Climate change, social vulnerability, and stunting in South Asia

Despite recent advancements in global economic and food security, climate change threatens to undermine child nutritional health, particularly for marginalized populations in tropical low- and middle-income countries, where temperatures are already high and community resources for responding to climate shocks are often few. Climate change in these places can damage crop yields, increase heat stress and infectious disease, and destabilize the economy, all of which puts children’s nutritional health at risk. This is a major concern because adequate nutrition is central to the physical and cognitive development of children under five years old, and undernutrition in early life can cause damage that lasts well into adulthood. South Asia is at particular risk for climate-driven undernutrition due to a combination of extreme weather, existing nutritional deficits, and a lack of sanitation access. Previous studies have established that precipitation extremes in particular threaten to increase rates of undernutrition in this region, but the existing literature lacks adequate consideration of temperature anomalies, mediating social factors, and developmentally relevant timing of exposure to climate shocks. We combine high-resolution temperature and precipitation data with household demographics and child anthropology, using an approach that incorporates three key developmental periods and a rigorous fixed effects design. We find that temperature and precipitation extremes in the first year of life significantly increase the likelihood of stunting (height-for-age $z < -2$) for the majority of South Asian children. The detrimental effects of extreme precipitation are especially concentrated in under-resourced households, such as those lacking access to proper sanitation and education for women, while anomalous heat is particularly harmful for children in Pakistan. These results indicate that nutritional status in South Asia is highly responsive to climate exposures, and ongoing nutritional improvements in South Asia are likely to be handicapped as climate change leads to more frequent and intense climate shocks.