

## Practical Session

# Heat2Harvest: interlinkages of climate change on human health, work capacity, agricultural outcomes, and nutritional status in children

Dr. Sandra Barteit, Heidelberg Institute of Global Health (HIGH), Heidelberg University Hospital, Heidelberg University, Germany



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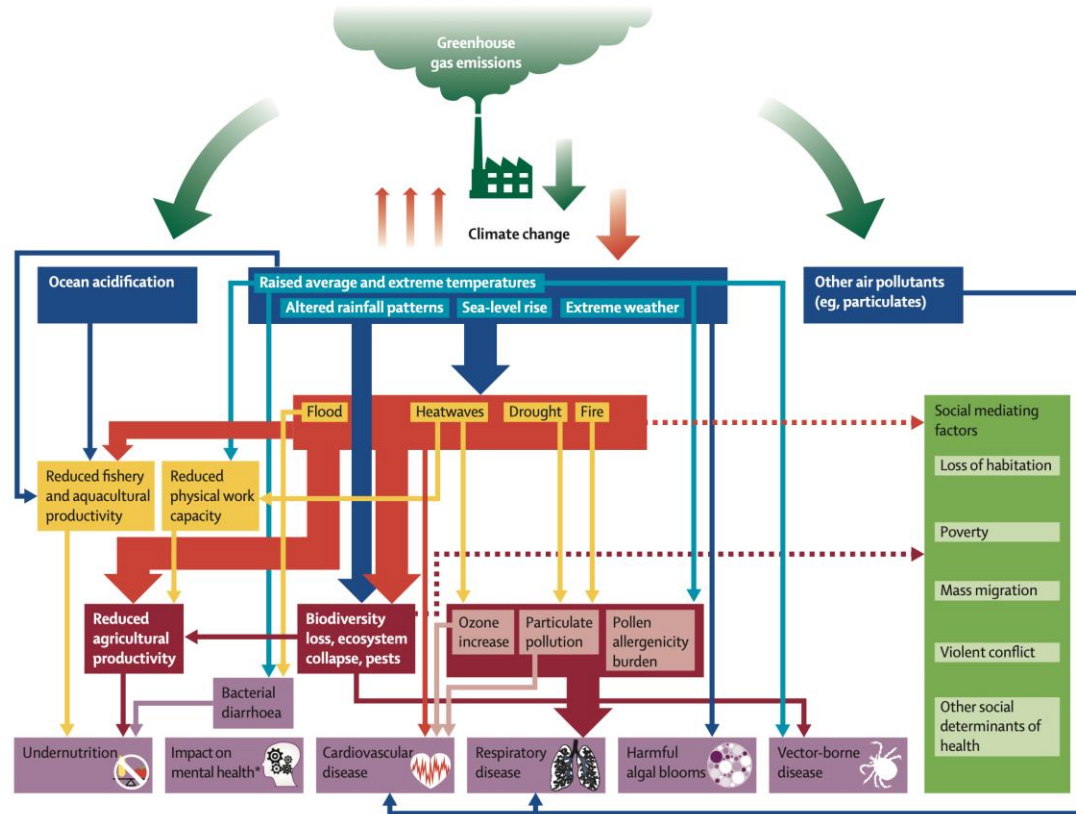
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## Learning objectives

- To provide a comprehensive overview of the Heat2Harvest (H2H) study, its objectives, and its significance in understanding the impacts of climate change.
- To engage participants in interactive activities that illustrate the complex relationships between heat, work capacity, agricultural productivity, and child nutrition.
- To foster discussion and critical thinking about the implications of the H2H study for policy and practice.

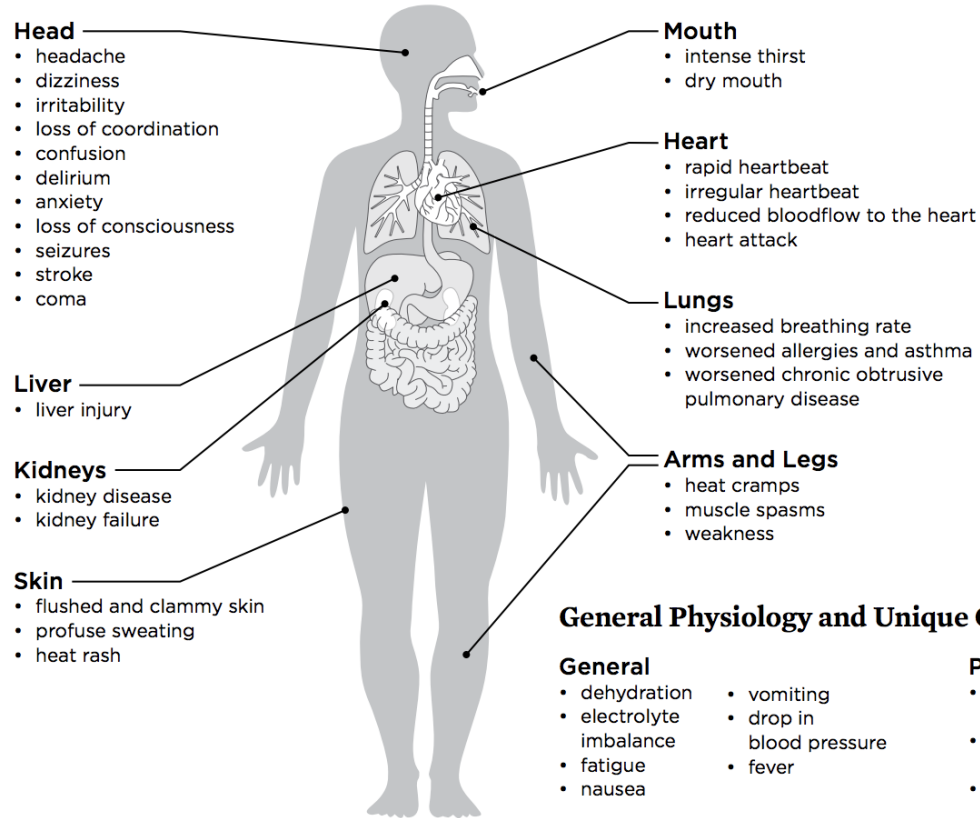
# Brief overview of climate change and its potential impacts on human health and agriculture

## Human Health



# Brief overview of climate change and its potential impacts on human health and agriculture

## Human Physiology



# Brief overview of climate change and its potential impacts on human health and agriculture

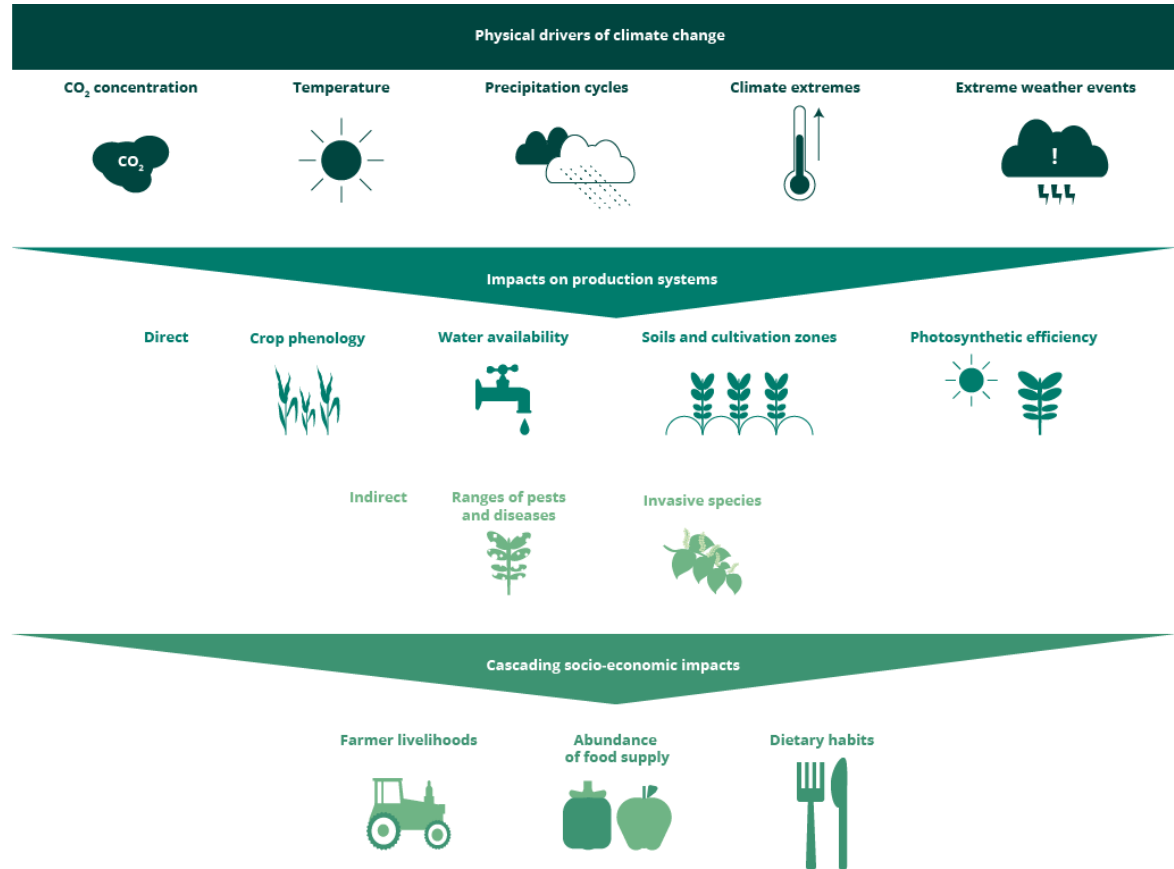
## Agriculture

**Global Warming:** Leads to loss of soil organic carbon, soil erosion, and increased soil wetness.

**Extreme Weather:** Contributes to soil nutrient loss, halts seedling growth and development, and decreases photosynthesis.

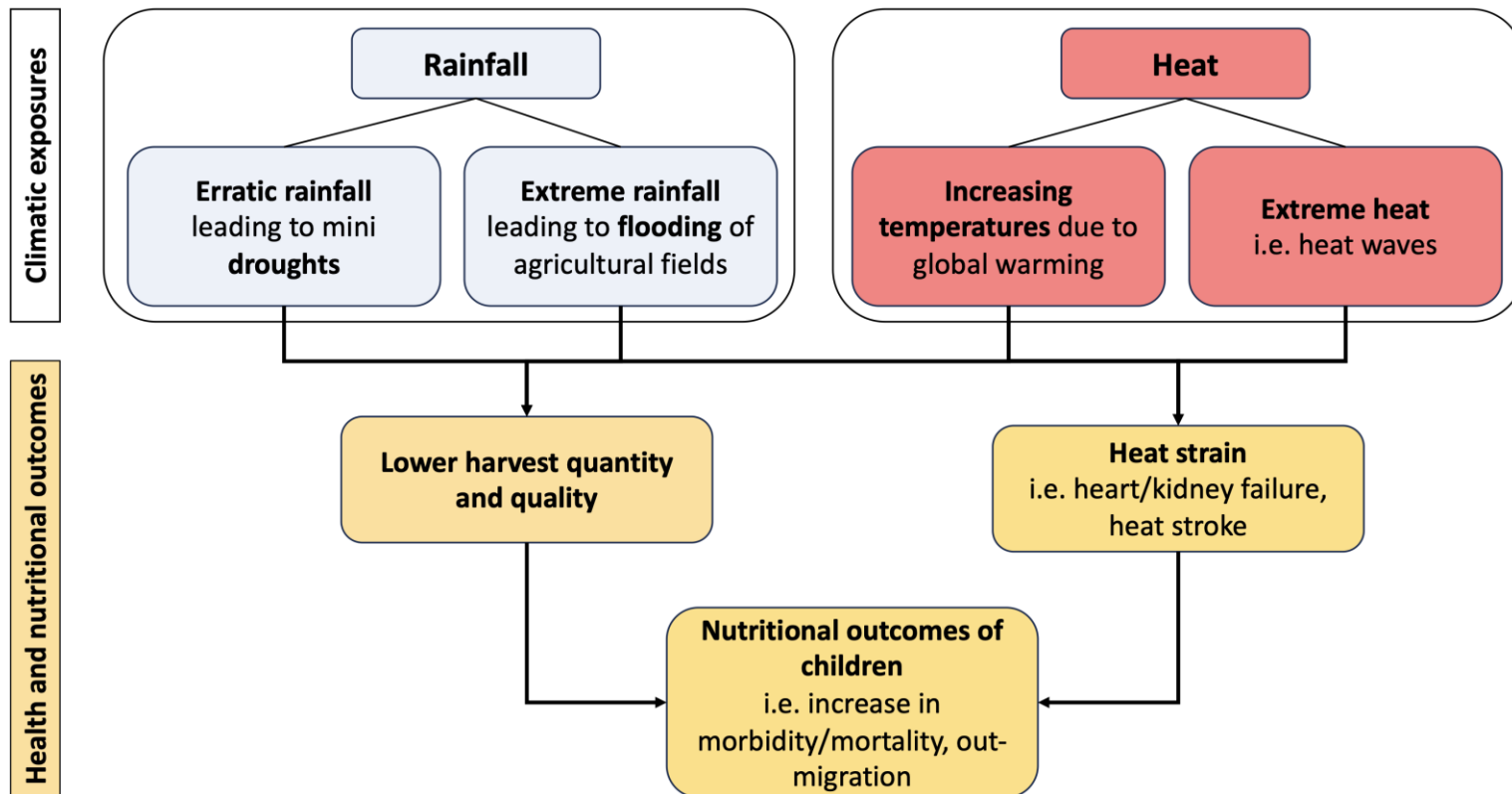
**Rainfall Intensity:** Causes alterations in nutrient dynamics and increases the likelihood of soil erosion.

**Overall Impact:** These factors collectively result in a loss of overall crop yield, negatively affecting agriculture.



# Introduction to H2H Study

## Overview Study Concept



# Introduction to H2H Study

## Study Objectives

### Heat to Harvest (H2H) Study Objectives:

- Examine **how heat (and other weather exposures) impact the physiological responses** of farmers in Burkina Faso
- **Quantify the impact of heat on farmers' work capacity** and farming behaviors
- Explore the **relationship between heat exposure, work capacity, health, and farming practices** on harvest yields.
- Determine **how these factors indirectly affect the nutritional status of children under five** in the studied households

**Overall Goal:** Understand the cascading effects of heat on agricultural productivity and child nutrition to inform adaptation strategies and improve resilience in farming communities facing climate change.

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# Introduction to H2H Study

## Study Location

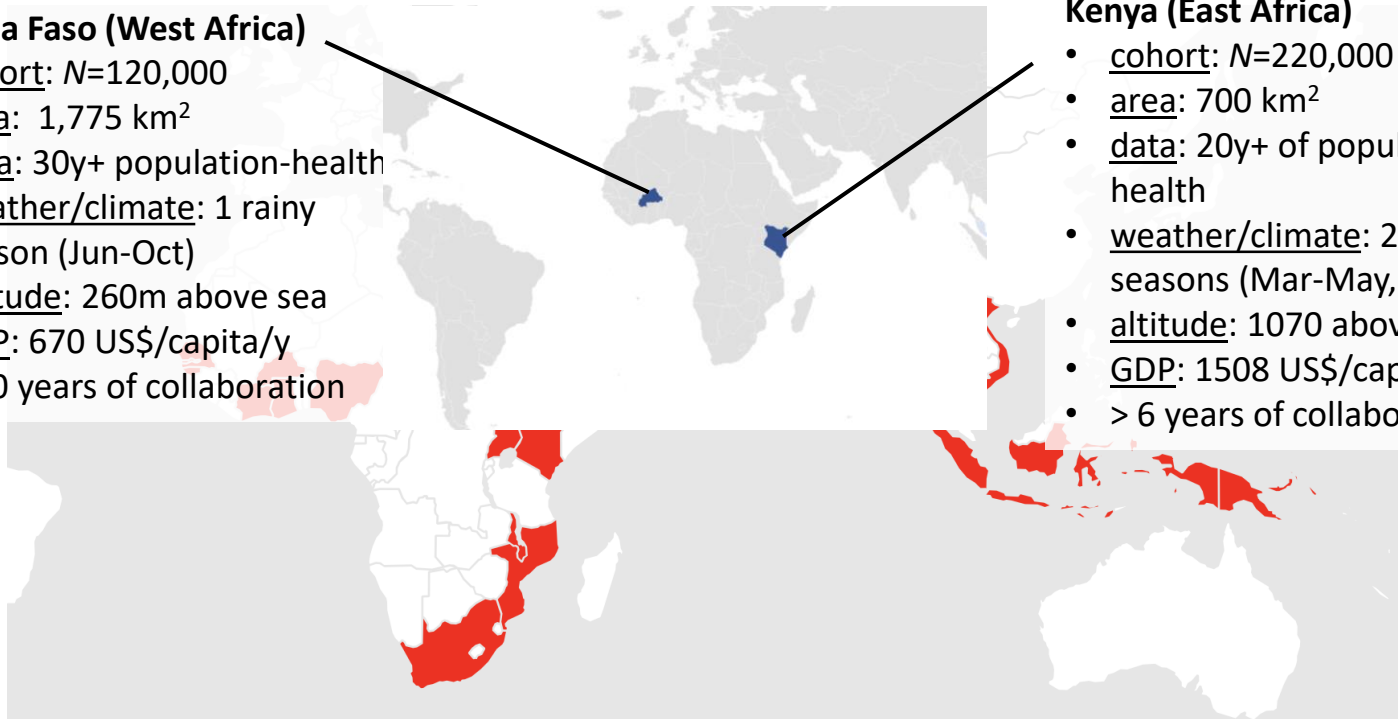
### Health and demographic surveillance sites (HDSSs):

#### Burkina Faso (West Africa)

- cohort:  $N=120,000$
- area:  $1,775 \text{ km}^2$
- data: 30y+ population-health
- weather/climate: 1 rainy season (Jun-Oct)
- altitude: 260m above sea
- GDP: 670 US\$/capita/y
- > 30 years of collaboration

#### Kenya (East Africa)

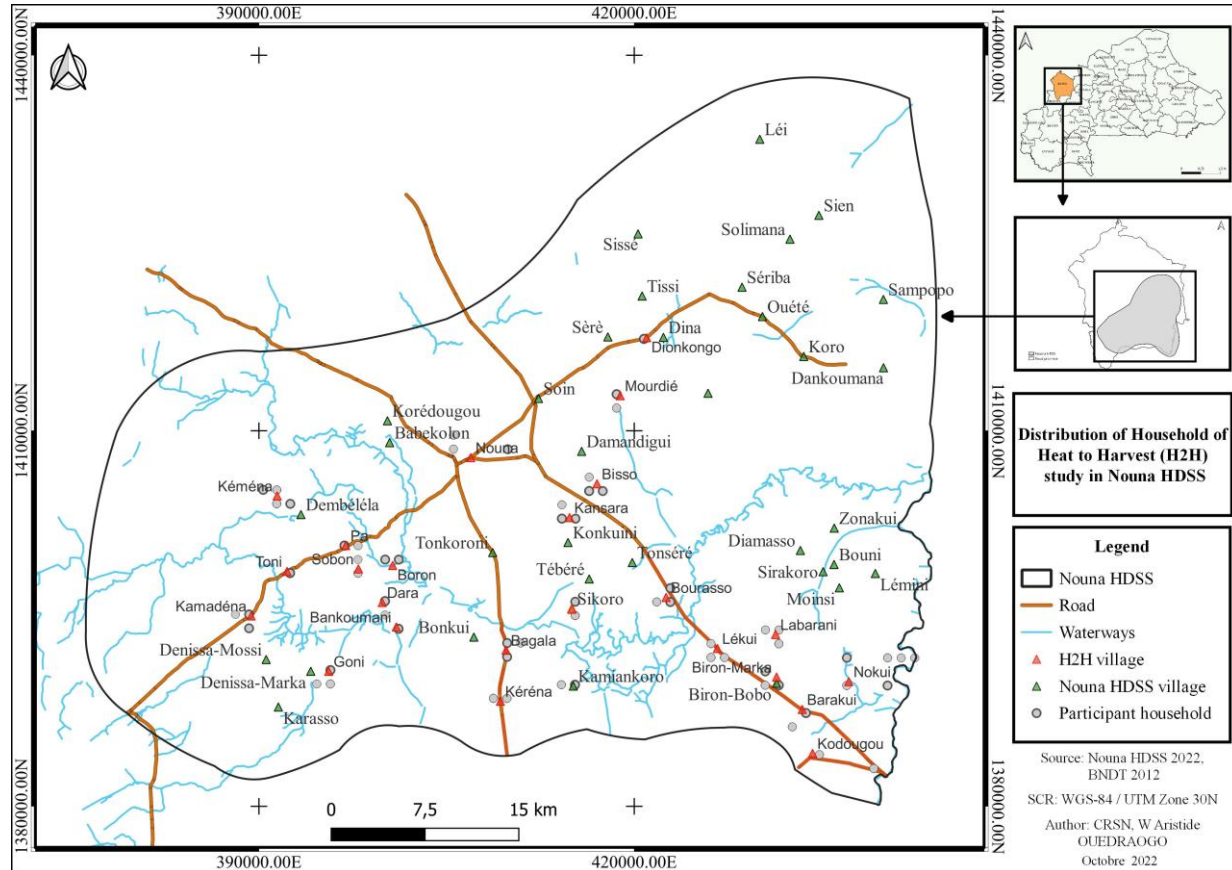
- cohort:  $N=220,000$
- area:  $700 \text{ km}^2$
- data: 20y+ of population-health
- weather/climate: 2 rainy seasons (Mar-May, Oct-Dec)
- altitude: 1070 above sea
- GDP: 1508 US\$/capita/y
- > 6 years of collaboration





# Introduction to H2H Study

## Study Location



# Introduction to H2H Study

## Study Overview

- **Prospective cohort design:** Follows farmers and their children over time to assess the impact of heat on health and agriculture.
- **Location:** Embedded within two Health and Demographic Surveillance Systems (HDSS):
  - Nouna HDSS in Burkina Faso
  - Siaya HDSS in Kenya
- **Study Participants:**
  - Randomly selected farmers whose main occupation is farming
  - Children under five residing in the farmers' households
- **Data Collection:**
  - Socio-demographic data
  - Wearable devices to monitor heart rate, physical activity, and sleep
  - GPS trackers to track time spent in fields and distance covered
  - Temperature and humidity sensors
  - Remote sensing data to estimate harvest yields
  - Anthropometric measurements of children under five

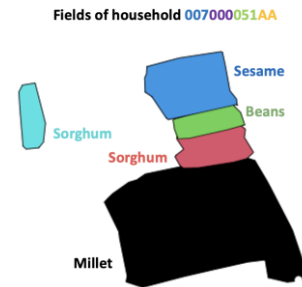
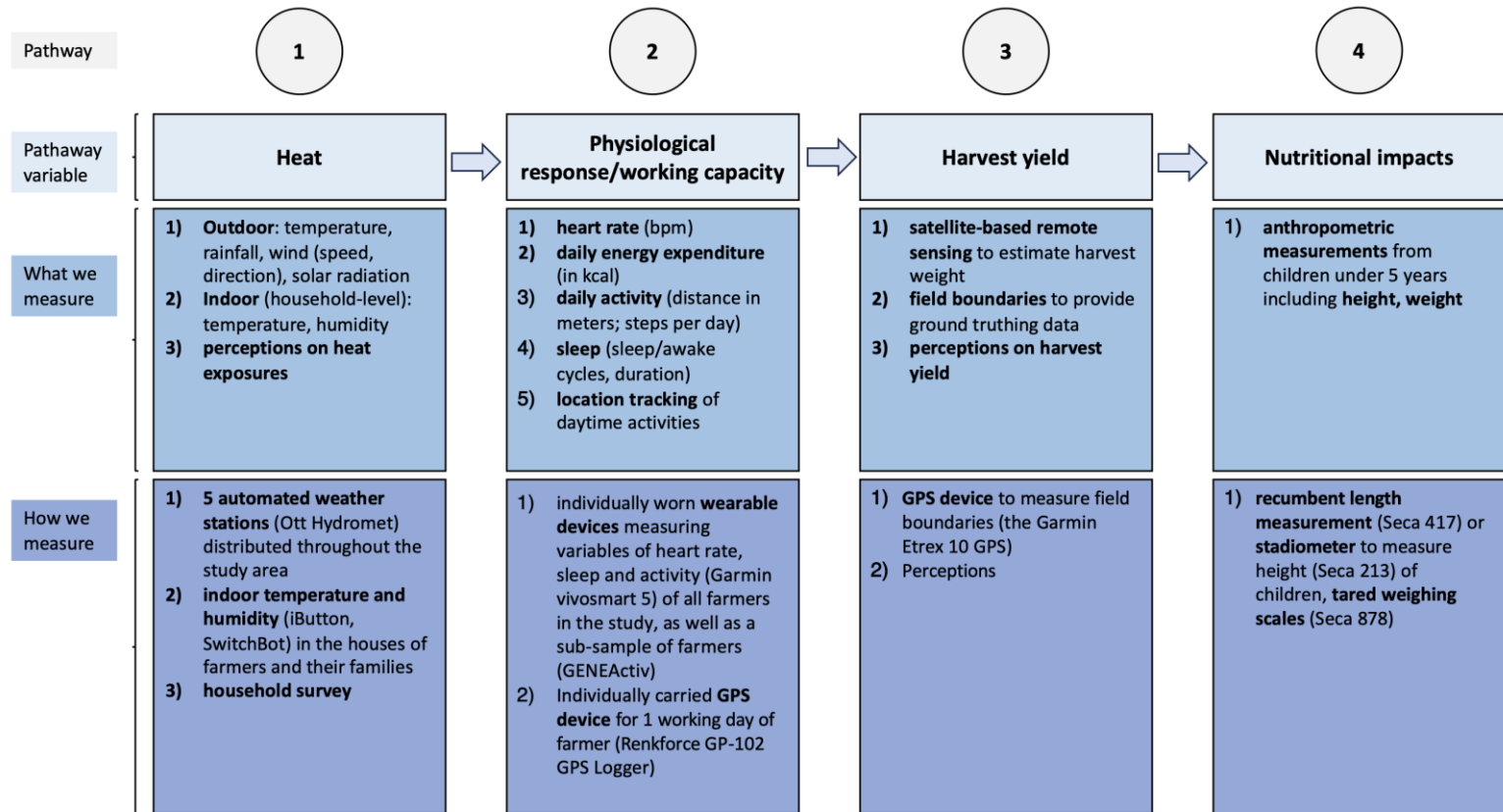


Figure: Data collection

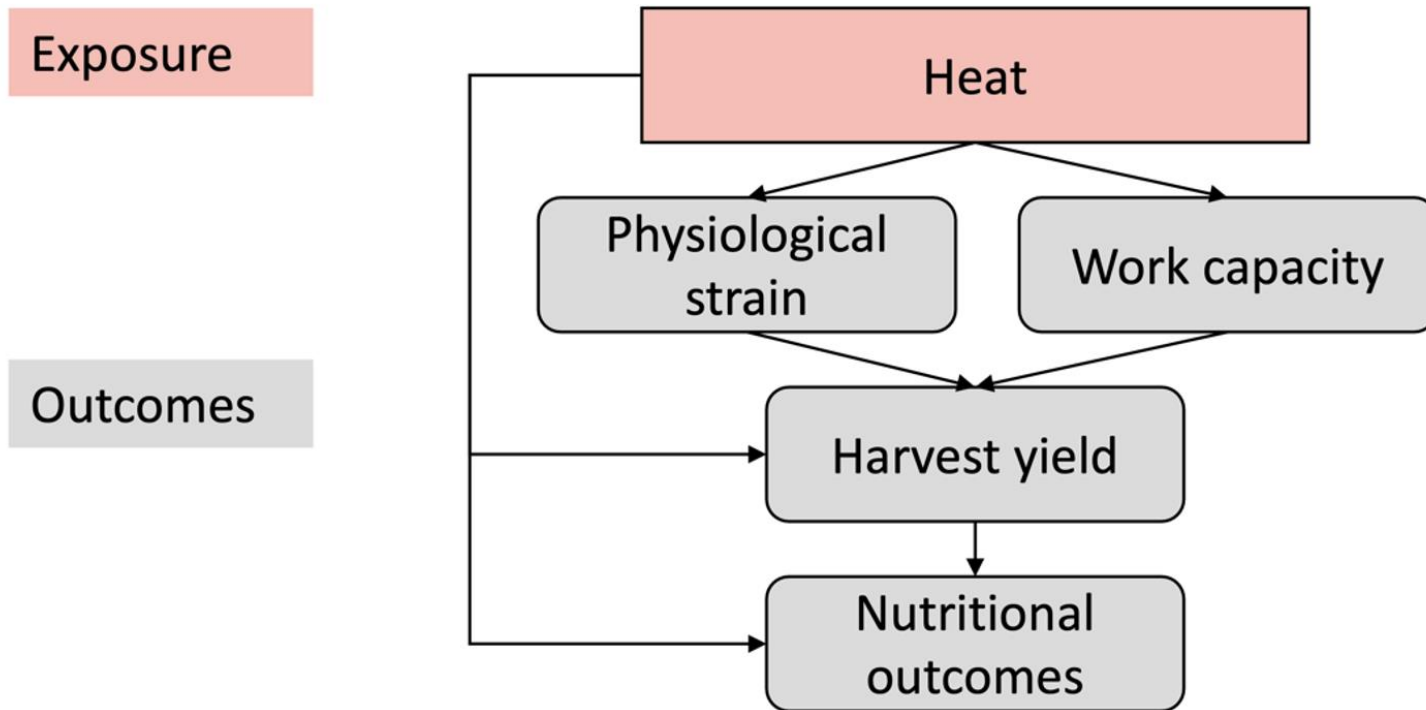
# Introduction to H2H Study

## Health impact pathways



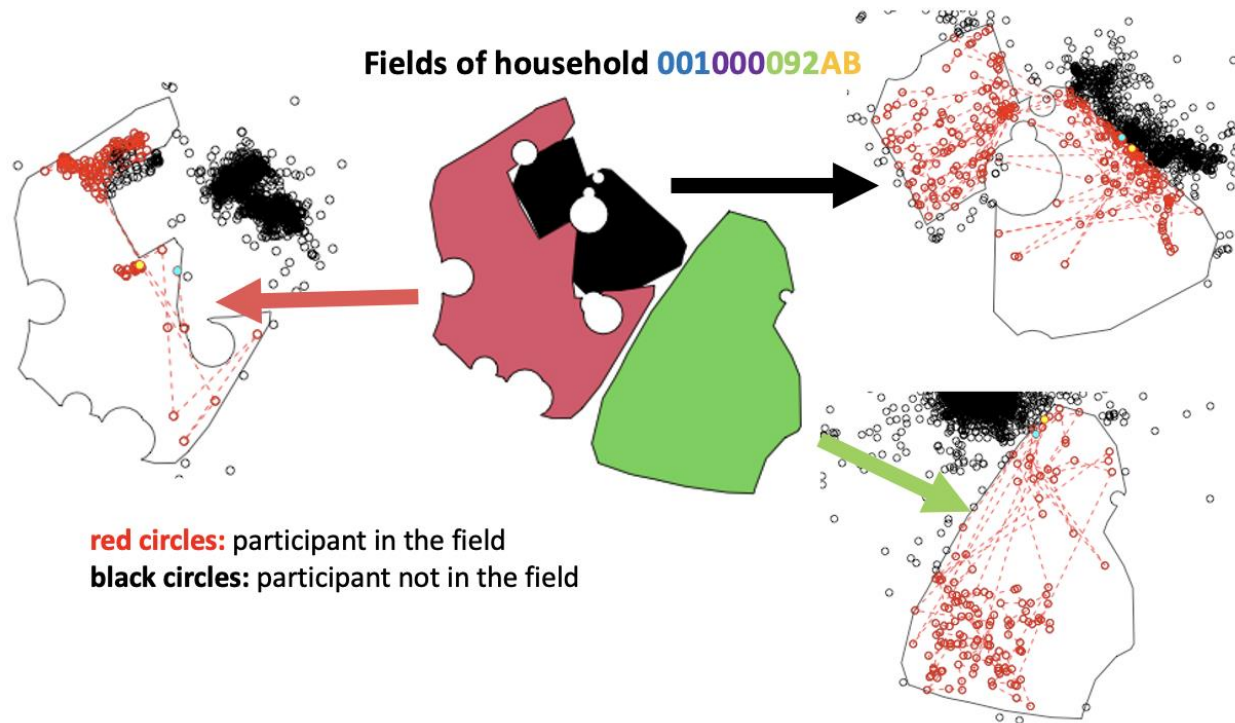
# Introduction to H2H Study

Exposure and outcome variables



# H2H Study

## First results



# H2H Study

## First results



Battery life: 18-  
20 hours



Register  
Tracking: >6 days

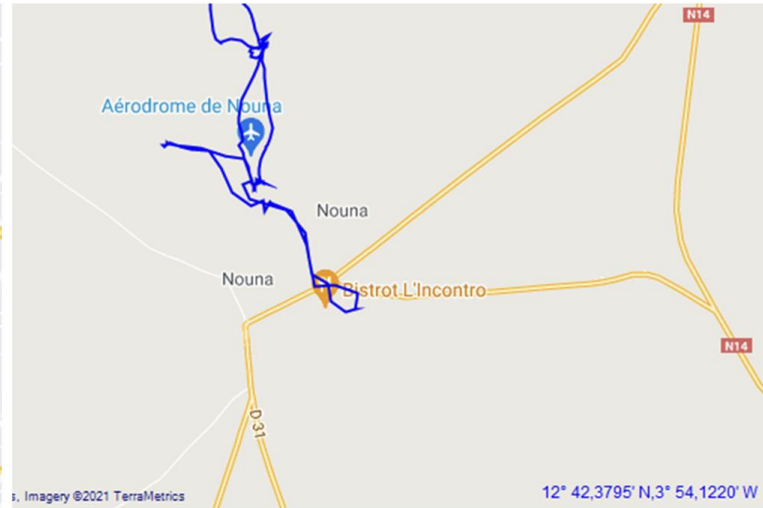
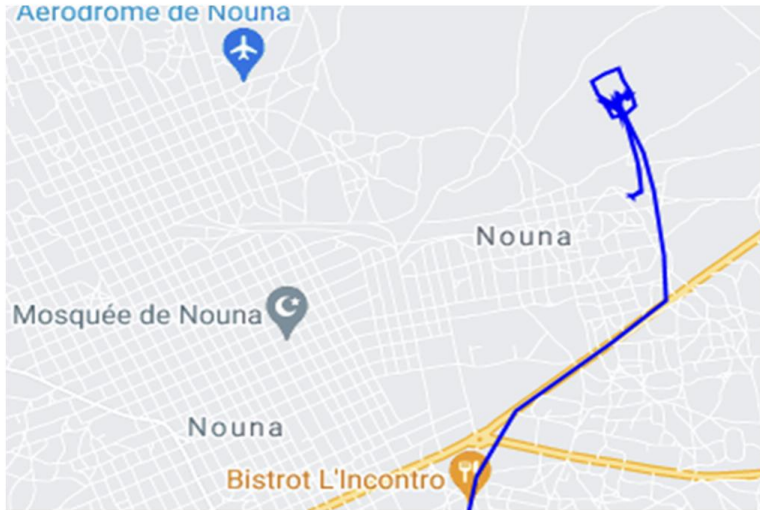


Charging time: 1  
to 1:15 hours



# H2H Study

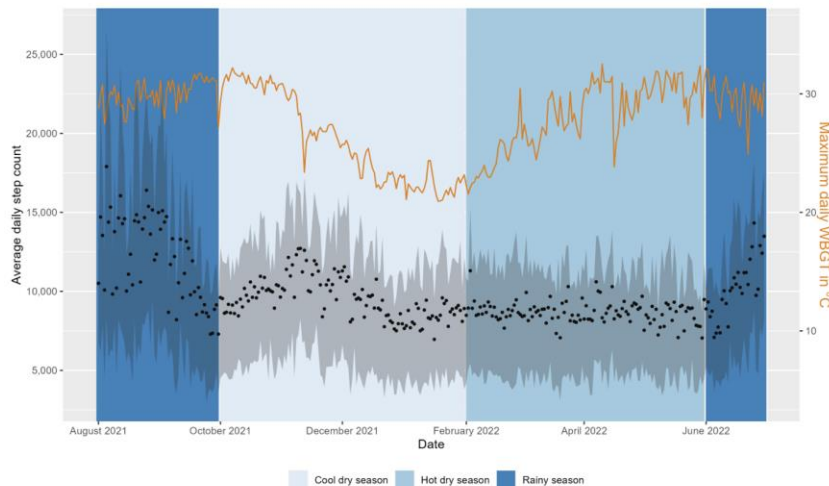
## First results – Farmers movement activity



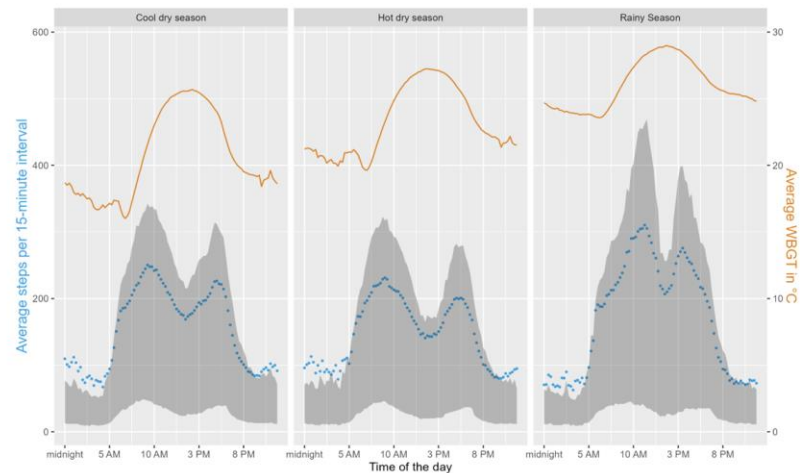


# H2H Study

## First results – Activity



**Step counts decrease as the Wet Bulb Globe Temperature rises, indicating less activity in hotter or rainier weather.**

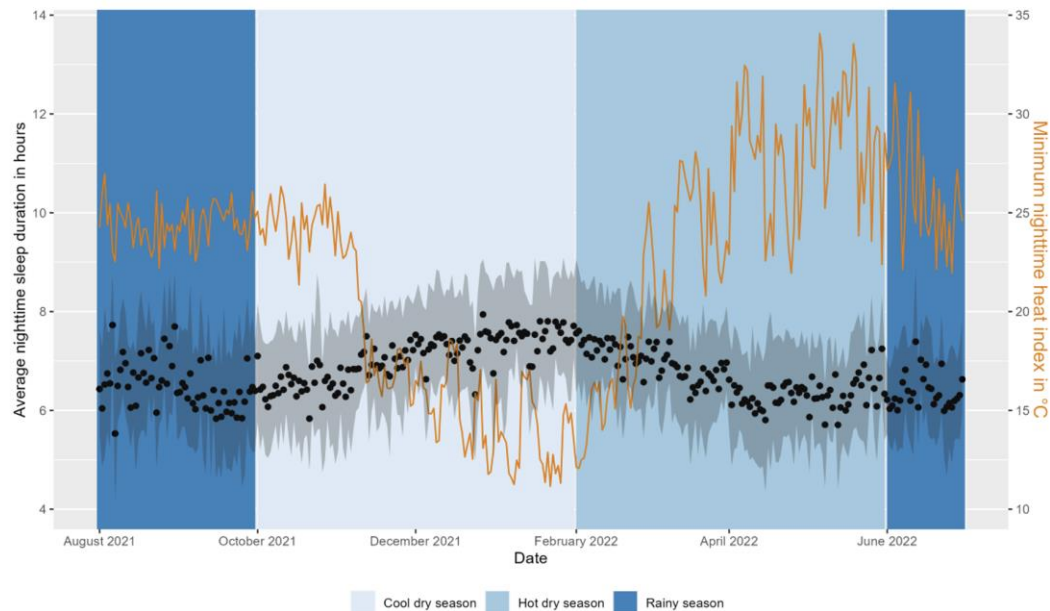


**Activity peaks during cooler hours and dips in hotter midday periods, indicating temperature affects activity levels.**



# H2H Study

## First results – Sleep



**Sleep duration fluctuates slightly across seasons, with a subtle increase during cooler periods and a decrease when nighttime temperatures rise.**

# Group Activity

## Instructions:

Group activity (4-5 groups, f2f and online): after 20 minutes of discussion, each group will share their key points with the class

## Questions:

### 1. Physiological Strain and Heat:

- How might the study's findings on the physiological impacts of heat stress inform the development of heat-mitigation strategies for farmers?
- What are the potential long-term health consequences of repeated heat stress for farmers, and how might these be addressed?

### 2. Physiological Response and Working Capacity:

- How could the study's insights into the relationship between heat, physiological responses, and work capacity be used to optimize work schedules and improve labor productivity in agriculture?
- What role might wearable technology play in monitoring and mitigating heat stress in real-time for farmers?

### 3. Heat's Effect on Agricultural Work Capacity and Harvest Yield:

- How might the study's findings on the impact of heat on harvest yields inform agricultural practices and policies to ensure food security in the face of climate change?
- What types of interventions or technologies could be implemented to help farmers adapt to hotter conditions and maintain crop yields?

### 4. The Link Between Reduced Harvests and Child Nutrition:

- How can the study's findings on the link between reduced harvests and child nutrition inform policies and programs to protect children's health in the context of climate change?
- What role might social safety nets or other interventions play in mitigating the impact of reduced harvests on child nutrition?