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Assessing the Impact of High-Yielding Varieties of Maize in Resettlement Areas of Zimbabwe

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High-yielding varieties (HYVs) of maize have been widely adopted in Zimbabwe. In 1985, more than 85 percent of the smallholder maize area was planted with hybrid maize and production doubled over the period 1979–85. Despite this progress, rural poverty and child malnutrition remain endemic. Some argue that the gains from these hybrids have been concentrated on a few agroclimatic areas and that there has been little impact on child nutritional status. This possibility has implications for policy debates, not only about raising nutritional status within Zimbabwe but also about the Consultative Group on International Agricultural Research system and its mandate to link improvements in agricultural technology to better nutrition.

This study probed the relationship between high-yielding hybrid varieties of maize and the reduction of poverty by looking at two communities of resettlement farmers, comparing long-term surveys of their situation with detailed knowledge of selected cases to obtain the perspectives of the farmers and their families. The study examines the diffusion and impact of hybrid maize in selected resettlement areas of rural Zimbabwe, paying particular attention to varieties made widely available from the mid-1990s onward.

Drawing on the Sustainable Livelihoods Framework (SLF), the paper addresses three questions: (1) What factors have affected the diffusion of new maize hybrids in the 1990s? (2) How did the introduction of maize hybrids influence the development of asset bases, livelihood strategies, and livelihood outcomes? and (3) What is the relationship between these asset bases, livelihood strategies, and nutrition outcomes?

Methodology

The study team made use of a unique, longitudinal survey, covering three resettlement schemes in different agroecological zones of Zimbabwe. The initial survey was conducted in 1983–84, and the sample households have been reinterviewed repeatedly since 1992. The surveys contain extensive information on agricultural activities, nonfarm activities, assets, and child nutritional status, and, on two occasions, adoption of hybrid maize varieties.

While these surveys were rich in quantitative data and there was little sample attrition, there remained substantial information gaps. To address these, we commenced a case study with a workshop in Harare, where stakeholders identified and prioritized research questions. We then determined that qualitative field methods and analysis would allow us to understand more fully the vulnerability context

and obtain participant-defined characterizations of livelihood strategies and outcomes. In implementing the qualitative fieldwork, the core method was a series of household-level case studies supplemented by participant observation in villages found in two resettlement areas. This was followed by focus group discussions in the selected villages.

Results

Zimbabwe's "Green Revolution" was characterized by the widespread adoption of hybrid maize varieties and significant increases in yields. The diffusion of newer varieties that replace these has occurred more slowly and has had a more modest impact. Several factors account for this.

One factor is the changing role of private and public sectors. In the early 1980s, the government was heavily involved in dissemination of hybrid maize as well as development of supporting institutions. The government's current role is much reduced and increasingly focuses on "better farmers." Private-sector institutions that have entered the maize sector operate mainly in areas of high agricultural potential. Consequently, adoption partly reflects "choice" but also the limited availability of varieties. Another factor is the nature of the technology being introduced. Newer varieties are bred to meet the evolving needs of commercial farmers, but these new needs are not shared by the farmers in our survey and are not associated with significantly higher yields where use of fertilizers is limited. These factors point to the limitations of relying on the private sector for expanding the options for smallholders.

A further consideration is that information is disseminated via multiple channels and in a fragmentary fashion in an environment where tolerance of dissent is limited, the behavior of neighbors is viewed with suspicion, and some actors involved in dissemination are viewed with mistrust.

The case studies indicate links between the production of maize in excess of subsistence needs, the accumulation of

"Higher income from maize and other crops leads to investment in livestock, which is an important means through which child health is protected during drought."

assets such as livestock and tools, payment of school fees, and the acquisition of inputs such as fertilizer and labor for the subsequent cropping season. This coincides with the views of farmers who see HYVs as

an influential factor in raising livelihood above the level of poverty that prevailed when they first moved into the area.

However, new varieties appear to have increased incomes only marginally. When we control for farmer characteristics and the endogeneity of adoption, use of these

new varieties increases crop incomes only by about 10 percent. Additionally, farmers convey the view that there is nothing “special” about maize production. This was also confirmed by multivariate analysis: a 10-percent increase in maize income is associated with an increase in livestock holdings ranging from 4 to 12 percent. However, it also shows that income from maize and nonmaize crop production has approximately equal effects on the accumulation of assets.

That said, these modest impacts result in an improved ability to deal with vulnerability. Hybrids do raise productivity in maize production. Higher income from maize and other crops leads to investment in livestock, which is an important means through which child health is protected during drought. All such changes are associated with an improvement in well-being and a reduction in poverty.

An Assessment of the Methodology

Part of our research mandate was to employ and assess the SLF. While we found that it provided a useful checklist of issues to be researched and a useful base for conversations across disciplines, the SLF could not, however, always accommodate nuances of particular situations, and many topics appear in a variety of places in the framework, which could pose a problem of repetition for less experienced fieldworkers.

Although a method involving six months of fieldwork to cover a few households poses problems for replication and generalization, the depth of the understanding gained compared to a more rapid assessment approach is substantial. The case studies were helpful for several reasons. Repeated visits to homesteads led to trust and a willingness to talk about issues on which people had initially been silent. Repeated visits also enabled us to verify data and hear the perceptions of the different household members.

Ideally such studies should cover a full agricultural cycle. In the time available, some questions remained too personal or too sensitive to obtain a reliable answer. A second problem was related to the timing of the fieldwork. Although

research in the off-season meant that farmers had more time to talk, it limited our observation of agricultural activities.

An attractive feature of our approach was our ability to iteratively integrate the qualitative and quantitative analysis. A good example of the benefits of this integration is our analysis of aspects of gender and technology adoption. Our qualitative work indicated that women do not have access to many of the channels through which information on new hybrids is diffused. But our quantitative data showed no difference between male- and female-headed households. These apparently contradictory results were reconciled by further qualitative work that indicated that other adult males, such as youth, provided an alternative conduit for information on new hybrids.

Future Directions of HYV in Zimbabwe

The current maize landscape in Zimbabwe is significantly different from the pre- and postindependence period up to the mid-1990s. These differences are such that it can be labeled as a *third* stage in the production and adoption of (hybrid) maize. This stage is fueled by a drastic change in the breeding and commercialization of hybrids by seed companies.

Varieties released by Seed Co, the dominant player in the provision of maize seeds in Zimbabwe, in the immediate postindependence period were attractive to many different types of farmers, including those found in resettlement and communal areas, because of their high yield potential and drought tolerance. In the late 1980s and early 1990s, when Seed Co reinvigorated its plant breeding efforts, agronomic and commercial considerations led to greater attention being placed on developing disease tolerance, an important concern of commercial farmers, but not smallholders. Together with the increased need for low-input hybrids, this suggests that the Zimbabwean public-private model of seed development and dissemination may be less appropriate in the future.

Keywords: poverty, agricultural research, sustainable livelihoods, vulnerability, agricultural extension, social capital, hybrid maize, Zimbabwe

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