

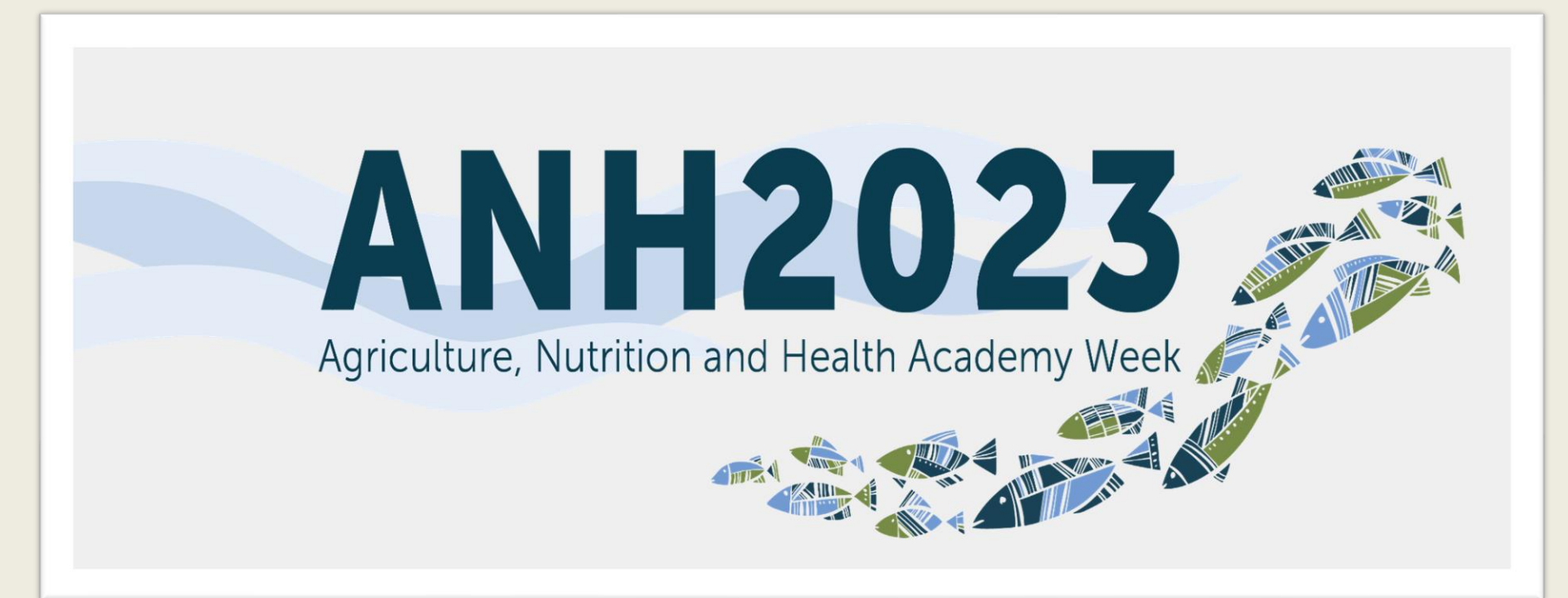
Association between Crop Production Diversity and Child Nutrition Status in India

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Introduction

- India's Global Hunger Index rank slipped to 107th and child malnourishment worsened in many states.
- The total net sown area in India increased from 42 percent in 1950-51 to 45 percent in 2016-17, with rice and wheat alone contributing to more than 50 percent of the gross cropped area (Pocket of Agriculture Statistics (2020)).
- Monoculture farming and diet homogenization are new challenges for policymakers in the fight against hunger.
- Supply shifts in food products lead to complex associations with the population's nutritional status and health.
- The evidentiary base of crop production diversity on malnutrition among rural households is not well understood.
- Our study seeks to address this research gap by providing a quantitative analysis of the links between agricultural crop diversity and child malnutrition in India.

Methods

Data

- District level data child undernutrition, Gross Domestic Product, and Agricultural Crop Diversity data is combined from different sources for two time-periods, viz; 2015-16 and 2019-21 into a comprehensive panel data
- Data for child undernutrition is sourced from two rounds of the nationally representative Indian *National Family Health Survey* (NFHS) conducted in 2015-2016 (NFHS-4) and 2021-22 (NFHS-5).
- The agricultural crop diversity data is taken from ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) District Level Database for Indian Agriculture and allied sectors data for 526 districts in 20 major states for the periods 2014-15 and 2018-19.

Nutrition Outcome

Child's undernutrition status is measured based on the failure in the child anthropometrics along three dimensions: Stunted (low height-for-age) Wasted (low weight-for height) and Underweight (low weight-for-age).

Agriculture Diversity is measured using the Shannon Index, and is calculated using the data on the production of 20 major crops.

Statistical Methods

The relationship between agricultural diversity and nutrition status is examined using a panel OLS regression method. A two-step regression was performed to examine the relationship between agricultural diversity and nutritional status.

The gross effect of agricultural diversity and nutritional status is examined by performing a fixed effects OLS regression using the agricultural diversity, measured using Shannon Index as the explanatory variable and nutritional status as the dependent variable.

Further, multiple fixed-effects OLS regressions are conducted while controlling for the socio-economic and demographic characteristics at household and population level.

Results

Table 1: Relationship between Child Nutrition Status and Crop Production Diversity

Variables	Child Undernutrition Status		
	Stunted	Wasted	Underweigh
Shannon Index	-0.473*** (-0.0861)	-0.323*** (-0.094)	-0.613*** (0.0934)
Constant	32.96*** (0.527)	18.48*** (0.581)	29.61*** (0.572)
R-Squared	0.054	0.022	0.075
Observations	1,049		
Number of Districts	521		

- The study shows that although there is a decline in the child undernourishment at the national level, many erstwhile better performing states showed an increase during the study period. This is in the backdrop of an increasing production and diversity.
- The spatial analysis showed that districts with higher diversity had lower undernourishment.
- However, it is also seen that a growth in diversity across the districts from 2014-15 to 2018-19 is not accompanied with a similar improvement in the child nutrition status.
- The child anthropometric failures: Stunting, Wasting and Underweight are negatively associated with the crop production diversity
- The relationship holds true for stunting and underweight after controlling for socio-economic and demographic characteristics.
- Whereas, the relationship between Shannon Index and Percentage of children wasted is statistically insignificant after controlling for the background characteristics.
- The study results show that maternal nutrition, maternal education, household economic status, improved access to drinking water, and place of residence play a major role in child nutrition.
- Moreover, wide inter-state disparities are found in terms of nutrition and agriculture performance. Districts in states with higher diversity showed lesser undernourishment.

Discussion

- Agricultural diversity is key to the future of nutrition and food security globally as it safeguards the agricultural production of today and future in the rapidly changing environments.
- Patterns of production lead to patterns of availability and consumption which go through complex distribution processes (Hawkesworth et al, 2010).
- With a high dependence on agriculture for livelihood and concentrated landholdings, the relationship between agriculture and nutrition is even more complex in the Indian context
- . Our study findings call for the policy efforts to strengthen the affordability of the households for buying adequate quality of food items.
- Since the increase in the crop production diversity doesn't inform whether the crops produced are accessed by the poorer households, who suffer the worst, policy efforts should be concerted to create an income effect and increase the affordability of diverse consumption baskets.

Bibliography

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