LEVERAGING AGRICULTURE
FOR IMPROVING NUTRITION & HEALTH

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Speaker Summary Note

Session: **Science and Technology Levers**

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Title: **Food Prices and Their Effects on Dietary Quality**

Populations in developing countries roughly doubled between 1965 and 2000. Thanks to the technological advancements of the Green Revolution, cereal production more than doubled over this period. After adjusting for inflation, real cereal prices fell over time despite the increase developing country populations.

By contrast, production of non-staple plant and animal foods did not increase as rapidly as population. There was no commensurate technological change to the Green Revolution in the non-staple food sector. Consequently, inflation-adjusted prices of many non-staple foods increased over time.

Given these relative price changes over time, staple foods, which are the cheapest sources of energy (calories) became more affordable, but dietary quality (non-staple foods) became more expensive. This change in relative prices has made it more difficult for the poor to achieve mineral and vitamin adequacy in their diets. Certainly, for those poor whose incomes have remained constant, price incentives have shifted the diet more and more toward reliance on food staples. This has led to a worsening of mineral and vitamin intakes for many segments of developing country populations, poor health, and much misery.

The high growth rates in cereal yields seen during the Green Revolution have not been sustained, in part due to declining investments in agriculture. Population, of course, has continued to grow. As incomes increased in China, India, and other developing countries, greater demand for animal products has led to increased use of cereals for animal feed. These longer-run supply and demand factors put underlying pressures on food staple prices to begin to rise. Finally, short-term draw downs in global cereal food stocks and weather shocks caused by drought in major producing countries, led to very rapid and substantial increases in food staple prices in the first half of 2008. What have been the consequences for dietary quality of the poor? The poor must protect their consumption of food staples to keep from going hungry.

Economists predict changes in diet caused by rising food prices through price and income "elasticities." These provide estimates of percentage changes in quantities in foods consumed for given percentage changes in prices and incomes. Using these elasticities, changes in quantities of food consumed can be predicted for varying levels of price rises. These changes in quantities, in turn, can be converted into changes in nutrient intakes. With an increase in prices for staple foods price:

With an increase in prices for staple foods, price expenditures on food staples increase markedly due to inelastic demand, and expenditures for non-staple foods and non-foods decline.

For example, given a food price increase of 50% across the board (holding incomes constant), simulations suggest that for Filipino women, iron intakes would decline from 7 mg Fe/day to about 5 mg Fe/day. This would mean that the percentage of Filipino women meeting their daily iron requirements would decline from 30% to 5% as a result of the price increase.

The long-run goal of public food policy is to stimulate growth in the non-staple food sector (sometimes referred to as "high-value" agriculture) through any number of instruments—agricultural research, education, building infrastructure, improving markets for agricultural inputs and outputs, to name a few. However, this process can take several decades. In the meantime, steps that can be taken to leverage agriculture to provide better nutrition in the shorter run.

One of the most promising strategies is biofortification. This is the process of improving the mineral and vitamin content of food staples eaten widely by the poor. This can be achieved either through conventional plant breeding or transgenic techniques**.** HarvestPlus[*]* leads a global effort to develop and distribute new varieties of high-yielding staple foods (rice, wheat, maize, cassava, pearl millet, beans, sweet potato) which are also high in iron, zinc, and provitamin A to combat micronutrient malnutrition (see table below).

Biofortification is targeted to rural areas, where most of the poor live. This complements fortification and supplementation programs, which work best in mostly urban areas that have the prerequisite infrastructure. After an initial investment in developing biofortified crops, they are then available to farming communities year after year. The crops can also be adapted to other regions at a low additional cost.

For biofortification to be successful, (a) high nutrient content must be combined with high yields, profitability, and other traits desired by farmers; (b) people's micronutrient status must be shown to improve from consuming the biofortified varieties; and (c) the biofortified crops must be adopted by farmers and consumed by those communities suffering from micronutrient malnutrition.

HarvestPlus Target Crops and Countries-Release Schedule

CROP	NUTRIENT	TARGET COUNTRY	TRAITS	RELEASE YEAR
Bean	Iron (Zinc)	DR Congo, Rwanda	virus resistance, heat, & drought tolerant	2012
Cassava	Vitamin A	DR Congo, Nigeria	virus resistant	2011
Maize	Vitamin A	Zambia	disease resistance, drought tolerant	2012
Pearl millet	Iron (Zinc)	India	mildew resistance, drought tolerant	2012
Rice	Zinc (Iron)	Bangladesh, India	disease & pest resistant	2013
Sweet potato	Vitamin A	Uganda, Mozambique	virus resistance, drought tolerant	2007
Wheat	Zinc (Iron)	India, Pakistan	disease resistant	2013

Note: HarvestPlus also supports biofortification of the following crops: Banana/Plantain (vitamin A), Lentil (iron,zinc) Potato (iron, zinc), Sorghum (zinc/iron).

[*] HarvestPlus is a Challenge Program of the CGIAR that works with experts in more than 40 countries. It is co-convened by the International Center for Tropical Agriculture (CIAT) and the International Food Policy Research Institute (IFPRI).