INDIA-AFRICA COMPARISON OF AGRICULTURAL & FOOD TRANSFORMATION

PRESENTED AT THE ZEF-FARA-ICRIER WORKSHOP “AFRICA AND INDIA: EXPERIENCES WITH TRANSFORMATION OF FOOD AND AGRICULTURE AND OPPORTUNITIES FOR LEARNING AND COLLABORATION”, 26 NOVEMBER 2021

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Why this study?

Research Questions & Methodology

Findings from Cluster Analysis

Agriculture performance in India & Africa

Drivers of agricultural growth in India & Africa

Drivers of nutritional change in India & Africa
MOTIVATION

✓ Diverse in natural resource endowments, agro-climatic zones, economic structure & food systems in Africa and India.

✓ Internal heterogeneity with India and Africa gives the premise of the present study

Source: WDI and MOSPI, GoI, 2016
RESEARCH QUESTIONS & METHODOLOGY

1. What key lessons can be drawn from distinct agricultural growth trajectory between Indian states & Africa countries?

Cluster Analysis: Common typologies between Indian states (20) & African Countries (24) based on Principal Component Analysis & Nearest Neighbor Matching

2. What are the key drivers of agricultural growth in both regions?

Panel Data Regression: Separate regressions for Indian states (27) & African countries (24) from 2000 to 2016 to explain Gross value of output (GVOA)

3. How agricultural transformation could improve nutritional outcomes in African countries and Indian states?

Panel Data Regression: Pooled panel of Indian states (27) & African countries (41) since 2000 to explain prevalence of stunting and underweight
CLUSTERS OF COMPARABLE INDIAN STATES AND AFRICAN COUNTRIES

Source: Author’s Compilation for 2016 data

Note: Clusters based on Principal Component Scores of nine variables: Per capita Agricultural GDP, Employment in agriculture, Population, Irrigation ratio, GVOA per hectare, Share of Agriculture in GDP, Share of Livestock in GVOA, Underweight, Poverty (2016 data)
## AFRICAN COUNTRIES & INDIAN STATES FALL INTO SIMILAR CLUSTERS

<table>
<thead>
<tr>
<th>CLUSTERS</th>
<th>Agri growth 2000-2016</th>
<th>Agri productivity (GVOA per ha)</th>
<th>Agri intensification (Access to Input, Irrigation)</th>
<th>Diversified Agri sector (high share of Livestock)</th>
<th>Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLUSTER 1</strong>: Gujarat, Rajasthan, Andhra Pradesh, West Bengal Cameroon, Uganda, Benin, Tanzania</td>
<td>High</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Mixed</td>
<td>High</td>
</tr>
<tr>
<td><strong>CLUSTER 2</strong>: Karnataka, Assam, Odisha, Chhattisgarh, Maharashtra, Jharkhand Burkina Faso, Rwanda, Mozambique, Mali, Malawi, Kenya, Ethiopia, Angola, Nigeria</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>CLUSTER 3</strong>: Himachal Pradesh, Uttarakhand, Jammu and Kashmir, Kerala Cote d'Ivoire, Senegal, Morocco, Tunisia, Ghana</td>
<td>Moderate</td>
<td>High</td>
<td>Low</td>
<td>Mixed</td>
<td>Low</td>
</tr>
<tr>
<td><strong>CLUSTER 4</strong>: Tamil Nadu, Punjab, Haryana Algeria, South Africa, Egypt</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>CLUSTER 5</strong>: Madhya Pradesh, Bihar, Uttar Pradesh Democratic Republic of Congo, Niger, Madagascar</td>
<td>Low</td>
<td>Low</td>
<td>Mixed</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: Author’s compilation
During 2000-2016

✓ African agriculture has entered into a period of sustained and remarkable growth since millennium
✓ India’s agricultural sector grew at 3.1% annually, while African grew 4.6% p.a.

Source: WDI and MOSPI, GoI, various years.
DRIVERS OF AGRICULTURAL GROWTH
Indian states have better access to inputs such as irrigation

Many African countries have better ICT infrastructure

Source: Africa Infrastructure Development Index, and TRAI, various years

Note: ICT index calculated using the total phone subscription, both fixed telephone lines and mobile cellular telephone subscriptions, given in a year per 100 habitants.
LABOUR PRODUCTIVITY IN INDIA & AFRICA

Source: WDI, FAOSTAT and MOSPI, GoI, Census 2011.
DIFFERENT DRIVERS OF AGRI-GROWTH IN INDIA & AFRICA

Indian states

- Access to inputs (fertilizer, tractors, irrigation)
- Agricultural diversification towards high valued activities
- Sectoral terms of trade (price incentives)
- Convergence across states in agri growth

African countries

- Agricultural area expansion
- Agricultural diversification towards high valued activities
- No convergence across countries in agri growth

Source: Based on Study’s Estimation
DRIVERS OF NUTRITIONAL CHANGE
Prevalence of undernutrition has declined in both Indian and Africa, but India show a higher percentage point (11%) reduction in under-five child stunting.

Agriculture plays a vital role both in Africa and India economies, but the empirical evidence on the link between agri-growth and nutritional outcomes is mixed (Kadiyala et al., 2014; Subramanyam et al., 2011; Smith & Haddad 2002, 2015).
ASSOCIATIONS BETWEEN GROWTH AND NUTRITION

Growth-nutrition (stunting) elasticities

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Full sample (N=312)</th>
<th>Africa (N=204)</th>
<th>India (N=108)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita</td>
<td>-.24***</td>
<td>-.23***</td>
<td>-.33***</td>
</tr>
<tr>
<td>Agricultural income per capita</td>
<td>-.19***</td>
<td>-.17**</td>
<td>-.27***</td>
</tr>
<tr>
<td>Agriculture value added (% GDP)</td>
<td>.22***</td>
<td>.20***</td>
<td>.29***</td>
</tr>
<tr>
<td>Agriculture employment share (%)</td>
<td>.41***</td>
<td>.38***</td>
<td>.50***</td>
</tr>
</tbody>
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Note: statistical significance, *** p<0.01, ** p<0.05

- Growth in GDP p.c. has a greater impact on stunting than growth in p.c. agricultural income
Other key drivers of undernutrition

- Access to improved sanitation
- Improved access to water supply
- Female school enrollment as indicator of women empowerment
- Share of rural population

- Nutrition-sensitive policies (biofortification, targeted transfers)

Source: UNICEF, NFHS.
OBJECTIVE AND INDICATIONS

✓ What are comparable patterns that could inform strategies for transformation in agriculture and food systems within Indian states & African countries?
  ❖ Agricultural and income growth performance; innovation

✓ What are the key drivers of agricultural growth in both regions?
  ❖ Different & common drivers, intensification, area expansion, diversified agri-sector

✓ How agricultural transformation could improve nutritional outcomes in African countries and Indian states?
  ❖ Agricultural transformation through productivity gains; integrated set of policies

To be discussed in the panels