake at work
  - ↓ electrolyte solution at work
- Lifestyle
  - ↑ pre-harvest creatinine
  - Local (vs. migrant)
  - Current smoker
  - NSAIDs ( $\leq$  3 months)

## Multivariate Risk Factors

- Abnormal eGFR
  - ↑ pre-harvest creatinine
  - Current smoker
- $>$  20% decline eGFR
  - ↑ pre-harvest creatinine
  - Local (vs. migrant)



2016/17 Zafra

# Potential Risk Factors

## Urine and Blood Biomarkers:

Cotinine

NSAIDs (Diclofenac)

Infectious disease (Leptospirosis)

Heavy metals (U, As, Cd)

Agrochemicals (2,4 D, glyphosate)

Dehydration (sp. gravity, weight loss)

## Water samples:

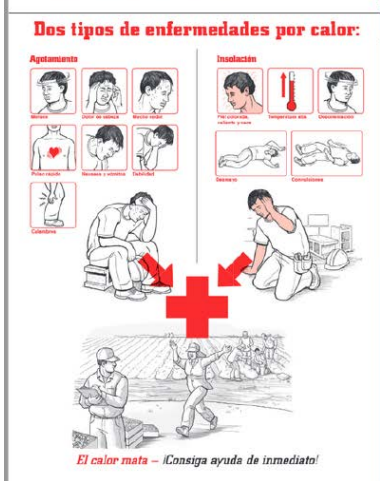
Nephrotoxic heavy metals & agrochemicals

## Survey:

24 hr recall of work & lifestyle behaviors



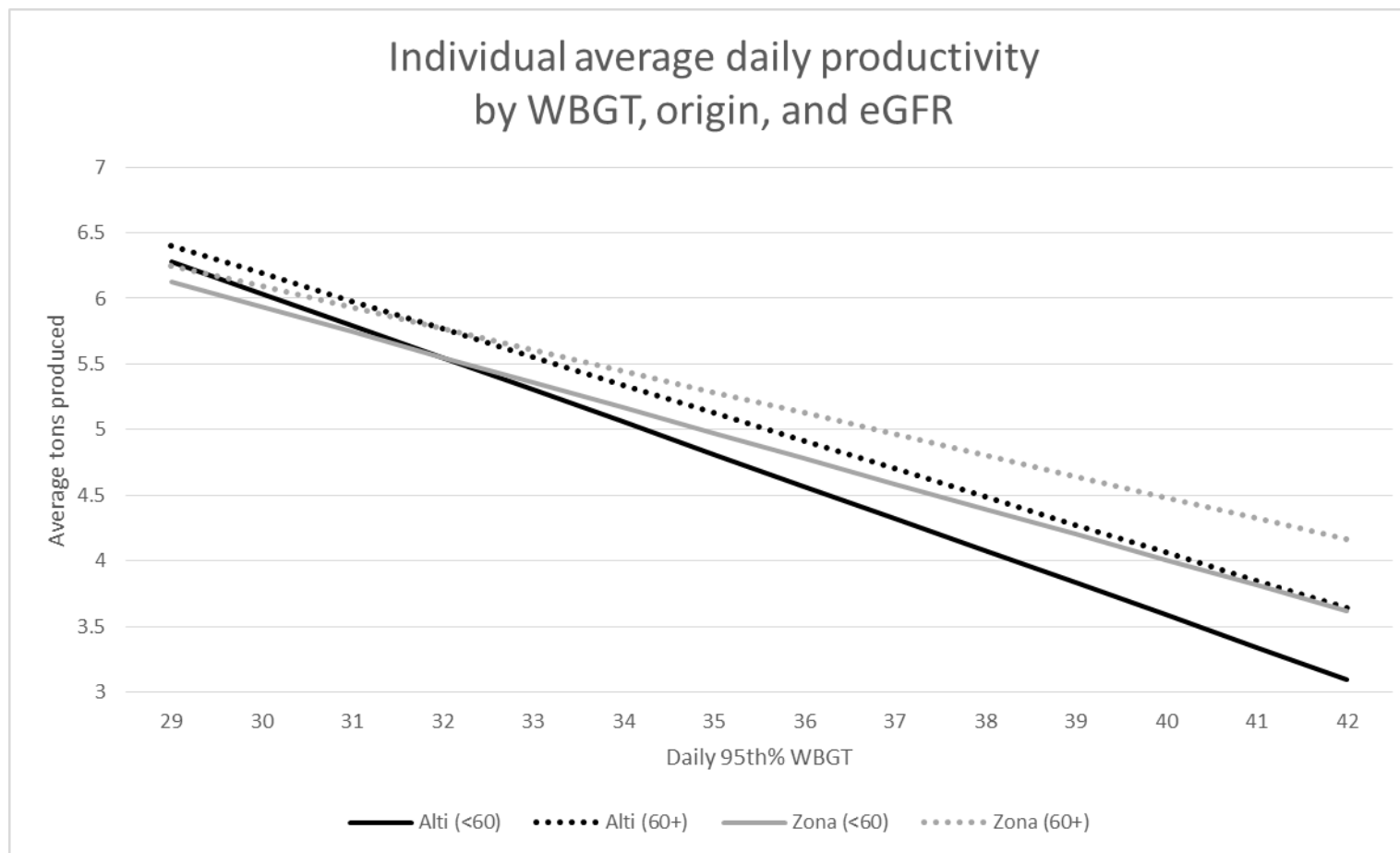
# Intervention



# Preliminary results

Cane Cutters	Seed cutters and planters
<ul style="list-style-type: none"><li>• Liquid intake: 16 L water &amp; 2.5 L electrolytes</li><li>• <b>AKI: 72%</b> (+0.3 mg/dL or 1.5 X pre)</li><li>• <b>Dehydrated: &lt; 1%</b></li><li>• Hypokalemia: 36%</li><li>• Hyponatremia: 54%</li></ul>	<ul style="list-style-type: none"><li>• Liquid intake: 5 L water &amp; 0.5 L electrolytes</li><li>• <b>AKI: 90%</b></li><li>• Dehydrated: 48%</li><li>• Hypokalemia: 52%</li><li>• Hyponatremia: 0</li></ul>

# Productivity, Heat Index & eGFR





# Corporate Social Responsibility

Sustainable Work

# The Business Landscape

- Globalization & climate change
- Current and future regulations
- Changing attitudes of shareholders and consumers
- Evolving product markets
- Innovative competitors
- New technologies
- Increased investment and insurance costs
- Public opinion
- Affect on business – operations, value chains, commercial environment
- Core operations – facilities, buildings, sites
- Production processes – cost of operations and maintenance
- Resource availability
- Large reach, vulnerable populations

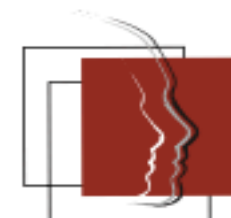


# GURN

Global Union Research Network



International  
Labour  
Office  
Geneva



## **The Employment Effects of Climate Change and Climate Change Responses: A Role for International Labour Standards?**

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*How to tackle these*  
challenges to ensure a healthy and  
productive workforce for the future?

# Sustainable Work

- Fair wages
- Safe working conditions
- Protects from hazards
- Organize workers and communities
- Surveillance
- Adaptability
- **Workforce to meet global demand for commodities in the face of climate change**

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# Climate, Work & Health Research Opportunities

## Impact of climate on:

- Health effects of pesticides
- Musculoskeletal disorders
- Psychosocial conditions
- Zoonotic diseases
- Infectious diseases
- Chronic diseases
- Productivity

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# Opportunities to Collaborate

- Research/Clinical research sites in U.S., Guatemala, elsewhere
- Expertise in conducting large field-based epidemiological studies including health outcomes
- Expertise in conducting intervention r2p
- Formed public private partnerships
- Data looking for data
- Biological specimens
- Access to cohorts of workers



# Take Homes

A sunset over a field of tall grass with birds flying in the sky. The sun is low on the horizon, creating a warm, golden glow. The sky is filled with soft, wispy clouds. The foreground is dark, with the silhouettes of tall grasses and several birds in flight.

- We have an opportunity to conduct transdisciplinary research to understand climate, work and health
- Heat stress likely significant contributor to worker health, additional work and life risk factors exist
- Center provides expertise in executing largescale field research studies – including health endpoint, developing and applying workforce interventions, and reaching both corporate and academic stakeholders
- Total Worker Health® approach plays important role in sustainability and health in the face of climate change

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- Medical team
- Nurse aides
- Agricultural team

**All photos courtesy of Amanda Walker**



# Understanding Small Enterprises

Worker Well-being & Sustainable Business Health:  
From Ideas to Achievable Reality

**Denver, CO | October 25–27**

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