

Project overview

Title:

Mobility-Heat Stress-Undernutrition (MoHSUn): The impact of (in)adequate potable water access in a biosocial syndemic among female IDPs

Timeframe:

August–December 2024

Summary:

This pilot project examined the complex interconnections between heat stress and undernutrition as experienced by female internally displaced persons (IDPs) in the global tropics, using Maiduguri (Nigeria) and Jacobabad (Pakistan) as case study locations. It identified an urgent need to tackle heat stress and undernutrition as a syndemic.

Change in action

Several recent studies have established a correlation between heat stress and undernutrition. IDPs – particularly women – are at high risk of experiencing heat stress and undernutrition simultaneously due to geographic location combined with poor living conditions and food insecurity. This pilot project mapped the mechanisms linking heat stress and undernutrition to identify possible future projects to improve heat-health and nutrition among especially vulnerable people.

Safe water for the nutrition and heat-related health of displaced women

IDPs often encounter undernutrition and heat stress simultaneously. Potable water combats both.

Most internally displaced people (IDPs) are located in the global tropics, often in heat-exposed shelter without electricity, and are vulnerable to food insecurity, meaning they often experience heat stress and undernutrition simultaneously.¹ Over the past decade, research has also shown a concerning correlation between exposure to heat stress and undernutrition outcomes;² however, there has been limited investigation into the exact mechanisms that connect heat stress and undernutrition and none relating these to IDP mobility. As a result, no policies have been made to address these interactions.

In late 2024, an interdisciplinary group of researchers with expertise in thermal physiology, nutrition, displacement and heat-health came together to investigate the complex relationship between mobility, heat stress and undernutrition in the lives of internally displaced women. Having reviewed the academic literature, we completed a conceptual framework that identified a plethora of relationships between heat stress, undernutrition and mobility, including pathways as diverse as:

- Heat stress, resulting in heat strain, contributing to increased nutrient needs, which in the context of food scarcity contributes to undernutrition
- Undernutrition contributing to impaired temperature sensation and response, affecting behavioural modification of heat exposure, resulting in heat stress and heat strain, and
- Heat strain from heat stress contributing to reduced human performance, specifically in gathering or preparing food, contributing to reduced nutrient intake and undernutrition.

Most of these pathways had very limited evidence associated with them, in part because the vast majority of heat stress research has taken place with healthy individuals with adequate nutrition, in developed country contexts where basic needs, such as adequate water and shelter, are met.

Potable water

Potable water is one of the most essential yet precarious pathways linking heat stress and undernutrition for IDPs. Having access to enough safe water to drink is essential for both heat-health and nutrition; not having enough water, or drinking contaminated water, increases vulnerability to heat stress and undernutrition. Sufficient water intake, especially in hot conditions, keeps the body hydrated and supports thermoregulation through sweating; but ingesting contaminated water can cause gastrointestinal illness, which leads to reduced water absorption (leading to dehydration), nutrient loss (leading to malnutrition) and increased core temperature (exacerbating the effects of heat stress). Dehydration leads to reduced kidney function, which in turn increases the risk of malnutrition; and undernutrition and dehydration increase the likelihood of reduced breastmilk quality and quantity, leading to infant undernutrition. Figure 1 outlines these and other potential pathways.

The role of women

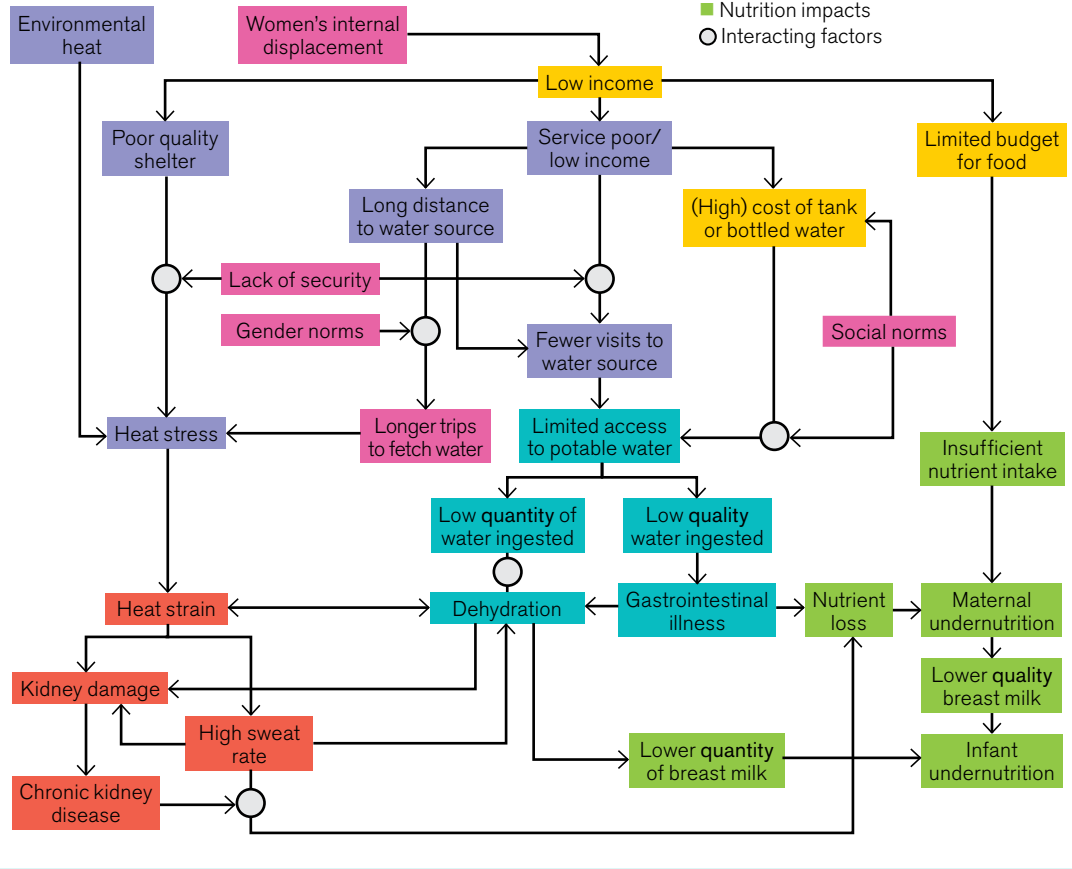
Among the IDP community, women are often more vulnerable to heat stress and undernutrition, but they are also critical in securing heat-health and nutrition outcomes for themselves and for their families as they may be

Figure 1. The potable water pathway for MoHSUn as a syndemic

Authors' own, derived from MoHSUn Phase 1 research. This conceptual framework is indicative and subject to change.

Key

- Social/Behavioural factors
- Material/Environmental factors
- Economic factors
- Water factors
- Heat strain effects
- Nutrition impacts
- Interacting factors



breastfeeding infants and are often responsible for collecting and preparing the household's food and water. Their own nutrition and exposure to heat stress (and resulting heat strain) can have an impact on their ability to perform these roles as well as the quantity and quality of the breastmilk they produce.

Research and policy implications

We urgently need further research on how people who are undernourished experience heat stress and how heat stress affects nutrition, and how this plays out in the context of internal displacement. Given the complex and reinforcing interactions between heat stress and undernutrition and the relationship of these to the material, economic and social conditions associated with living as an IDP, we have identified mobility–heat-stress–undernutrition as a type of syndemic – a situation in which one

or more diseases or health conditions co-occur and interact as a result of social factors.³ Investigating these issues as syndemic, through transdisciplinary research situated in a real-world context, could revolutionise our understanding of vulnerability to heat stress and undernutrition as discrete and compounding risks. With cross-sectoral collaboration and coordination, this could inform the development of syndemic-appropriate policy responses that recognise not only shared risks but also shared opportunities to act on key pathways – like potable water access.

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Notes

¹ Protection Sector Pakistan (2022) Pakistan protection analysis update, October. UNHCR, Pakistan; Protection Sector North-East Nigeria (2023) Protection Sector north-east Nigeria annual report. UNHCR, Nigeria. / ² Tusting, LS, Bradley, J, Bhatt, S, Gibson, HS, Weiss, DJ, Shenton, FC and Lindsay, SW (2020) Environmental temperature and growth faltering in African children: a cross-sectional study, *Lancet Planetary Health*, 4(3), e116–e123. / ³ Singer, M, Bulled, N, Ostrach, B and Mendenhall, E (2017) Syndemics and the biosocial conception of health, *Lancet*, 389(10072), pp.941–950.

Key lessons & innovations

- Heat stress and undernutrition co-occur and interact for female IDPs.
- Inadequate access to potable water is a key pathway whereby IDP mobility increases vulnerability to heat stress and undernutrition.
- Adequate ingestion of potable water enables hydration and effective thermoregulation and decreases the incidence of gastrointestinal disease, which contributes to dehydration, malnutrition and higher core temperature.

Partners' view

In the extreme climate of Maiduguri, this initiative addresses underexplored areas to provide context-specific and stakeholder-driven solutions to enhance health, wellbeing and policy action for vulnerable IDP communities.

Co-creation session participant from FHI 360 Nigeria

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