



RESEARCH TO CHANGE
POLICY AND PRACTICE:

*Lessons gleaned protecting workers from **heat stress** and occupationally related CKD in Mesoamerica*

PRESENTED BY
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CEO of La Isla Network

May 9th 2023



Taking action in the face of uncertainty

Protecting workers in
a changing climate





Chronic kidney disease of non-traditional origin in Mesoamerica: a disease primarily driven by occupational heat stress

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ABSTRACT

The death toll of the epidemic of chronic kidney disease of nontraditional origin (CKDnt) in Mesoamerica runs into the tens of thousands, affecting mostly young men. There is no consensus on the etiology. Anecdotal evidence from the 1990s pointed to work in sugarcane, pesticides and heat stress were suspected. Subsequent population-based surveys supported an occupational origin with overall high male-female ratios in high-risk lowlands, but small sex differences within occupational categories, and low prevalence in non-workers. CKDnt was reported in sugarcane and other high-intensity agriculture, and in non-agricultural occupations with heavy manual labor in hot environments, but not among subsistence farmers. Recent studies with stronger designs have shown cross-shift changes in kidney function and hydration biomarkers and cross-harvest kidney function declines related to heat and workload. The implementation of a water-rest-shade intervention midharvest program appeared sufficient to prevent kidney damage among cane cutters. In Nicaragua a water-rest-shade not among cutters with heaviest workload. Studies on pesticides and infectious risk factors have been largely negative. Non-occupational risk factors do not explain the observed epidemiologic patterns. In conclusion, work is the main driver of the CKDnt epidemic in Mesoamerica, with occupational heat stress being the single unifying factor shown to lead to kidney dysfunction in affected populations. Sugarcane cutters with extreme heat stress could be viewed as a sentinel occupational population. Occupational heat stress prevention is critical, even more so in view of climate change.

Keywords

Renal insufficiency, chronic; occupational health; disorder, heat stress; pesticides; metals; infections; Central America

CKDnt in MESOAMERICA: A DEVASTATING EPIDEMIC

An epidemic of chronic kidney disease (CKD) unrelated to diabetes, hypertension and other known causes devastates

the Pacific coasts of Nicaragua, El Salvador, Costa Rica and Guatemala (1). The epidemic emerged, initially unnoticed, in the 1970s (2,3). Tens of thousands of deaths have occurred among young male agricultural workers (3,4), particularly sugarcane cutters (3). The Pan-American Health Organization

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LIN makes research relevant to practitioners and decision makers

How to change regulation or policy if you don't change research priority (policy)?



DEGREE study

Funders: UK-MRC and multiple site funders
Note: Active DEGREE program in Nepal

Adelante initiative

Funders: DEG, BMZ y GIZ

prep4change

- prevention
- ||| resilience
- + efficiency
- protection

Funders: DoL, NSF, UK & Swedish RCs

Note: Active PREP program in Nepal funded by Swedish RCs



ENBEL
Connecting
HEALTH &
CLIMATE
CHANGE

Funders: European Commission

Related work:



DIAGEO

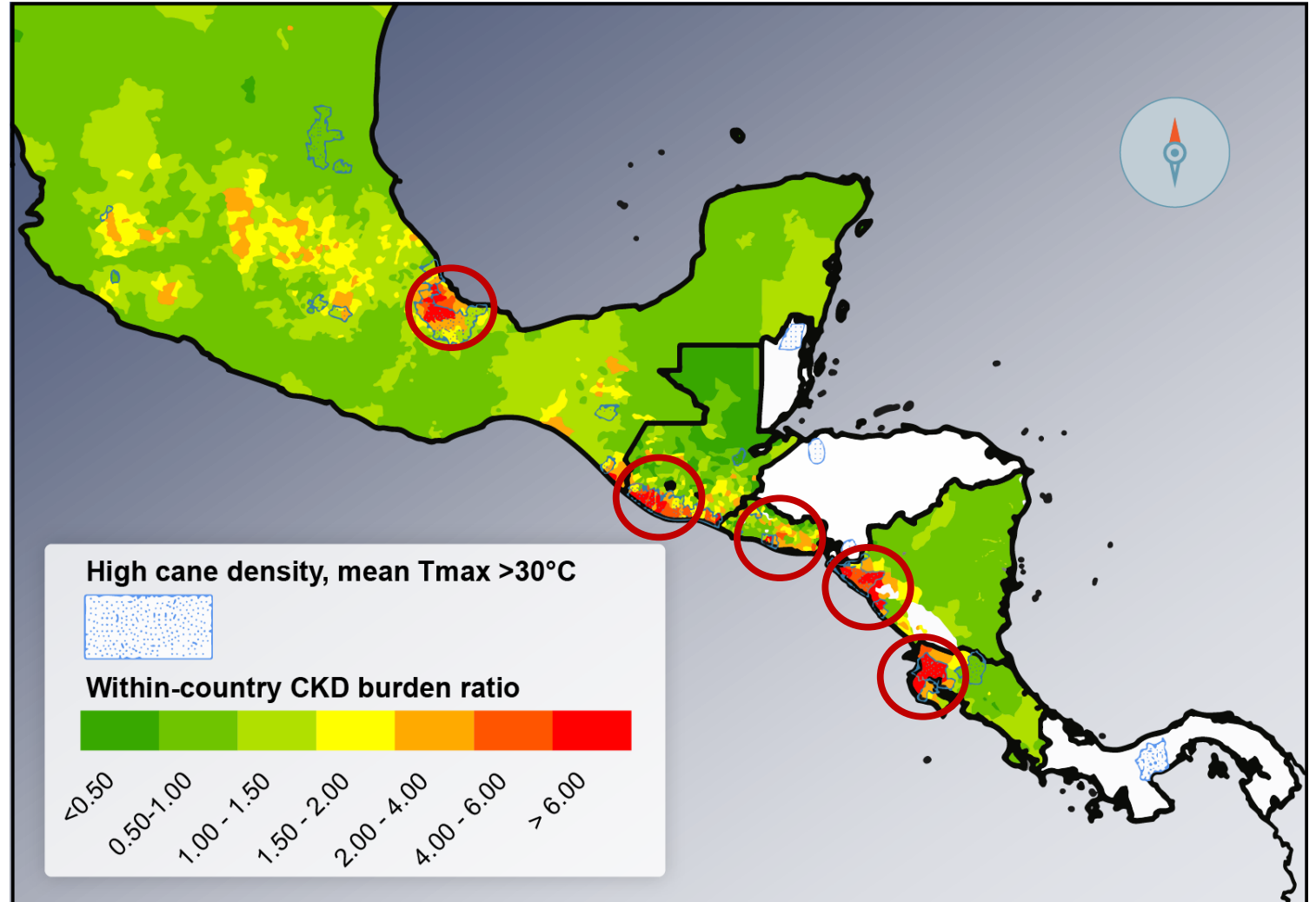
A/s VINMONOPOLET

Turner



An Unaddressed disaster prompted action

- » At least **20,000 people died** over from 2002-2012.
- » At least **25,000 more** were reported dead in Sri Lanka during a similar timeframe.
- » **Insufficient funding** provided and lack of action taken
- » **Building** on Adelante programs active in: Nepal, El Salvador, Honduras, Guatemala, Cuba, Nicaragua, Mexico, and Jamaica

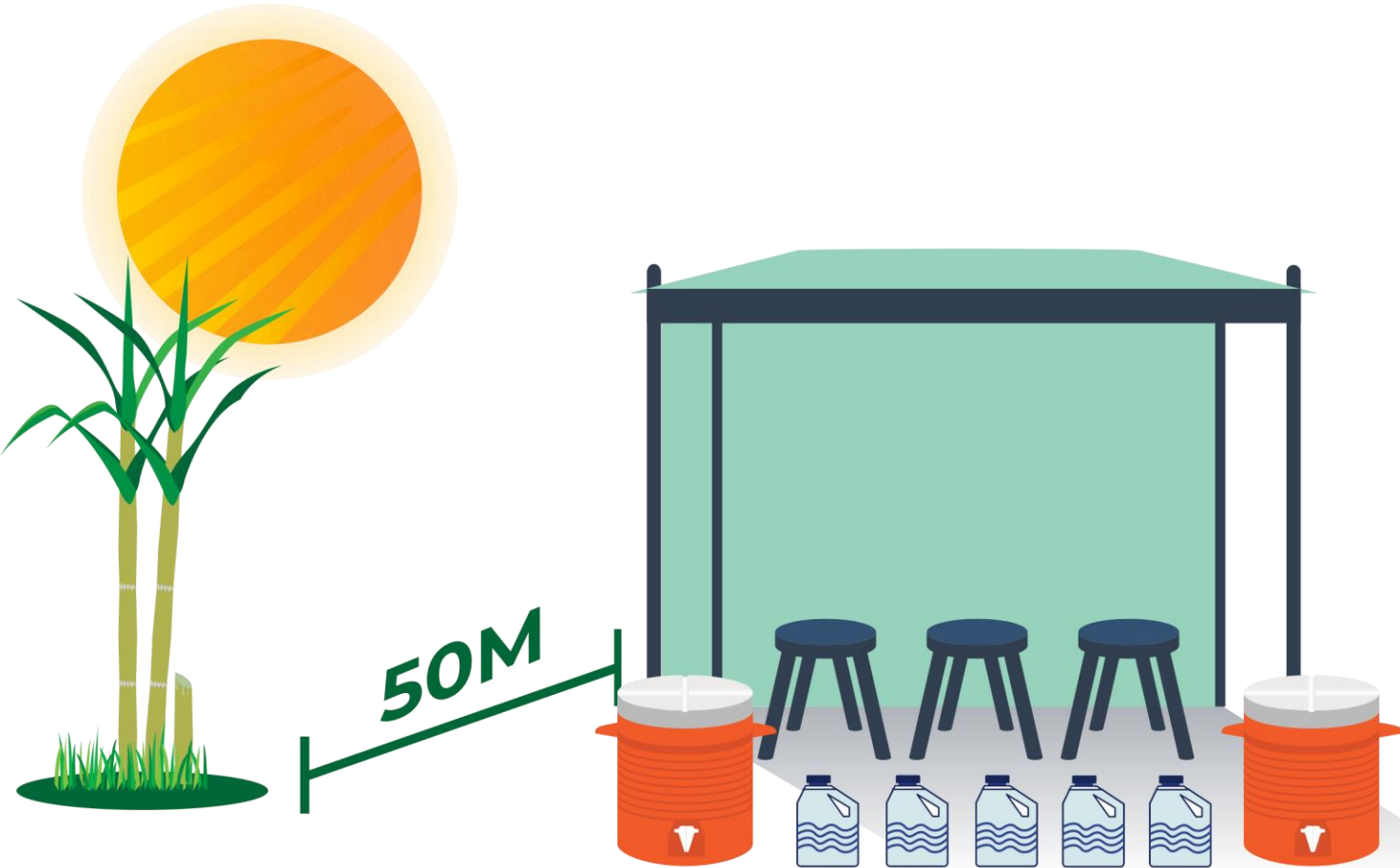


The Adelante Initiative: A Mesoamerican Center of Excellence serving over **4500** field workers

- » **Managing core temperature:** mandatory scheduled and sufficient shaded rest breaks
- » **Hydration:** provision of potable water and isotonic beverages
- » **Adherence:** implementation support and assessment
- » **Behavior Change:** Organizational management assessment and support
- » **Expansion:** 4 additional countries



Details matter

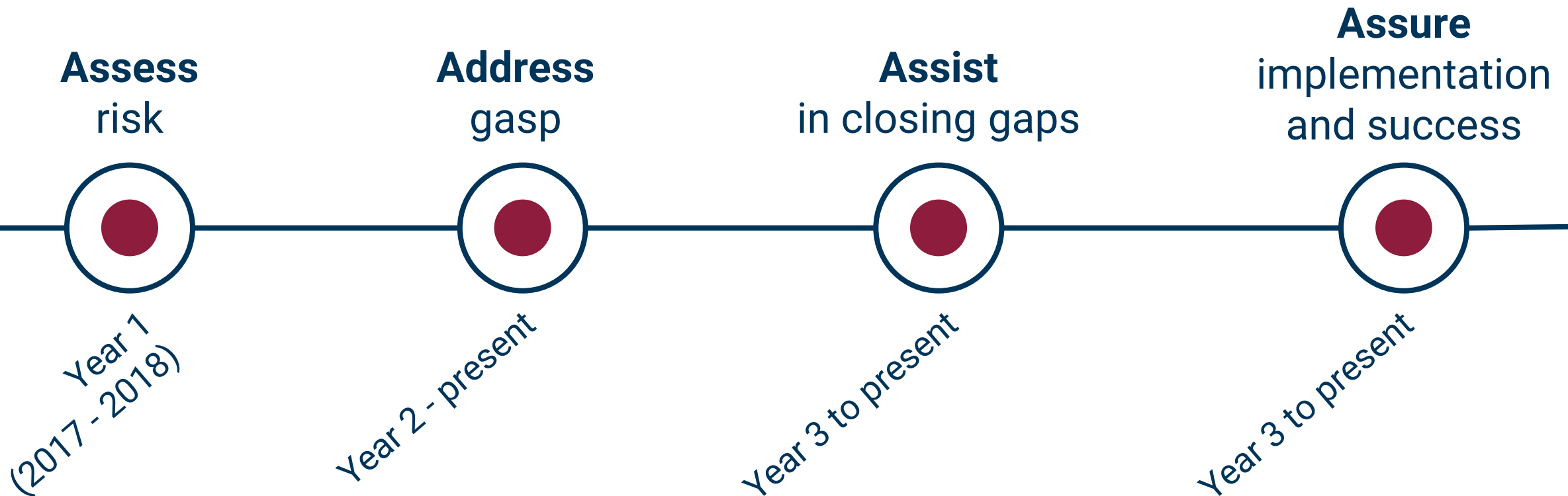
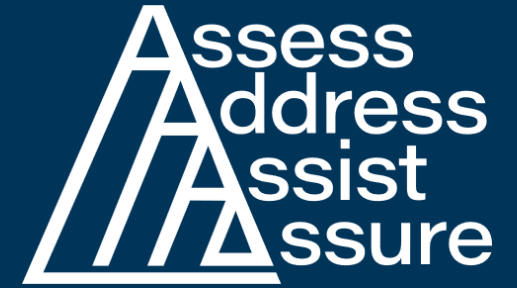


Hydration per

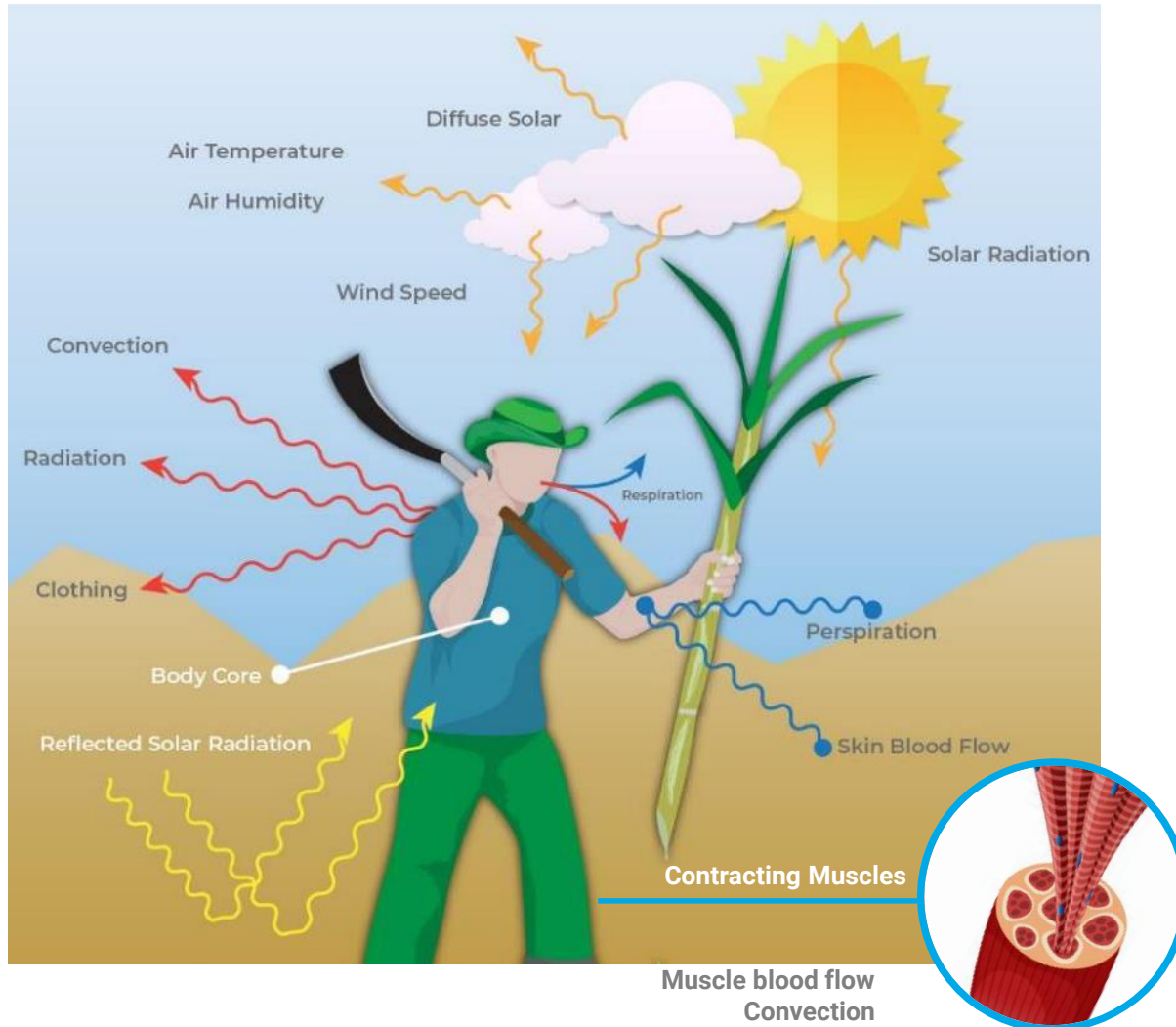
Heat Category	WBGT	Light Workload Security, Supervisors, field nurse		Medium Workload Irrigation Maintenance		Heavy Workload Cane and seed cutters	
		Water/hour	Electrolite Solution (250 ml)	Water/hour	Solución electrolítica (250ml)	Water/hour	Electrolite Solution (250ml)
1	22-27	½ lts	1 unit	¾ lts	1 unit	¾ lts	1 unit
2	27-29	½ lts	1 unit	¾ lts	1 unit	1 lts	1 unit
3	29-31	¾ lts	1 unit	¾ lts	1 unit	1 lts	1 unit
4	31-33	¾ lts	1 unit	¾ lts	1 unit	1 lts	1 unit
5	>33	1 lt	1 unit	1 lts	1 unit	1 lts	1 unit

Adelante Initiative: A platform for change

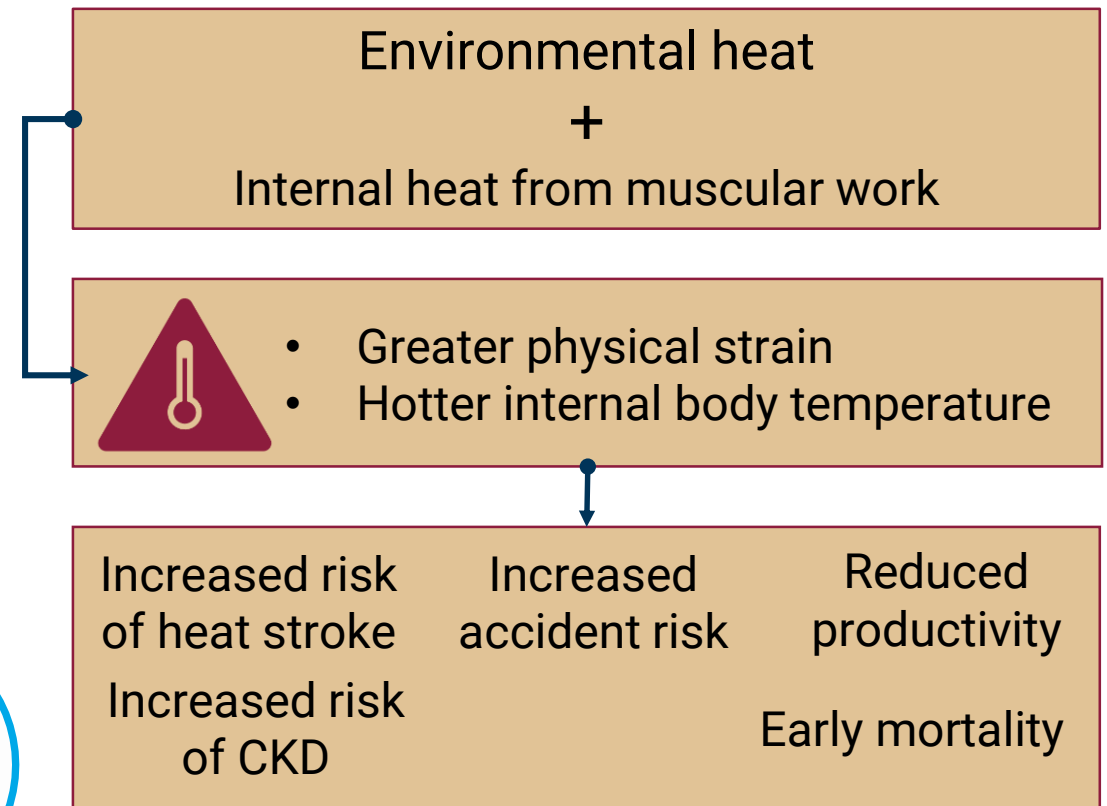
La Isla Network's four-pronged approach to improve occupational safety and health at the work place



A mortal, but addressable risk: Those facing most severe **heat stress** have worst outcomes



Heat Stress





CKD

Chronic Kidney Disease

CKDnt

Chronic Kidney Disease of Non-traditional Origin

Who Gets It?

Older people,
both males and females



Disproportionately
working age males

Risk Factors

Diabetes,
hypertension,
obesity



Strenuous labor,
without sufficient access to
water, rest and shade



How, where?

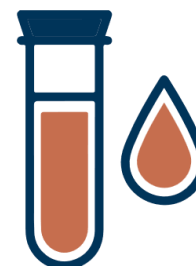


Proteinuria



Worldwide, more widespread
in developed countries

How, where?

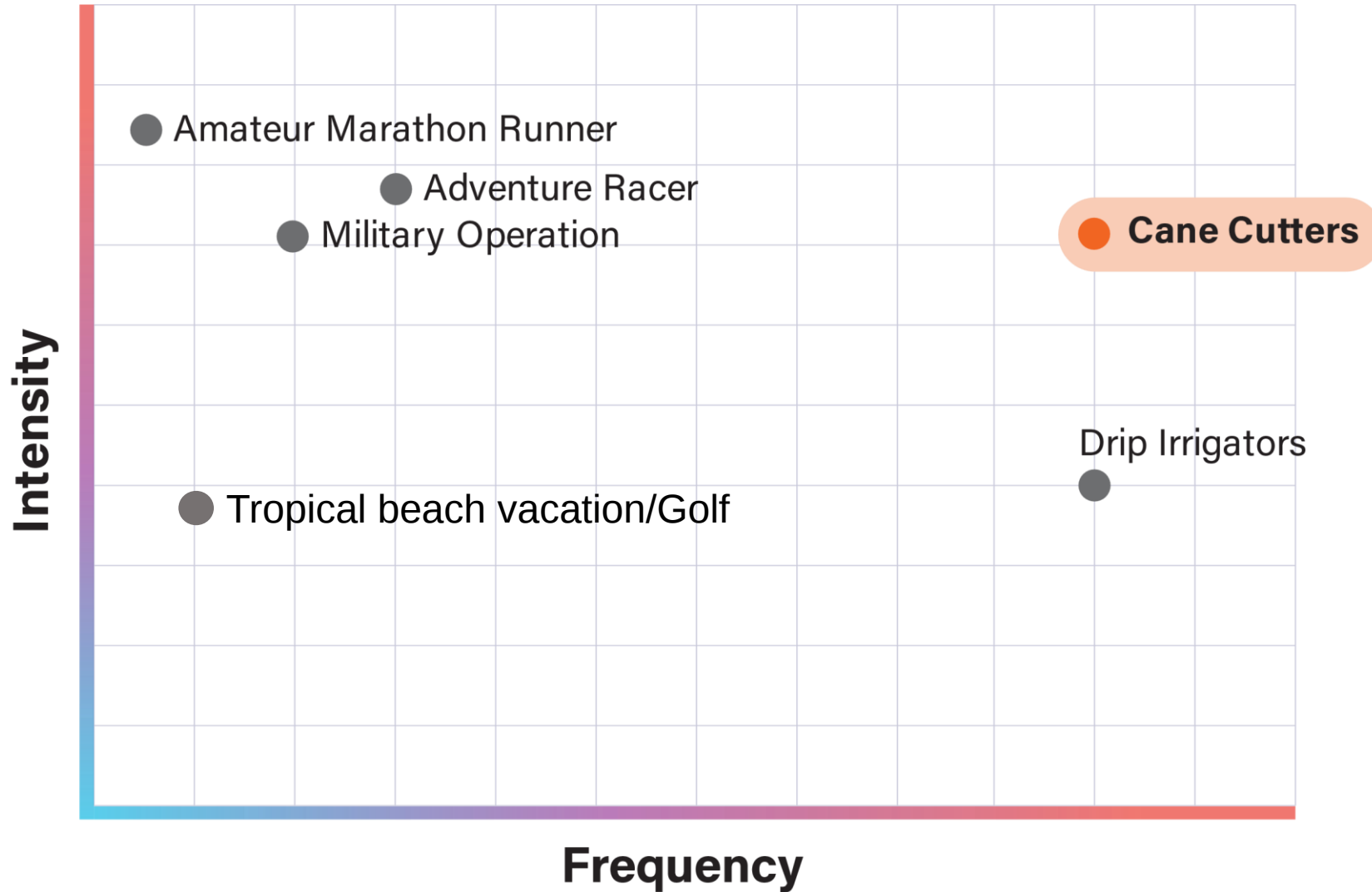


Serum
creatinine



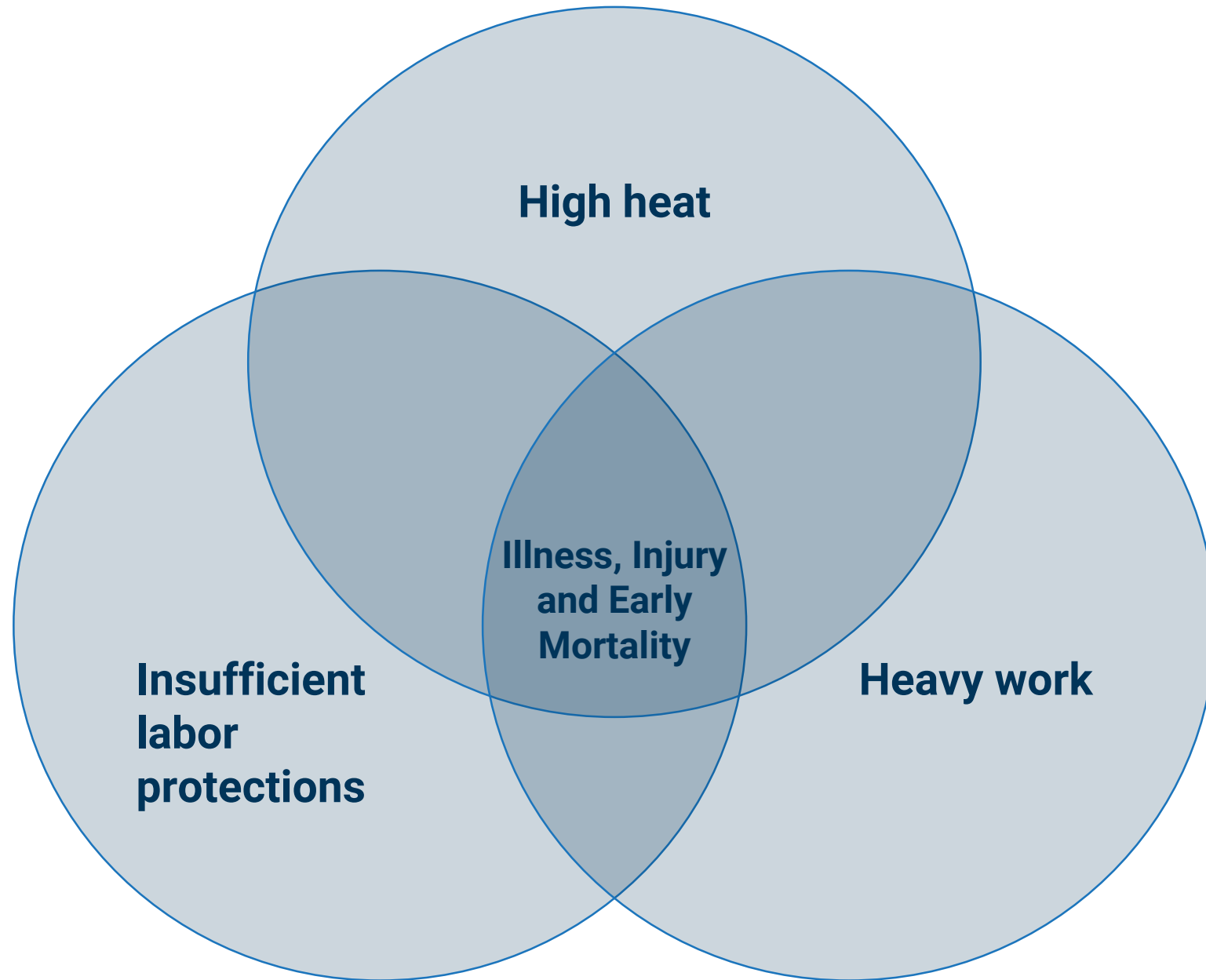
Central America, South Asia
and other tropical lowlands

Workload: An **extreme** situation yields insights



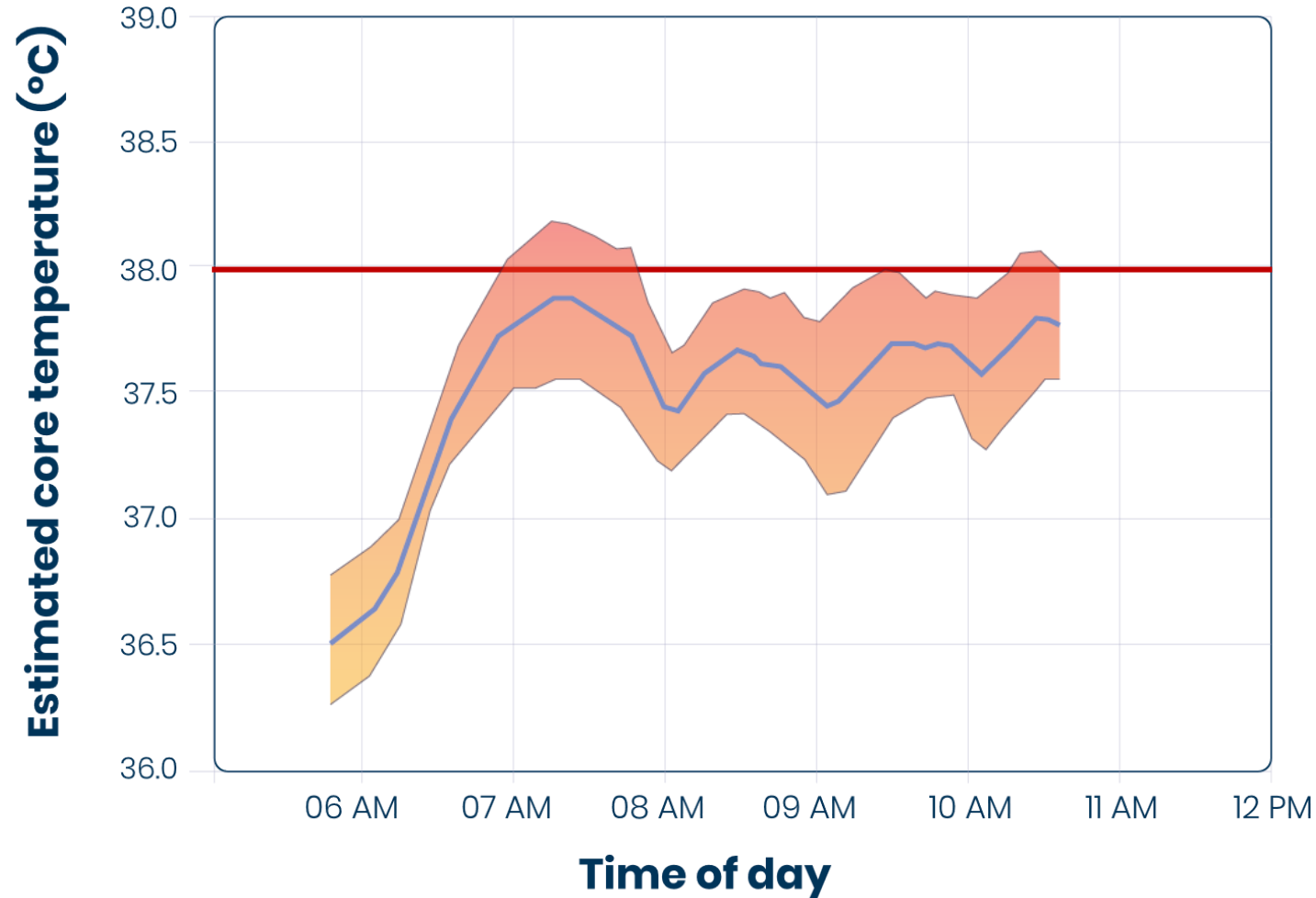
Other industries impacted globally: **Construction** is of major concern along with several sectors





A key objective:

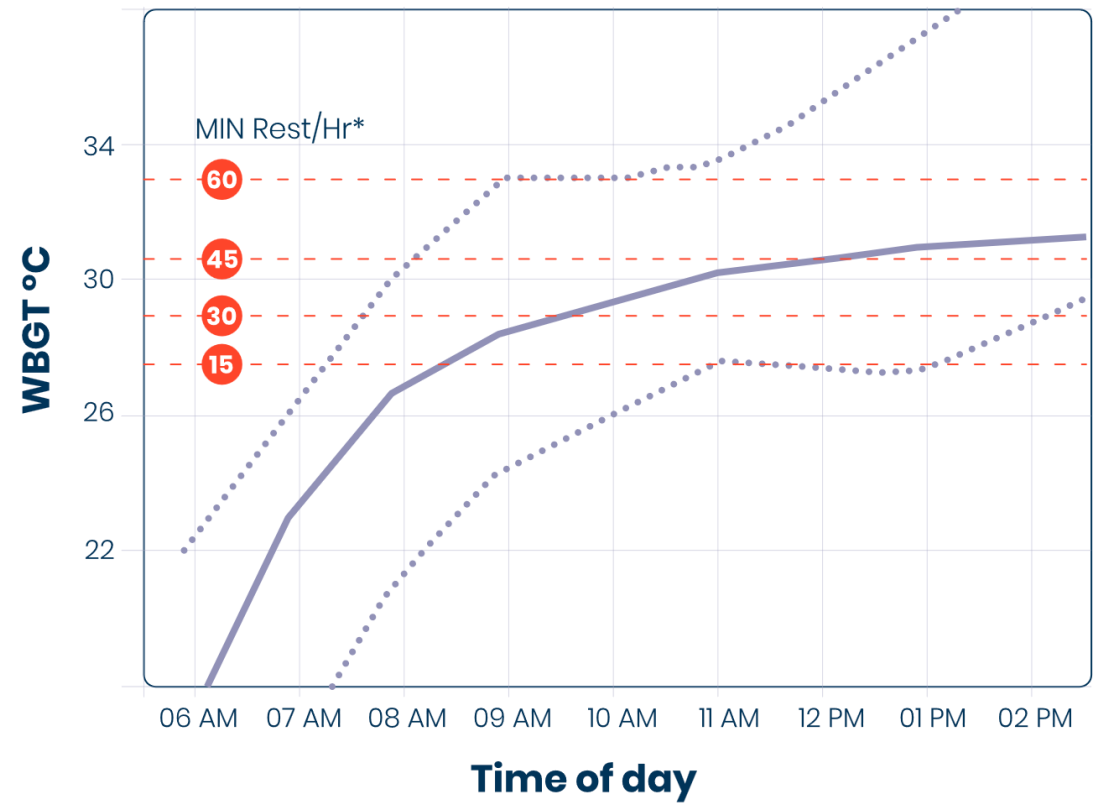
Reduce dangerously high core temps



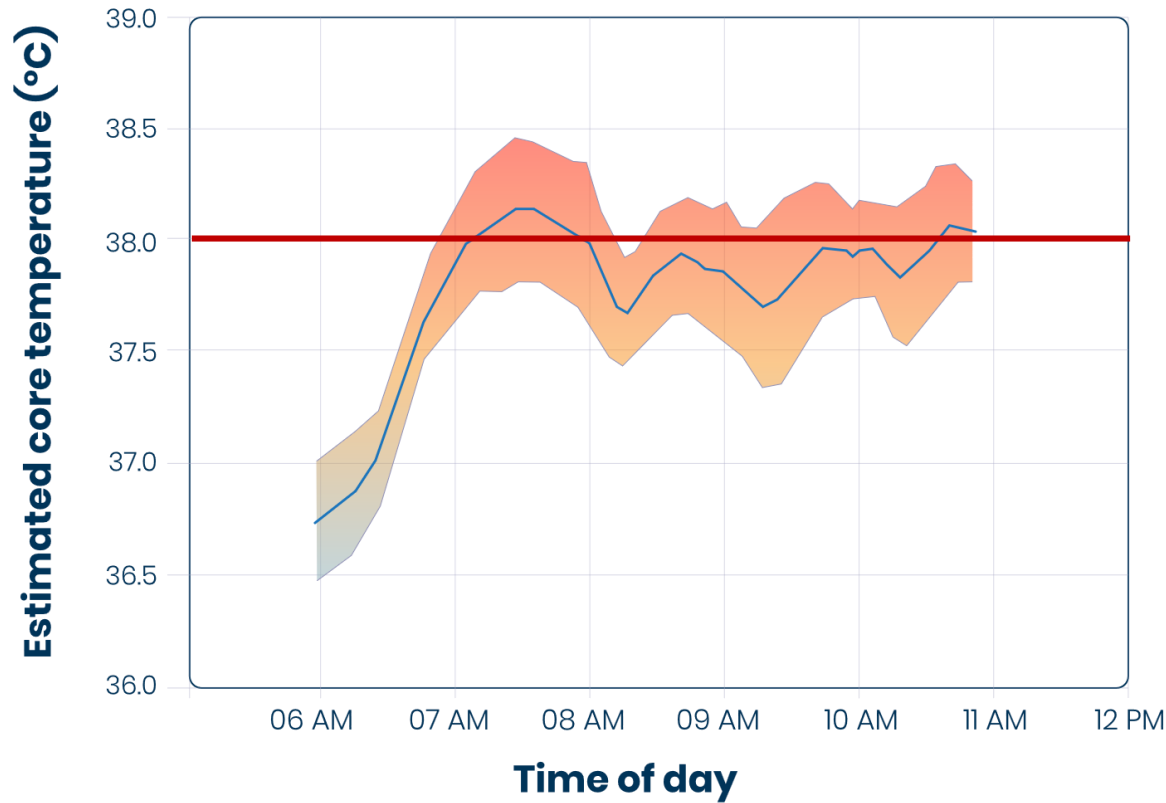
Assess: Current policy/regulation/recommendations were unattainable/ineffective



Environmental Temps and
OSHA Rest Guidelines



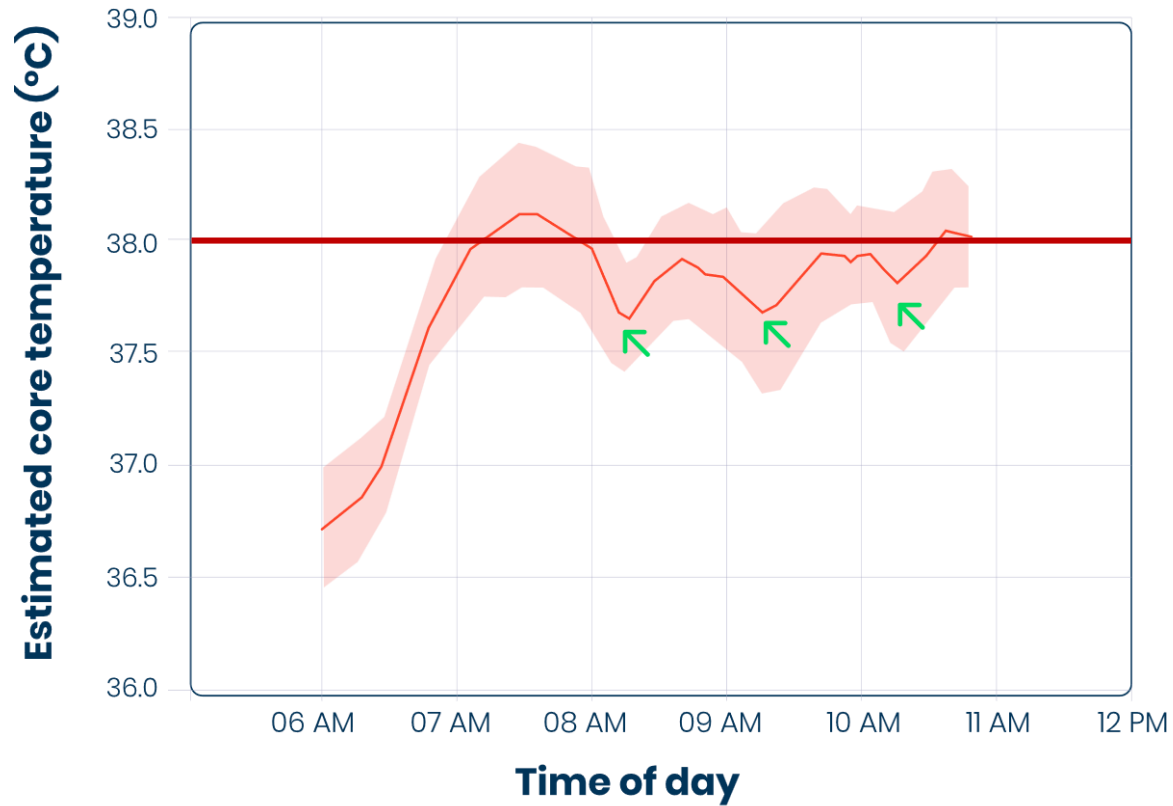
Average core temperature of burned
cane cutters (Harvest 2-Adelante)



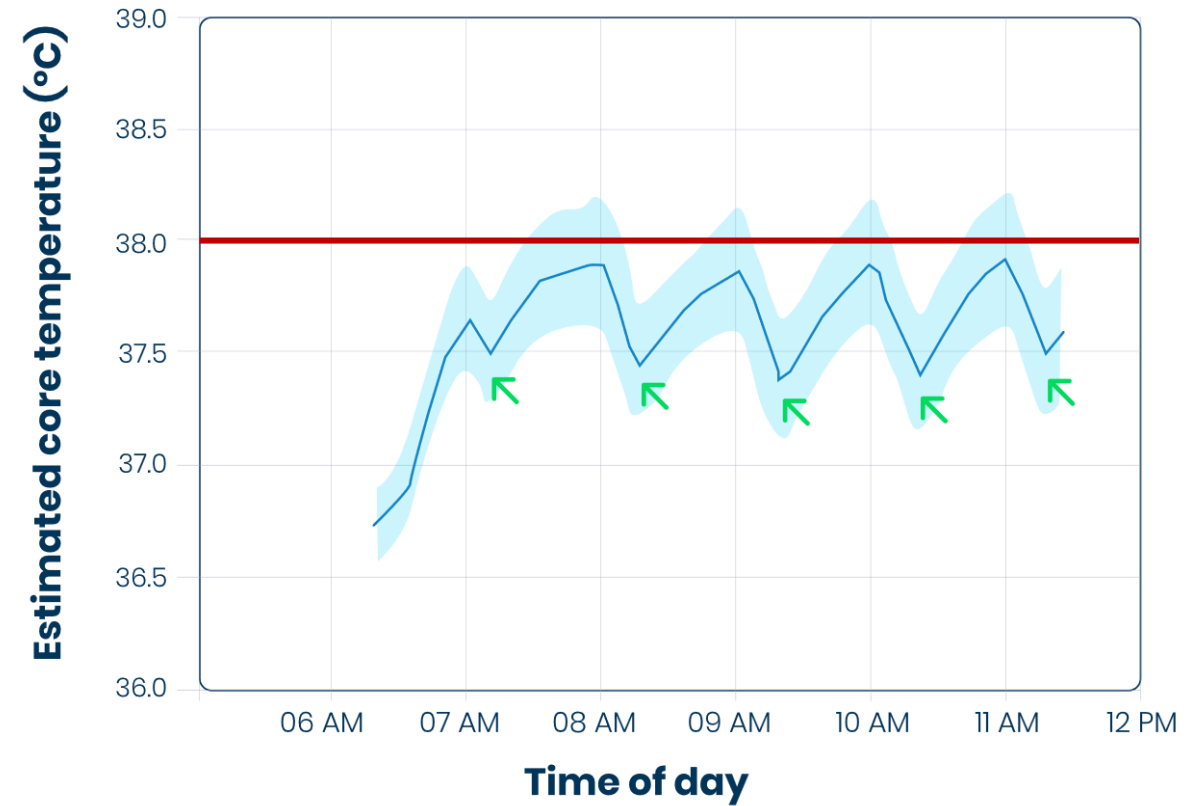
Sugar mill intervention design was insufficient



Address: Adelante harvest 3 increased duration and frequency of breaks



H2



H3

Time core body temperature over 38°C during work shift

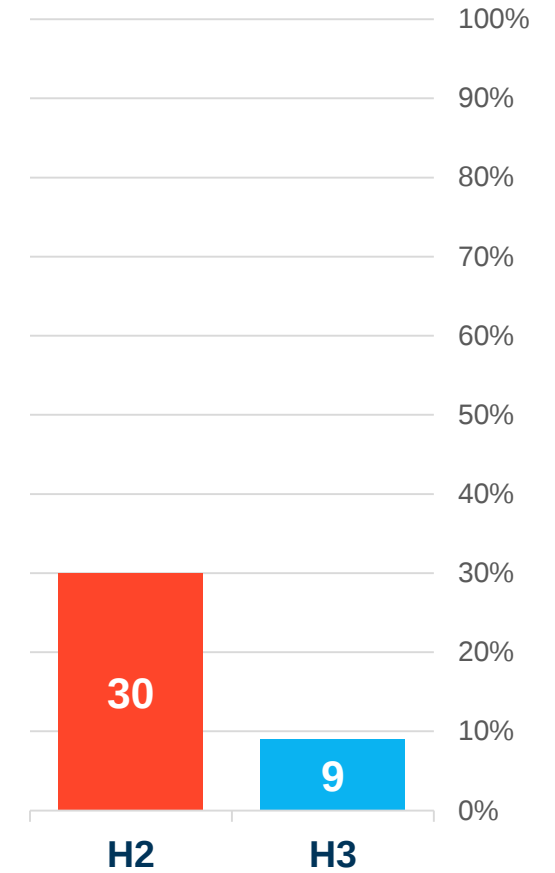
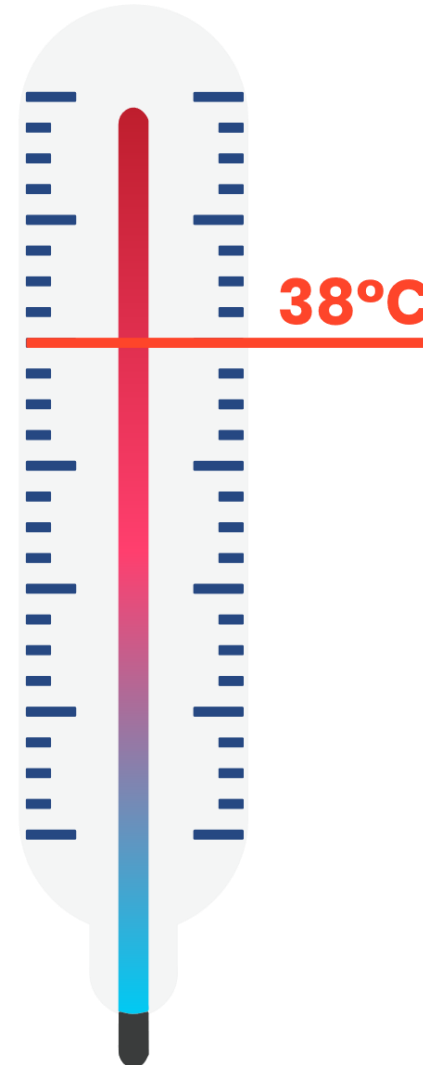


Nicaragua H2

01:45

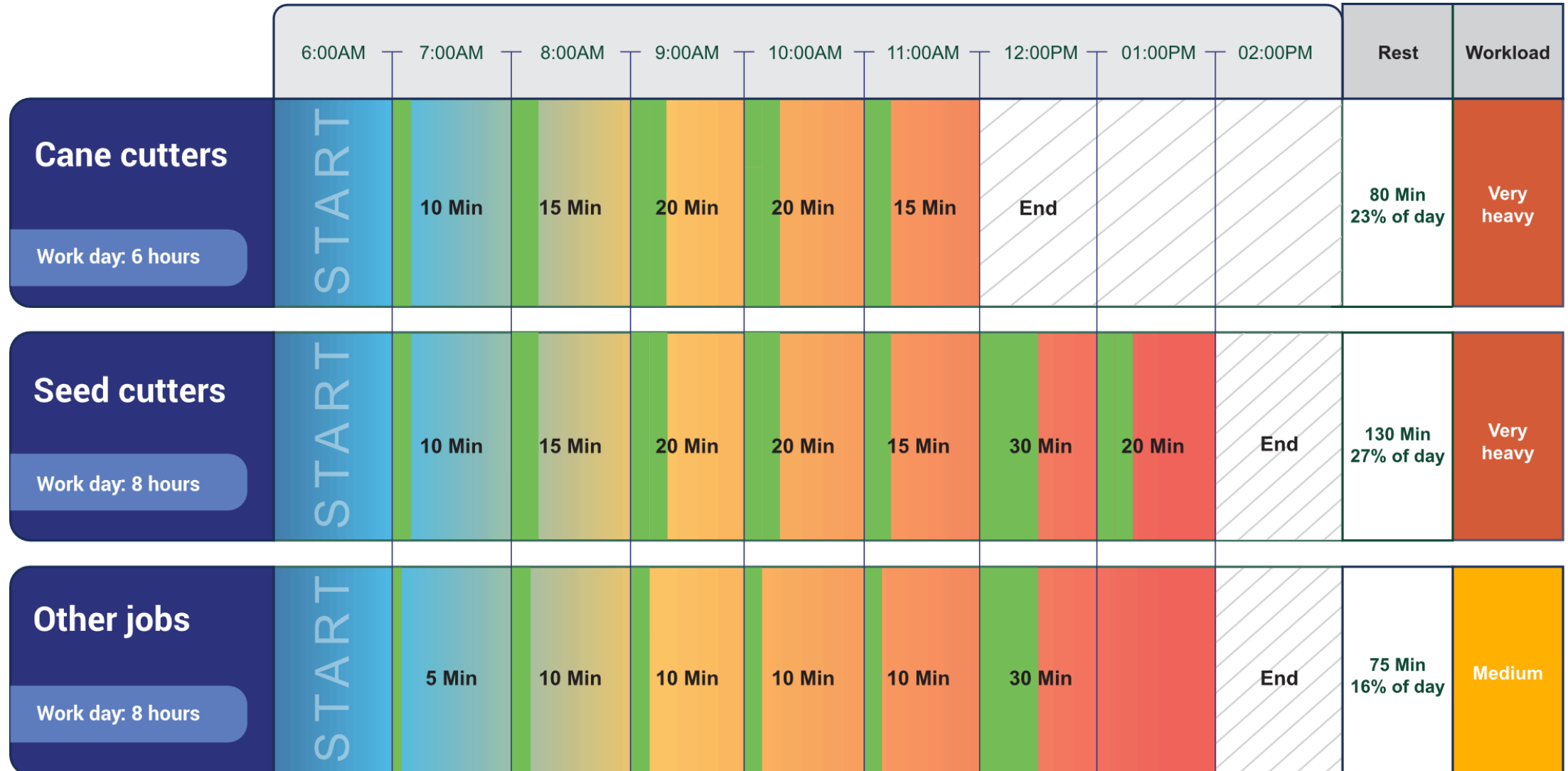
Nicaragua H3

00:32



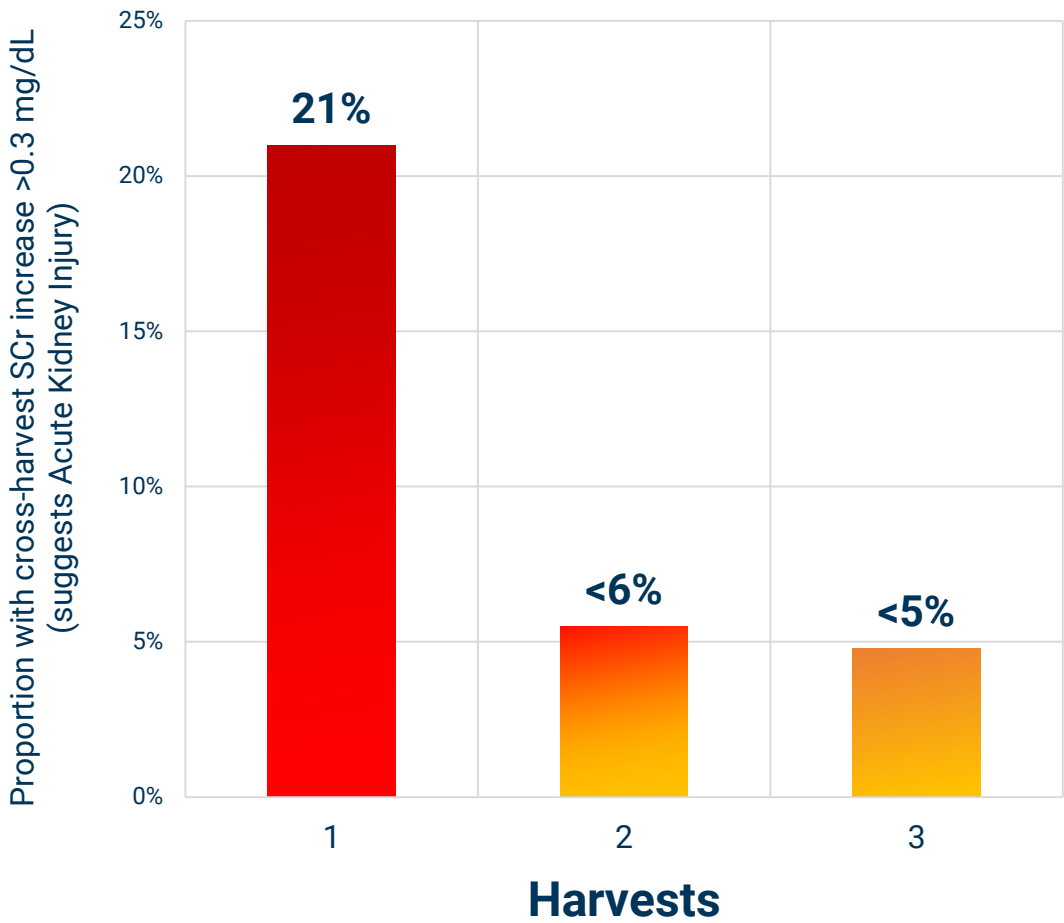
Percentage of working
over 38°C

Rest breaks: driven by data this became the schedule from harvest 3 to present

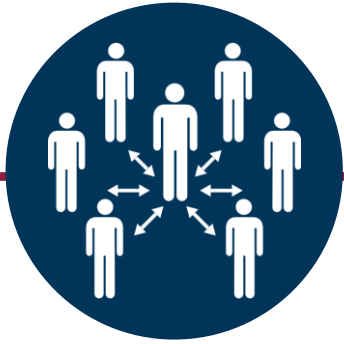


Intervention design alone is insufficient

Incident Kidney Injury
Burned cane cutters



Beyond Epidemiology, Physiology and Economics: Organizational management to **change internal** policy and priority



Organizational Management assessment

Workplace culture needs positive engagement to address messaging and operational gaps



Managing on exposures and health outcomes

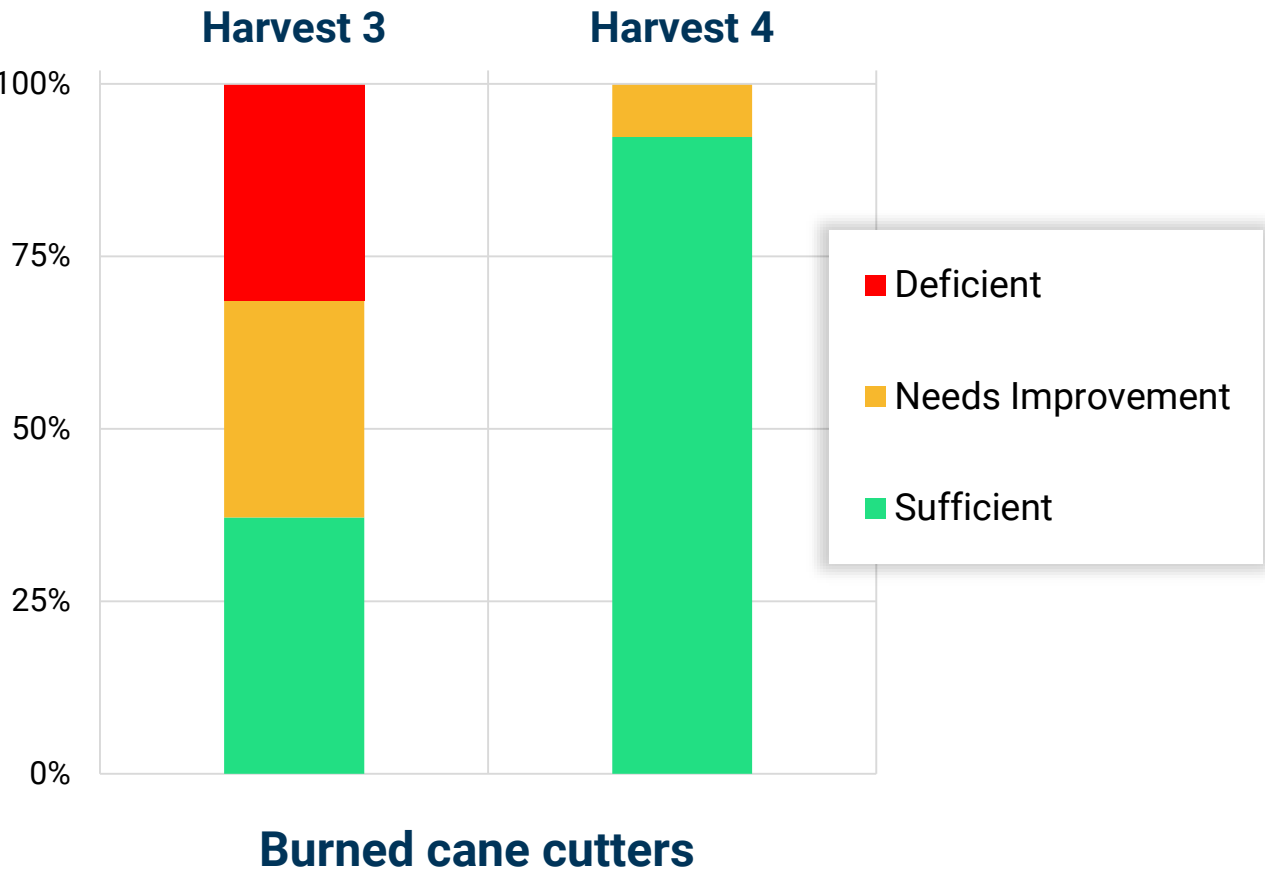
Nurture culture of health, build safety-climate, focus on exposures that can be managed in the work.



Communication

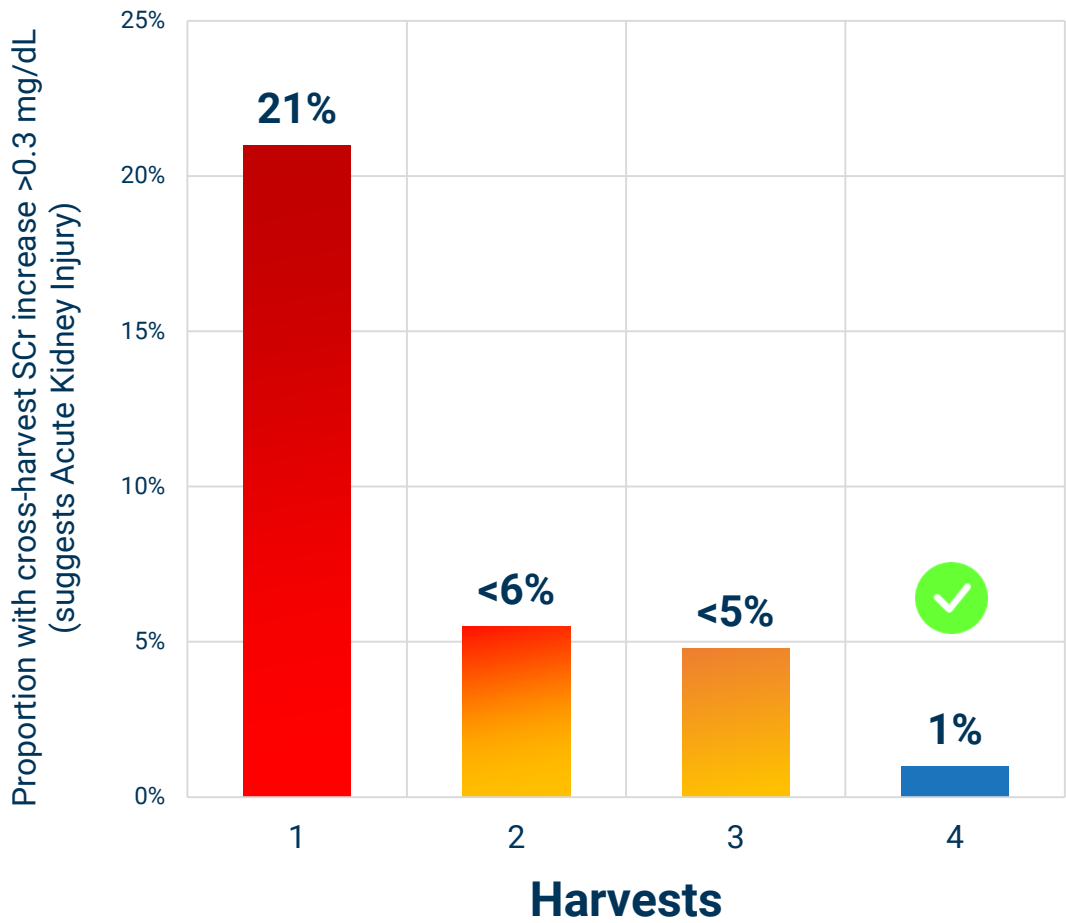
Effective communication between the study team and all levels of organization.

Assist: Implementation Support



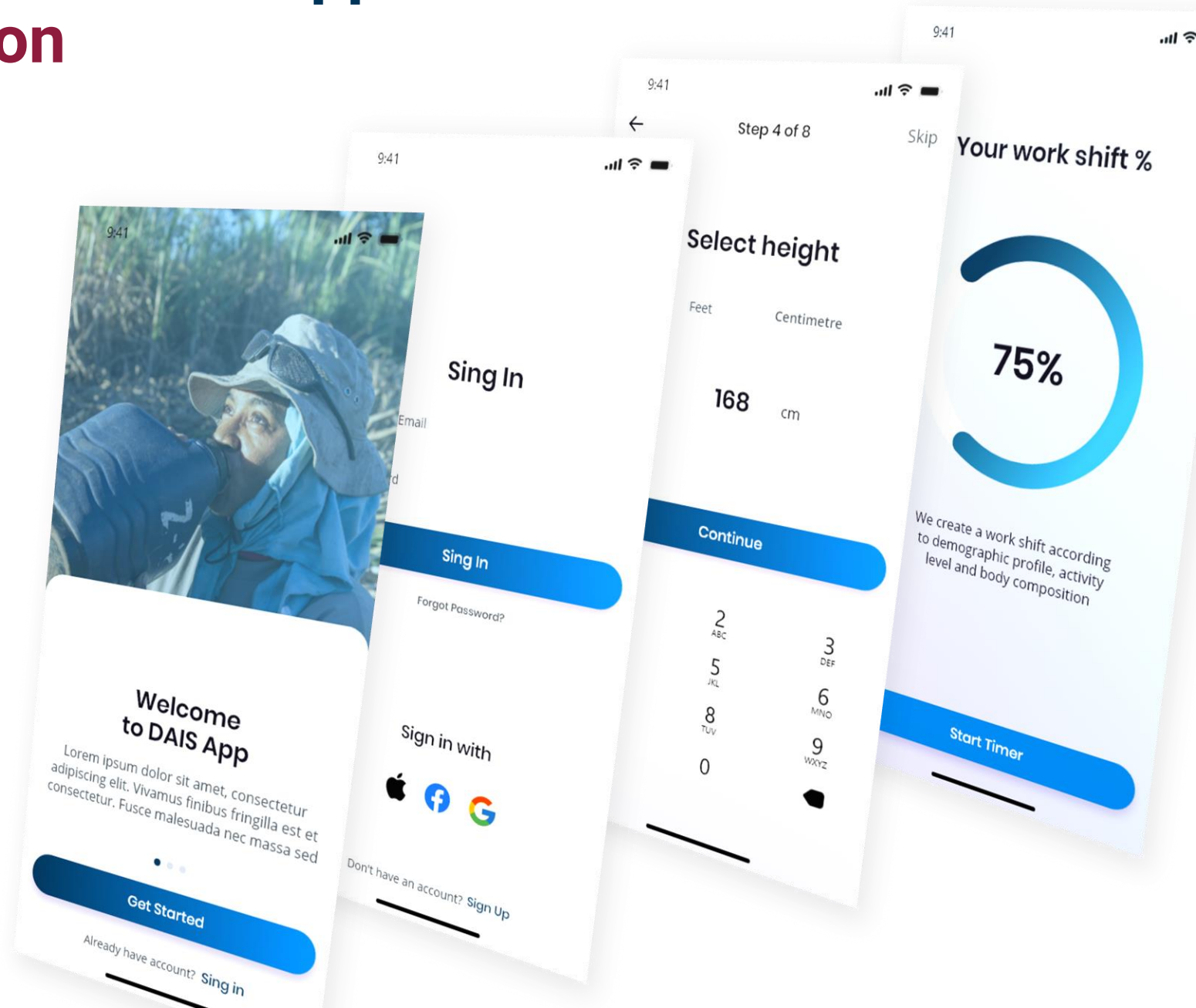
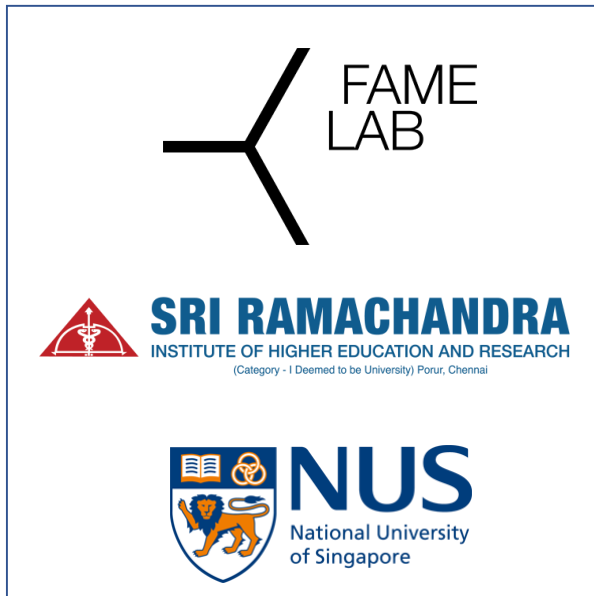
Intervention implementation support yields **improvement**

Incident Kidney Injury
Burned cane cutters



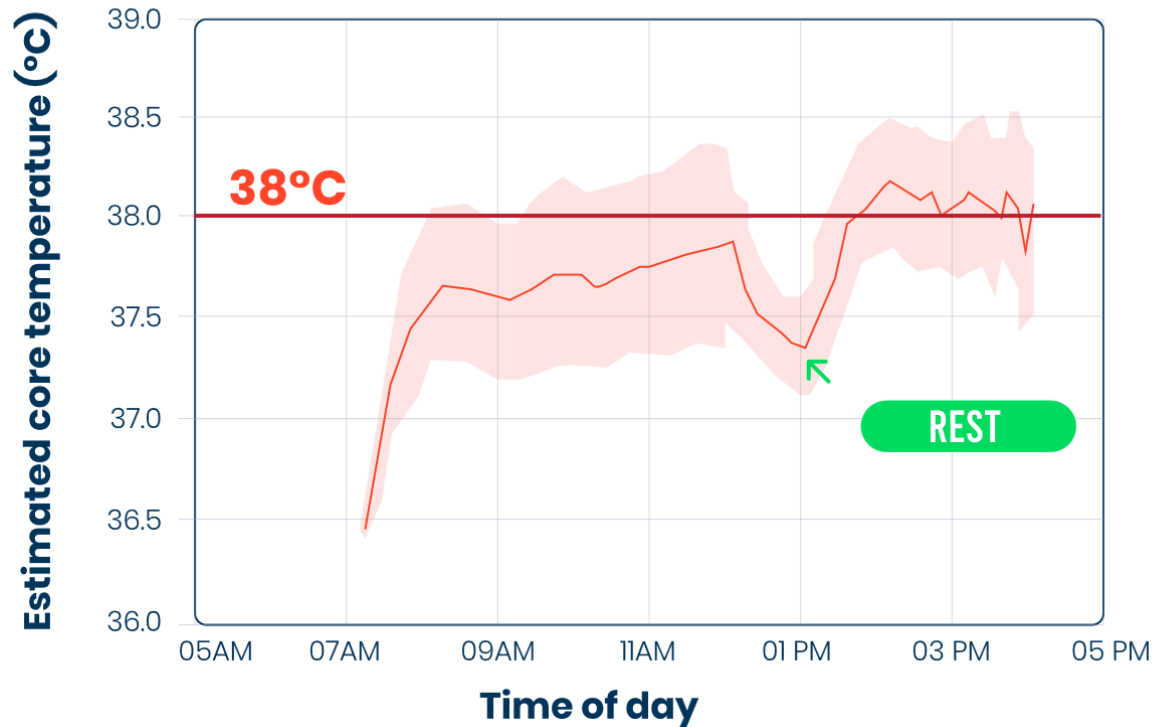
Assure: Development of DAIS to support consistent **implementation**

- » **DAIS** under development with FAME Lab and partnership with LIN and team of Andreas Flouris with support from colleagues Venugopal and Lee



What happens when workers **are** and **are not** protected: El Salvador (No program) Nicaragua (Adelante)

El Salvador



2 hours 9 minutes
27% of workday over 38° C

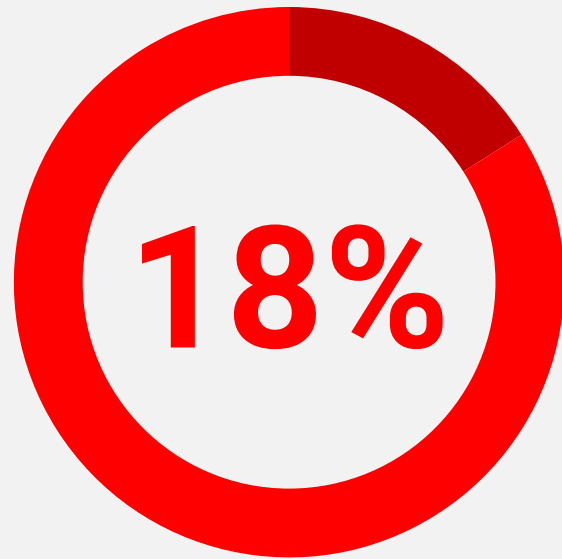
Nicaragua



32 minutes
9% of workday over 38°C



El Salvador

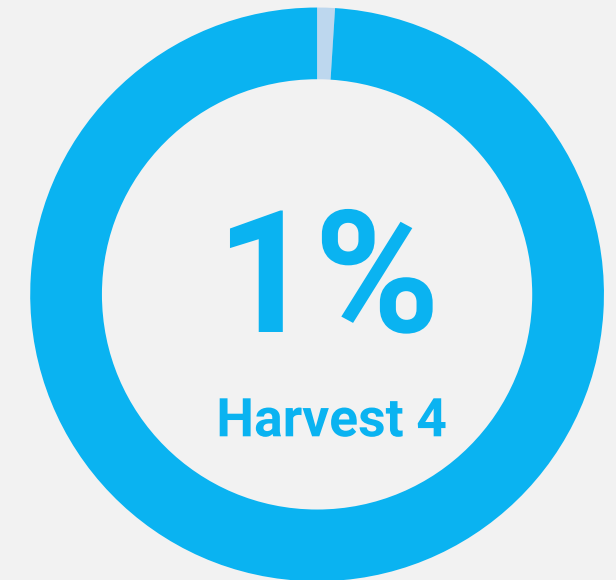


**Incident kidney injury over
harvest
without adequate intervention**

Site 2: Adelante / PREP



**Incident kidney injury over harvest
in Year 2, and 4 of the intervention**

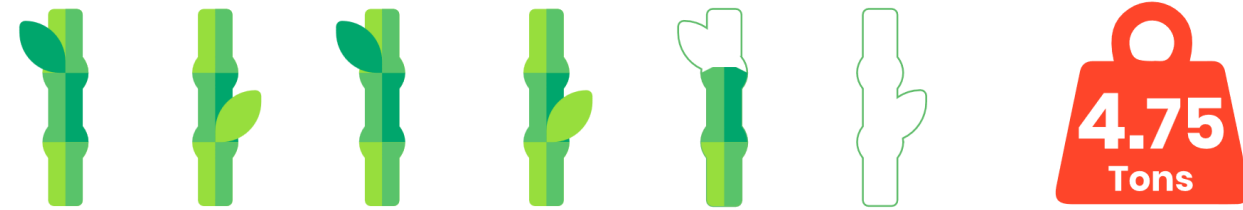


Work, health *and* efficiency

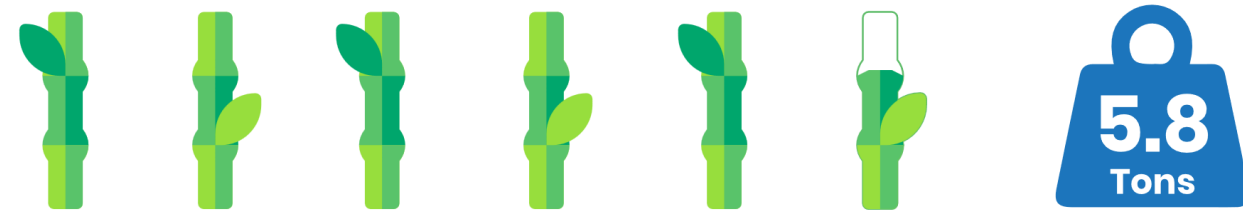




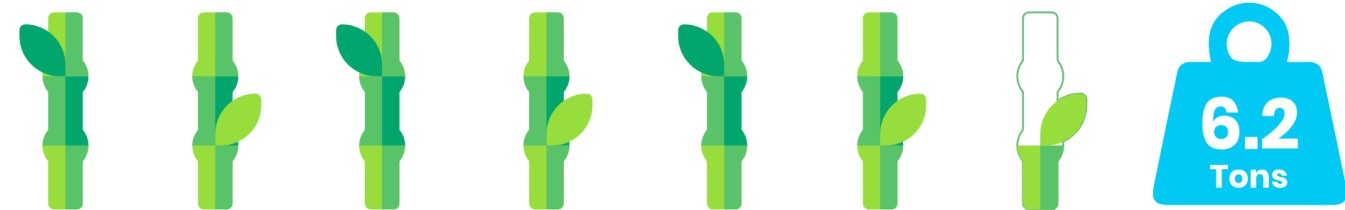
El Salvador: no program



Pre Adelante Results (w/ insufficient program)



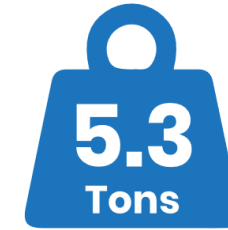
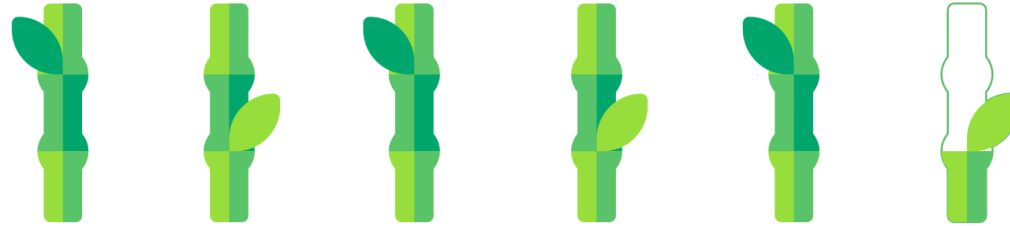
Post Adelante results





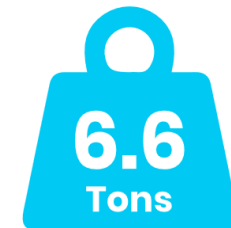
4.5HOURS

Pre Adelante Average



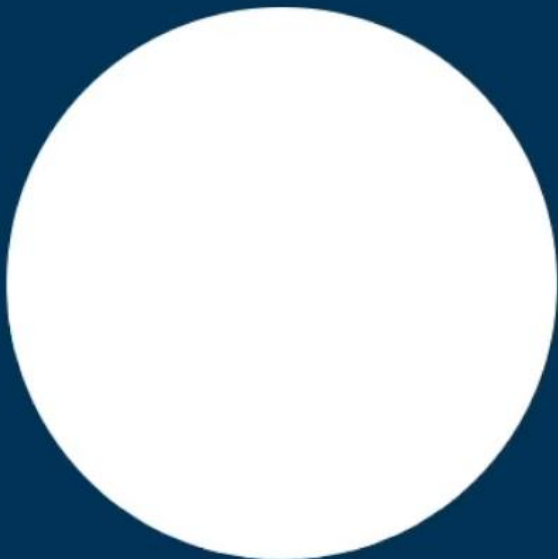
4.2HOURS

Post Adelante Average



Positive ROI in ISA by PREP and Adelante Initiative

With the investment in the occupational safety and health program, ISA has obtained a positive return on investment.



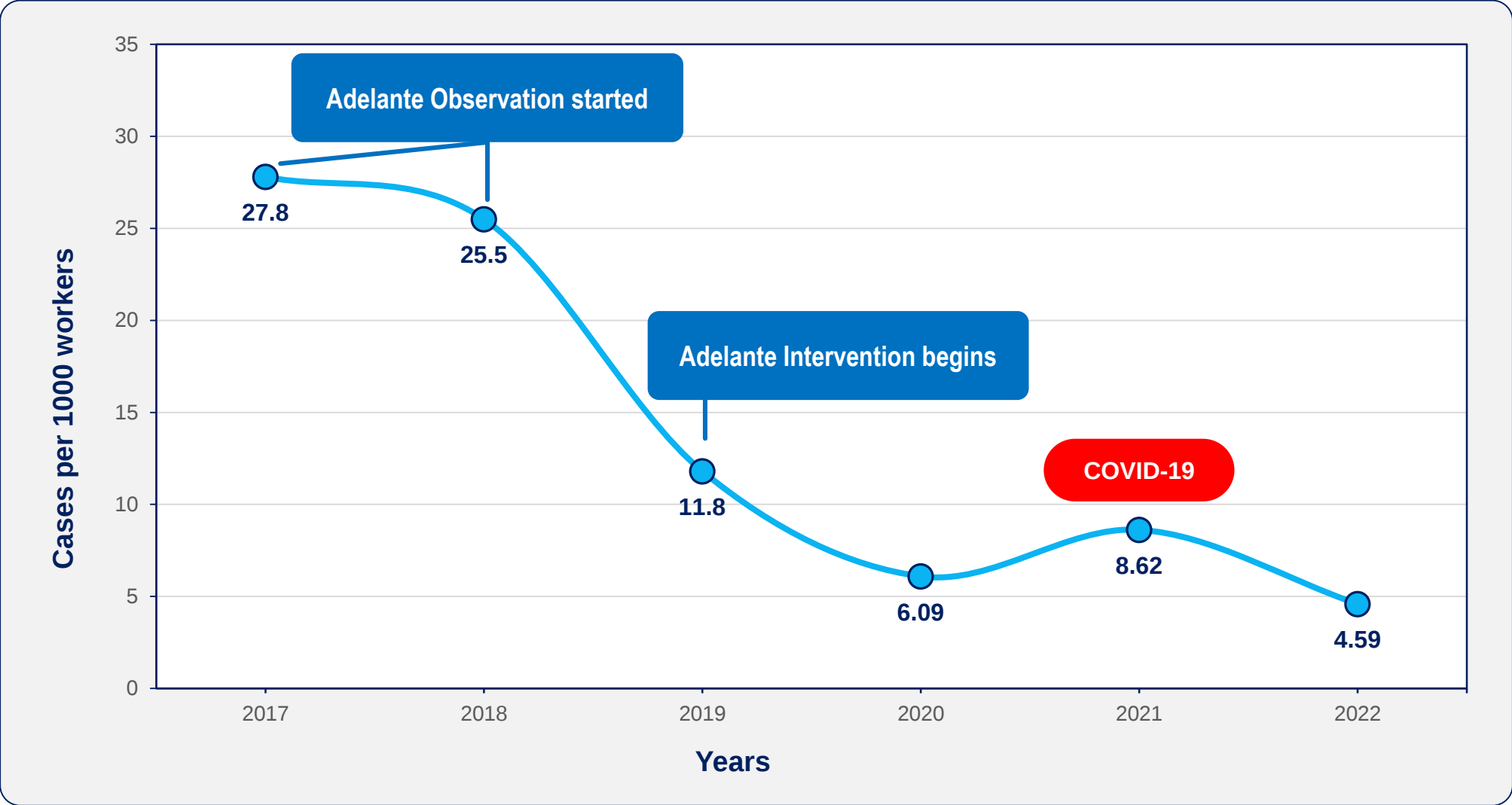
How?

- » Lower staff turnover.
- » Reduces absenteeism.
- » Reduces accidents.
- » Reduces hospital care.
- » Ensures the well-being of the worker.



Acute Kidney Injury incidence rate per 1,000 workers

January 2017 – December 2022



Impact on government **policy**

USA:

- » LIN is consulting OSHA on new heat stress regulations
- » Funding priority for research and development programming
 - » NIH funding for climate change related health impacts
 - » US dept of labor ILAB improving worker protections
 - » Office of the president taskforce on improving worker protections

Costa Rica

- » Improved heat stress regulation (2015)

Nicaragua

- » Recognition of CKDnt as occupationally acquired disease

El Salvador

- » Prioritization of heat stress and CKD by health ministry



Design and Implementation



Certification bodies



Brands & industry



What we can do together:

In this room are the experts, resources, vision and talent that can support a **Center of Excellence** for worksite and lab-based data driven solutions to protect workers in Qatar, the GCC and the world. No other country has the potential to serve more people and more places than here.

With a clear model to point to in Mesoamerica, and the ongoing work from everyone here a **Center of Excellence in Qatar** could advance the field in the region and the world.



Support for the future



HARVARD
UNIVERSITY



SRI RAMACHANDRA
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Category - I Deemed to be University) Porur, Chennai

- » Expertise and planning and talent sourcing of CoE including lab, chamber and onsite work:, **LIN/Adelante, FAME Lab, Heatsafe, Sri Ramachandra University**
- » Generating data of impact of occupational disease and need for care from Nepal, **LIN and Nepalese Development Society**
- » Improved incident and population level data collection: **Tord Kjelstrom and LIN**
- » Software and App development: **LIN**

A committed and pragmatic group is ready to support any future initiative



Thank you

And thank you to the participants, the international and local research teams and all those at GIZ, DEG, BMZ, National Science Foundation, UKRI, FORTE, US Dept of Labor and Ingenio San Antonio who have made the Adelante Initiative possible

Together we are taking action in the face of uncertainty and attaining results by exercising agency over what we can control and act upon

Let's Connect

Jason@laislanetwork.org



