IRRI’s Perspective on Production Economics and Rice Production systems

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International Rice Research Institute

Acknowledgements

- H. Bhandari, IRRI
- Pie Moya, IRRI
- Thelma Paris, IRRI
Program 5: Targeting & Policy
4 Product Lines & 12 Products

**Program 2**

**Program 3**

**Program 4**

**Evaluation**
- Technology Needs
- Poverty Dynamics
- Consumer Perceptions

**Targeting**
- Information on Agro Ecologies
- Rice Maps: Abiotic & Biotic stress
- Characterization

**Policy**
- Rice Monitoring
- Data
- Policy Analysis
- Regional Integration

**Impact**
- Ex Ante
- Ex Post

**Core Activity**

Collection of farm household data to:
- Identify technology needs of the farmers
- Understand constraints to adoption
- Analyze adoption patterns including the role of women in technology adoption
- Analyze unintended consequences of technology interventions
- Monitor and evaluate adoption
- Establish a baseline for ex post impact assessment

Data on input, output, prices and costs of rice production and farm household demographics are collected for all surveys
Studies on the rice production systems have been done in several Asian countries.

Central Luzon Loop Survey
- Started in 1966/67
- Every four years
- 2011/12 (latest survey)

Accessible online at WWW.IRRI.ORG
Click on “Knowledge”
Click on “Household Survey Database”
1987/88 Survey

- The benchmark survey was conducted in 1987-88 covering 1231 households
  - Selected from 62 villages in 57 out of 64 districts
  - A random sample of 20 households were drawn from each village.
  - Covered all agro ecological zones in Bangladesh.
  - Implemented by BIDS and IRRI
Data collection

- demographic characteristics of all household members
- use of all parcels of land owned and operated by the household
- costs and returns on the cultivation of major crops
- purchase of inputs and the marketing of products
- ownership of non-land assets
- employment of working members and earnings from non-farm activities, and
- the perception of the households regarding changes in its economic conditions.

Source: Uttam Deb and Alamgir Choudhury

High Frequency Data Collection (2009 onwards)

<table>
<thead>
<tr>
<th>Villages</th>
<th>District</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boikuntapur</td>
<td>Thakurgaon</td>
<td>Drought</td>
</tr>
<tr>
<td>Rasun Simul Bari</td>
<td>Kurigram</td>
<td>Flood prone</td>
</tr>
<tr>
<td>Daricamari</td>
<td>Bogra</td>
<td>Favorable</td>
</tr>
<tr>
<td>Khudiakhali</td>
<td>Chuadanda</td>
<td>Favorable - Drought</td>
</tr>
<tr>
<td>Dakhin Kabirkati</td>
<td>Patuakhali</td>
<td>Coastal</td>
</tr>
<tr>
<td>Paschim Bahadurpur</td>
<td>Madaripur</td>
<td>Flood prone</td>
</tr>
<tr>
<td>Phorthand</td>
<td>Narshingdi</td>
<td>Favorable</td>
</tr>
<tr>
<td>Nishaigonj</td>
<td>Mymensingh</td>
<td>Flood prone</td>
</tr>
<tr>
<td>Bhojanipur</td>
<td>Comilla</td>
<td>Favorable</td>
</tr>
<tr>
<td>Begumpur</td>
<td>Chandpur</td>
<td>Flood prone</td>
</tr>
<tr>
<td>Niamatpur</td>
<td>Jhenaidaha</td>
<td>Favorable-Drought</td>
</tr>
<tr>
<td>Konapara</td>
<td>Mymensingh</td>
<td>Favorable-Drought</td>
</tr>
</tbody>
</table>
**Data collection Modules**

<table>
<thead>
<tr>
<th>Data collection modules</th>
<th>Frequency of data collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1 – Household census schedule</td>
<td>Project beginning (2009)</td>
</tr>
<tr>
<td>M2 – General endowment schedule</td>
<td>Annual</td>
</tr>
<tr>
<td>M3 – Plot-list and cropping pattern schedule</td>
<td>Every season (3 seasons)</td>
</tr>
<tr>
<td>M4 – Employment schedule</td>
<td>Every month</td>
</tr>
<tr>
<td>M5 – Income and expenditure schedule</td>
<td>Every month</td>
</tr>
<tr>
<td>M6 – Price schedule</td>
<td>Every month</td>
</tr>
<tr>
<td>M7 – Rainfall schedule</td>
<td>Every day</td>
</tr>
<tr>
<td>M8 – Crop cultivation schedule</td>
<td>Every season (3 season)</td>
</tr>
<tr>
<td>M9 – Livestock schedule</td>
<td>Every month</td>
</tr>
<tr>
<td>M10 – Health and nutrition</td>
<td>Annual</td>
</tr>
</tbody>
</table>

### Household Poverty Dynamics During a Commodity Price Spike: Evidence from Bangladesh (forthcoming in Agricultural Economics)

Joseph V. Balagtas, Purdue University; Elanie Cabrera, IRRI; Humnath Bhandari, IRRI; Sam Mohanty, IRRI and Mohabub Hossain, BRAC

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>1,238</td>
<td>1,872</td>
<td>1,927</td>
<td>2,010</td>
</tr>
<tr>
<td>HH size</td>
<td>5.9</td>
<td>5.4</td>
<td>5.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td>0.62</td>
<td>0.54</td>
<td>0.48</td>
<td>0.47</td>
</tr>
<tr>
<td>Nonfarm HH (%)</td>
<td>34</td>
<td>42</td>
<td>39</td>
<td>43</td>
</tr>
<tr>
<td>Area under tenancy (%)</td>
<td>22</td>
<td>33</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>Ag workers (no.)</td>
<td>1.2</td>
<td>0.9</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Nonag workers (no.)</td>
<td>0.7</td>
<td>0.9</td>
<td>0.9</td>
<td>0.7</td>
</tr>
<tr>
<td>Domestic migrants (no.)</td>
<td>0.2</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Overseas migrants (no.)</td>
<td>0.01</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
</tr>
</tbody>
</table>

- **Summary Findings**
  - Commodity market volatility + global recession ➔ reversal of long trend out of poverty
  - Increased poverty incidence driven by an increase in transitory poverty (25% to 37%)
    - Rates of exit from poverty largely unchanged (60%)
  - Chronic poor are more reliant on agricultural income, and increasingly so
    - Nonfarm households and land renters tend to be poor
  - Chronic poor less reliant on non-farm income
    - Could this have protected them from global recession?
    - A cautionary tale for those recommending non-ag income sources as pathway out of poverty

**Selected Sample Statistics**
Rice production in Asia, 1970-2010

Income rise in Asia, 1980-2011

Source: Bhandari, IRRI
Agriculture share of total employment, 1980-2011

Source: Bhandari, IRRI

Changes in primary occupation: BANGLADESH

Source: Bangladesh panel data
Trends in farm size in Asia, 1990-2005

Changes in asset endowments

<table>
<thead>
<tr>
<th></th>
<th>1988</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural capital</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm size (ha/hh)</td>
<td>0.61</td>
<td>0.53</td>
<td>0.48</td>
</tr>
<tr>
<td>Irrigated land (%)</td>
<td>25</td>
<td>55</td>
<td>64</td>
</tr>
<tr>
<td>Area under tenancy (%)</td>
<td>16</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td><strong>Human capital</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total worker (no./hh)</td>
<td>1.36</td>
<td>1.43</td>
<td>1.64</td>
</tr>
<tr>
<td>No. of migrants (no./hh)</td>
<td>0.26</td>
<td>0.61</td>
<td>0.86</td>
</tr>
<tr>
<td>Av. education (yr)</td>
<td>3.2</td>
<td>4.1</td>
<td>5.2</td>
</tr>
</tbody>
</table>
Change in Farm Size, Central Luzon, Ph

Hectare

Source: Loop survey

Rural out-migration in Asia

Bangladesh

India

Vietnam

Source: Bhandari, IRRI
Age of farm household head in Asia

Bangladesh

Philippines

Source: Bangladesh panel & Loop survey

Family and hired labor use in rice farming

Bangladesh

Philippines

Source: Bangladesh panel & Loop survey
Increase in wage rate of agricultural labor

Fertilizer (NPK) use in agriculture, 1970-2009

Source: Bhandari, IRRI
NITROGEN (N) FERTILIZER USE PER HECTARE, CENTRAL LUZON FARMS, PHIL. 1966-2012

Source: Loop survey

Irrigated rice area, 1970s and 2010s
Pump irrigation in Bangladesh, 1980-2010

Distribution of rice production cost, Bangladesh
Rice production cost in Asia

Women in Rice Farming
Changing Role of Women

• Drivers
  – Migration of male labor
  – The adoption of labor-saving technologies and mechanization
  – Social and cultural norms regarding female labor
Empowering women as entrepreneurs in transplanting rice

Chi et al., 2006

Fertilizer application
Cleaning the dikes
Pest control

Tamil Nadu, India  CSISA project
Opportunities to address the changing gender roles

- Train women as farm managers (on crop/farm management) and as entrepreneurs
- Provide training on non-traditional jobs eg. machinery repair and making spare parts in anticipation of machinery adoption
- The adoption of mechanical transplanters will increase in the future with labor shortages
- Need to explore other opportunities for displaced women workers by organizing and training women to operate and own-for renting out machines
- Develop custom-made equipment/machines for women to address the drudgery and labor efficiency in rice farming
- Employ more women in agro-processing or value adding agriculture-based income generating activities and other livelihood activities in the rural areas e.g increasing crop diversification

Source: Paris, IRRI

Large Rice Field Model in Vietnam

- large fields enough (from 50-500 ha)
- Farmers are voluntary to participate
- Availability of input dealers and enterprises (exporters) to buy farmer product thru contract farming
- Efficiency: (1) Reduced costs of production; (2) Increase rice productivity and quality ; (3) Improve profits for farmers....;

Source: Pham van Du, Department of Crop Production-MARD
Concluding Remarks

• Farming population is declining and aging
• Labor scarcity is increasing
• Roles of men and women are changing
• Technology focus: small farms, labor saving, women & old farmers, new cropping system, etc.