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THE IMPACT OF THE GREEN REVOLUTION AND PROSPECTS FOR THE FUTURE

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Abstract - The Green Revolution has had a dramatic impact on incomes and food supplies in many developing countries. However, the impact goes far beyond these immediate and very important results. This paper explores issues as the Green Revolution have matured. More has been learned about its actual and potential impacts. Errors of judgment and incorrect predictions based on earlier studies are gradually bring connected Initial studies focused on immediate effects and one erroneously made long term predictions on the basis of data from the initial phases of the Green Revolution. This paper addresses some of the issues considered to be of great importance for continued success of the Green Revolution. The most recent data on its impact on food production after discussed first. Then follows a discussion of the impact on production fluctuations. Current evidence of the impact on poverty and nutrition is summarized in the third section. Recent research has shown that the multiplier or linkage effects of technological change may be very important for assuring a desirable path of self-sustaining growth. This issue is dealt with in the fourth section followed by discussion of the role of women in technological change, an important growth as well as equity issue which has received little attention until recently.

Keywords - Green Revolution, Green Revolution Impact, Impact on Production Fluctuations

INTRODUCTION

The impact of the Green Revolution on wheat and rice production is a function of the area sown to the new wheat and rice varieties, and the increase in yields per unit of land. Increasing yields have made rice and wheat more profitable for farmers than certain other crops, Thus, in addition to yield increases on traditional wheat and rice land, more land has been brought into cultivation of these two crops.

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The Green Revolution has also facilitated significant expansion of irrigation and multiple cropping in many countries, thereby adding to the total acreage of these crops, Shorter growing periods and reduced photoperiodicity are important properties of the new varieties which have enabled increased multiple cropping.

After proper study, it has been estimated that between one-third and one-half of the rice areas in the developing world is grown with high-yielding varieties, Table 1 shows estimates for 11 Asian countries, varying from 9% in Thailand to 78% in the Philippines.

Table 1. Area Grown with Modern Rice Varieties in 11 Asian Countries

Country	Year	1000 ha	% of Rice Area
Bangladesh	1981	2,325	22
India	1980	18,495	47
Nepal	1981	326	26
Pakistan	1978	1,015	50
Sri Lanka	1980	612	71
Burma	1980	1,502	29
Indonesia	1980	5,416	60
Malaysia	1977	316	44
Philippines	1980	2,710	78
Thailand	1979	800	9
South Korea	1981	321	26

IMPACT ON PRODUCTION FLUCTUATIONS

As shown above, the Green Revolution has enabled many developing countries to achieve impressive rates of growth in national food grain production since the mid-1960s. At the same time though, the variability of national food grain production around the trend has also increased. India, for example, increased its average cereal production by 47% between the periods 1952/1953-1964/1965 and 1967/1968 - 1977/1978. At the same time the coefficient of variation around trend of total cereal production increased from 4.7% in the first period to 5.9% in the second period (7). Despite this increased variability, countries like India are still much better off, even in drought years, in ensuring national food consumption because of the increased food output these technologies have permitted. But increased production variability can, in the absence of stabilization policies, lead to more volatile prices, creating problems for farmers and poor consumers alike.

The degree of price instability induced can be quite large in countries where a high proportion of total production is consumed on the farm. This is because year to-year fluctuations in production are then transmitted to relatively thin markets. In India, only one-third of food grain production is actually marketed, and farm price variability has more than doubled since the mid-1960s for wheat and rice.

DIRECT IMPACT ON POVERTY AND NUTRITION

A number of early studies on the impact of the Green Revolution concluded that the rural poor did not receive their fair share of the generated benefits. It was argued that mostly large farmers adopted the new yield-increasing technology, leaving small farmers unaffected or actually worse off because the Green Revolution resulted in (a) downward pressures on the prices of the commodities they produced, (b) upward pressures on the prices of the inputs they purchased, (c) efforts by large farmers to either increase rents to tenants or force the tenants off the land, and (d) attempts by large farmers to increase land holdings by purchasing smaller farms, thus forcing small farmers into landlessness. Furthermore, it was argued that the Green Revolution resulted in reduced rural employment. The net result, as argued by some, was a rapid increase in the inequality of income and asset distribution and a worsening of rural poverty in areas affected by the Green Revolution.

Impact on Poor Producers: High-yielding wheat and rice varieties have been adopted

widely by producers irrespective of farm size and tenurial status. Earlier conclusions that the Green Revolution was predominately a large farmer phenomenon were clearly incorrect. In many, if not most, regions suited for the high-yielding varieties, low-income farmers have adapted at least to the same extent as larger farmers, and the most recent studies suggest that net gains -per unit of land tend to be larger on smaller farms. However, many regions are not suited for high-yielding rice and wheat varieties. Thus, the Green Revolution has contributed to a considerable change in regional income distribution in some countries, as illustrated in India.

Impact on Landless Labor: The Green Revolution is based on a combination of varieties with high yield potential, fertilizers, irrigation, and in some cases chemical pesticides and mechanization. One result of this combined package has been higher labor productivity and increased labor demand. In areas with high unemployment and a highly inelastic labor supply. This has resulted in a considerable expansion in employment. In regions with little unemployment and an inelastic labor supply whether existing prior to the introduction of, or brought about by, the technology, considerable wage increased have occurred. However in-migration of labor from other regions and availability of labor saving mechanical technology has limited such wage increases.

Impact on Nutritional Status: Technological change in agriculture influences human nutrition through impact on:

1. Incomes acquired by households at risk of having malnourished or under nourished members
2. The prices they have to pay for food commodities.
3. The nature of the production systems among semi subsistence farmers.
4. Risk and fluctuations in food production, storage, prices, and incomes
5. The nutrient composition of the foods available to malnourished households
6. Household income composition, intra household income and budget control and women's time allocation
7. Labor demand and energy expenditures.
8. Infectious diseases.

ENVIRONMENTAL EFFECTS OF THE GREEN REVOLUTION

While the contemporary distribution of benefits and costs among population groups is important, the effects on intergenerational distribution should not be overlooked. What has been the impact of the Green evolution on the resource base needed by future generations to meet their food and other needs?

A continuation of current trends of agricultural expansion into marginal lands, rapid rates of deforestation, and overgrazing in dry areas are likely to have severe adverse environmental consequences. Land and water erosion and loss of organic matter lead to land degradation and desertification, which in turn will make it more difficult for future generations to fulfill their needs for food, fuel wood, and other agricultural and forestry products. Existing poverty and unsatisfied food needs, together with opportunities for quick political and economic gains without having to bear associated environmental costs, naturally lead to exploitation of the land base.

LESSONS FOR THE FUTURE

What are some of the lessons learned from recent studies and observations of the Green Revolution? First it has become abundantly dear that the technological barriers to expanded food production among small and large farmers in developing countries can be alleviated. Another lesson learned from the Green Revolution is that, while technological change in agriculture provides a vehicle for development that reaches far beyond the more immediate goals of

satisfying food and nutrition needs, its full potential for achieving growth as well as equity goals will be realized only if it is properly integrated into the overall development strategy and accompanied by appropriate public policy and institutional changes. The short term impact on the poor is particularly sensitive to institutional arrangements and public policies. Where existing institutions favor very unequal asset and income distributions, technological change has tended to amplify the inequality.

However, although the impact on the relative income distribution varies among regions, in most cases the Green Revolution has contributed to higher incomes of both poor and rich.

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