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The primary goal of agricultural research has been to increase agricultural production, particularly in high-potential areas. This has contributed enormously to reducing the number of people living in poverty worldwide, as well as to reducing food prices for all. Despite these gains, about 1 billion rural people still live in poverty in the developing world.

In an era in which global food supplies are plentiful though poorly distributed and trade barriers are being reduced, the public sector has a greater opportunity to focus more resources on research strategies that directly benefit the poor. This opportunity is enhanced by the private sector's increasing role in addressing many mainstream productivity challenges at the global level. But what strategies should the public sector adopt if it is to more explicitly address the needs of the poor?

## HOW AGRICULTURAL RESEARCH CAN HELP THE POOR

Agricultural research that leads to improved technologies can: 1) increase poor farmers' own-farm production; 2) provide farmers and landless laborers greater agricultural employment opportunities and higher wages within the adopting regions; 3) increase migration opportunities for the poor to other agricultural regions; 4) benefit a wide range of poor people through growth in the rural and urban nonfarm economy; 5) lead to lower food prices for all consumers, rural or urban; 6) lead to greater physical and economic access to crops that are high in nutrients, which are crucial to the well-being of the poor, especially women; and 7) empower the poor by increasing their access to decisionmaking and their capacity for collective action, and reducing their vulnerability to shocks via asset accumulation.

Many of these benefits do not necessarily materialize for the poor; many conditioning factors determine who benefits from technological change. Nor do they all necessarily work in the same direction. For example, while many may benefit from cheaper food and greater nonfarm income earning opportunities, the production and employment benefits in the adopting regions may be disappointing or even perverse. The net outcomes, both for individuals and for the poor in total, can be difficult to determine a priori.

## A TYPOLOGY FOR AGRICULTURAL RESEARCH DECISIONS

Given these complexities, can agricultural research be targeted more accurately to help the poor within the socio-economic conditions of specific regions? Must such targeting be done differently for every site or can sufficient commonalities across sites be identified to construct a typology that can serve as a useful decision guide?

Numerous national, regional, and local factors condition the size and distribution of benefits. At the national level, these include liberalized markets, rural infrastructure, per capita income levels, the share of poor people who live in urban areas, and population growth. At the regional or local level, agroclimatic conditions, labor market structure, land distribution, infrastructure, and institutional and empowerment issues all affect benefits. These criteria are too numerous for a single typology, but can be clustered or merged when they are strongly correlated to provide an index measure. The typology is structured around the following questions:

- Is the region located in a low-income country (LIC) or a middle-income country (MIC)?
- Does the country have liberalized or unliberalized market and trade policies?
- Does the region have high or low agroclimatic potential for agricultural growth?
- How good are the rural infrastructure, service provision, and market access?
- Are wages low and the labor abundant or are wages high and labor scarce?
- How empowered are the region's poor?

Answers to these questions can be used to set priorities for agricultural research appropriate in different contexts. The resulting framework helps prioritize the inter-regional allocation of resources to reduce poverty nationally (the shaded cells in the table) and the types of research most appropriate within a specific region (the numbers in each cell). The empowerment criterion has not been used as a level of disaggregation in the table because it is more applicable to how research and extension are conducted.

## HELPING THE POOR: PRIORITIES FOR AGRICULTURAL RESEARCH

Key topics for pro-poor agricultural research agendas emerge from this typology. The most important are:

1. *Increasing staple food production in countries where food price effects are still important and/or that have a comparative advantage in growing these crops.* This includes most LICs, but also many MICs that have not liberalized their trade and markets. The Green Revolution technologies have now largely run their course in many irrigated and high-potential areas and more germplasm improvement work, including biotechnology, is needed to raise yield potentials. At the same time, better management of external inputs such as chemical fertilizer, pesticides, and irrigation water can contribute to higher productivity while reducing environmental problems that have arisen in many intensively farmed areas.

## Priorities for agricultural research to reduce national poverty by type of adopting region

Country Setting/ Regional Characteristic	Good infrastructure				Poor infrastructure			
	Surplus labor		Scarce labor		Surplus labor		Scarce labor	
	Low Potential	High Potential	Low Potential	High Potential	Low Potential	High Potential	Low Potential	High Potential
Middle-income country								
Markets liberalized	1,2,3,5	2,3,5,8	1,4,6	4,6,8	1,3,5,7	3,5,8	1,4,6,7	4,6,8
Markets not liberalized	1,2,3,5	1,2,3,5,8	1,4,6	1,4,6,8	1,3,5,7,9	1,3,5,8	1,4,6,7,9	1,4,6,8
Low-income country								
Markets liberalized	3,5	1,2,3,5,8	2,4,5,8	1,2,4,5,6,8	1,3,5,7,9	1,3,5,7,9	1,4,5,7,9	1,4,5,7,9
Markets not liberalized	1,3,5,9	1,3,5,8,9	1,4,5,8,9	1,4,5,8,9	1,3,5,7,9	1,3,5,7,9	1,4,5,7,9	1,4,5,7,9

Priority for agricultural research:

- |   |                                |  |
|---|--------------------------------|--|
| 1. Staple-food production                 | 4. Increase labor productivity | 7. Low external-input farming          |
| 2. High-value crops, trees, and livestock | 5. Smallholder farms           | 8. High external-input farming         |
| 3. Employment-intensive growth            | 6. Medium and large farms      | 9. Nutritional content of food staples |

### 2. Increasing agricultural productivity in many less-favored lands.

Special attention is needed for heavily populated low potential areas (LPAs), but also some high potential areas (HPAs) that are constrained by poor infrastructure and market access. Some types of commodity improvement work, such as improving pest, disease, and drought resistance, are vital for less-favored areas. But major productivity improvements will often first have to come from better natural resource management (NRM) to improve soil depth, organic matter, fertility, and moisture content. Poor infrastructure and market access characterize many less-favored areas, making the use of high levels of external inputs uneconomic, and placing a premium on development of low external input (LEI) technologies that could boost both labor and land productivity. While improved technologies for food crops for subsistence and local needs are often much needed in the poorer LPAs, sustained increases in per capita incomes will hinge on diversification into higher-value agricultural products and nonfarm activities.

3. *Helping smallholder farms across the board to diversify into higher value products*, especially in countries with rapidly growing domestic markets for such products (most MICs) and/or access to suitable export markets. Other income-augmenting measures for smallholder farms include creation of rural processing facilities to enable higher value added from agricultural output.

4. *Increasing employment and income earning opportunities for landless and near-landless workers in labor surplus regions.*

This is critical for LICs with growing populations and land scarcity. Increases in staple food crop production often lead to greater employment earnings for landless laborers. Increased investments in improved natural resource management and farm diversification into higher value livestock and horticultural products can help create additional employment, since many of these activities are labor intensive. Additionally, since many landless people keep poultry, rabbits, goats, and dairy cows in stalls or cages, or use common-property grazing resources

and purchased feeds, research should target these types of livestock systems and the rehabilitation and better management of common-property resources.

5. *Developing more nutritious and safer foods to enhance the diets of poor people*, and investing in agricultural technology and infrastructure that improve physical and economic access to micronutrient-rich foods, especially for LICs where poor diets and micronutrient deficiencies significantly impair health. Home gardening, improved post-harvest handling of food, and biotechnology are all promising avenues for research.

6. *Undertaking agricultural research in ways that empower the poor.* Participatory research, in which poor people help set and carry out the research agenda, can potentially give poor people more influence over the research system to address their needs and provide them with skills needed to solve many of their own problems.

These types of research also need to be undertaken in ways that sacrifice the least growth in national agricultural output. This is important to meet future food needs and to obtain larger rounds of indirect benefits for the poor in the nonfarm economy. There are good opportunities for such “win-win” research investments. For example, small farms are often more efficient producers than large farms in developing countries, and the right kinds of investments in many less-favored lands can yield favorable economic returns while also directly benefiting the poor. But where tradeoffs with growth are high, alternative policies for poverty alleviation should be considered. Technology is only one instrument for helping the poor, and not always the most effective one. It must be seen within the broader context of rural development and grassroots development efforts.

If public research and extension systems are to be more effective in undertaking targeted pro-poor research, they will have to make institutional adjustments, including adopting client-oriented, problem-solving approaches. This in turn will require changes in incentive structures and new partnerships with NGOs, private sector firms, and farmers.

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This brief is based on the 2020 Vision Discussion Paper 34 of the same title, Agricultural Research and Poverty Reduction (IFPRI 2001), by Peter Hazell and Lawrence Haddad.

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