Rising Food Prices Will Result in Severe Declines in Mineral and Vitamin Intakes of the Poor

Dr. Howarth Bouis, Director, HarvestPlus

SUMMARY

The poor in developing countries will cope with rising food prices in two primary ways:

1. They will consume smaller amount of relatively expensive and nutritious meats, dairy, fruit, vegetables, and pulses (non-staple food), resulting in large declines in mineral and vitamin intakes. This will have significant negative consequences for morbidity, mortality, cognitive abilities, and growth. Preschool children and females of reproductive age, in particular, are at risk for these deficiencies and so will suffer the most from food price increases.

2. They will reduce expenditures on non-food items, such as education, housing, and medical care.

Four basic factors drive the first conclusion:

I. Expenditures on non-staple foods by poor consumers comprise 40-60% of total expenditures for food.

II. Demand for food staples (rice, wheat, maize, etc. depending on the geographical region and culture) is highly inelastic. Income and price elasticities for food staples in the aggregate are low.

III. In diets, minerals and vitamins are concentrated in non-staple foods; energy is concentrated in staple foods.

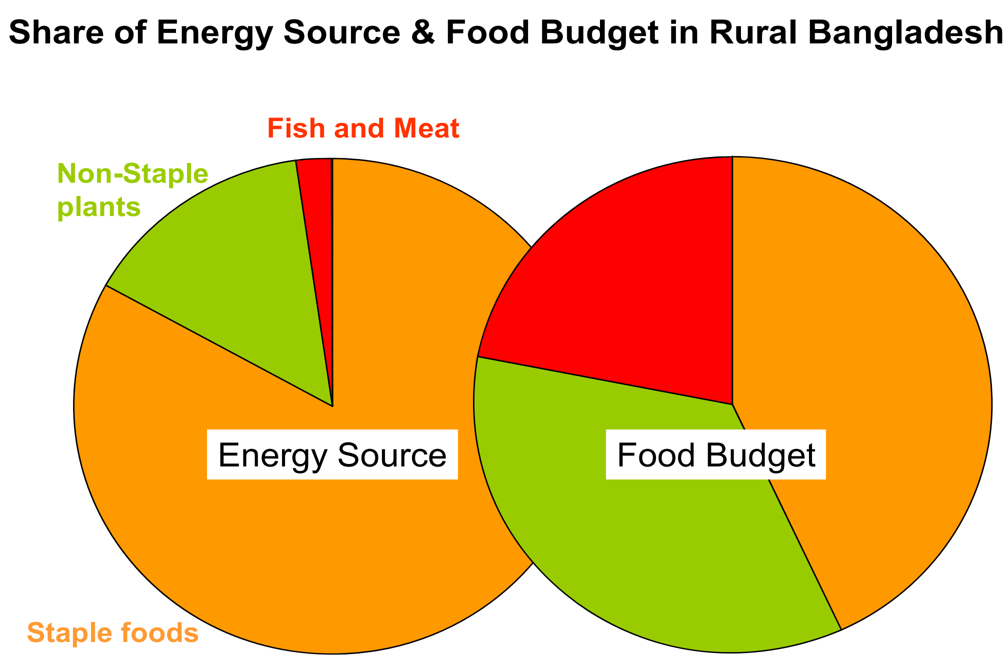
IV. Current intakes of vitamins and minerals are already too low, resulting in high prevalence rates of micronutrient deficiencies. Modest decreases in current intakes of minerals and vitamins will drive these prevalence rates significantly higher, with severe consequences for the nutritional status of the poor and public health.

Given these food consumption and nutrient intake patterns described in III -IV above, the following empirical estimates can be drawn:

A 50% increases in all food prices across the board (holding income constant) will result in a 30% decline in iron intakes. This, in turn, will result in an increase in the prevalence rate of iron deficiency among women and children of 25% (e.g. if, currently, the diets of women result in 60% consuming below the mean average iron requirement, then 85% will consume below the mean average iron requirement after the 50% price rise).

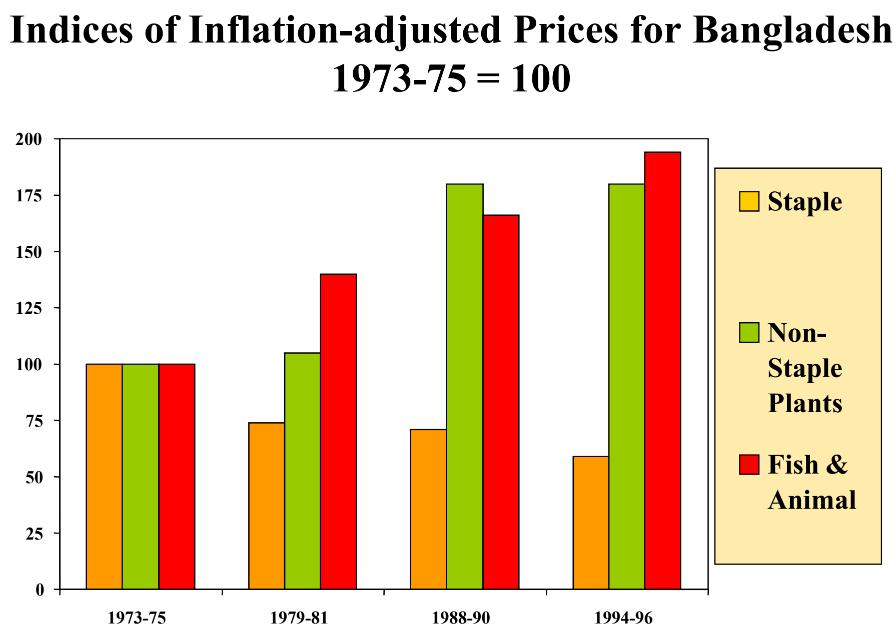
ECONOMICS OF FOOD PRICES AND NUTRIENT INTAKE: AN EXAMPLE FROM BANGALADESH

Using data from rural Bangladesh, it can be seen that food staples account for 80% of total energy intakes. However, expenditures for non-staple plant foods and fish and meat exceed those for rice, the basic staple:



Moreover, non-staple foods (the green and red areas aggregated above) are much richer in minerals and vitamins. In the simulations below, it is assumed that non-staple foods account for 50% of bioavailable iron and food staples the remaining 50%.

The data cited above were collected in the mid-1990s in rural Bangladesh after rice prices (adjusted for inflation) had fallen considerably from the early 1970s, and non-staple food prices had risen significantly:



The demand matrix below simulates responses to prices:

		Demand Elasticity Matrix			
	Budget Shares	**Staples**	**Non-Staples**	**Non-Foods**	**Income**
Staples	0.35	-0.20	0.10	0.05	0.05
Non-Staples	0.35	-0.27	-0.95	0.12	1.10
Non-Foods	0.30	-0.62	-0.18	-1.20	1.99

Calculated Elasticities
Assumed Elasticities

Some elasticities are assumed. Others may be calculated from demand theory. For estimates in the first row for food staples, I refer the reader to references given in point 6 above. The model is sensitive to the income elasticity for non-staples (a key parameter) and this is varied in the table below. Because the price increases for staples and non-staples are both assumed to be 50% (that is, no differential), it turns out that the results are **not** sensitive to the assumed own-prices elasticities for staples and non-staples. The results of the simulations are summarized below:

	Non-Staple Food Income Elasticity				
	1.0	**1.1**	**1.2**	**1.3**	**1.4**
% Change In Iron Intakes	-0.27	-0.29	-0.30	-0.32	-0.34
% Change in Energy Intakes	-0.14	-0.14	-0.15	-0.16	-0.16
% Change in Expenditures on Food Staples	0.43	0.43	0.43	0.43	0.43
% Change in Expenditures on Non-Staples	-0.23	-0.29	-0.34	-0.39	-0.44
% Change in Expenditures on Non-Foods	-0.23	-0.17	-0.10	-0.05	0.01
Calorie-Income Elasticitiy	0.24	0.26	0.28	0.30	0.32
Food Expenditure Elasticity	0.53	0.58	0.63	0.68	0.73
Absolute Change in Food Staple Calories	-74	-74	-73	-73	-72
Absolute Change in Non-Staple Food Calories	-196	-210	-224	-238	-251

Note: The results outlined within lines correspond to the food demand matrix above

The following observations may be made from the table above:

- As an order of magnitude, iron intakes decline by 30%. Energy intakes decline by 15%; however, note that **the decline in energy intakes is primarily due to the decline in consumption of non-staple foods.**

- Expenditures on food staples increase markedly due to inelastic demand; expenditures for non-staple foods and non-foods decline.

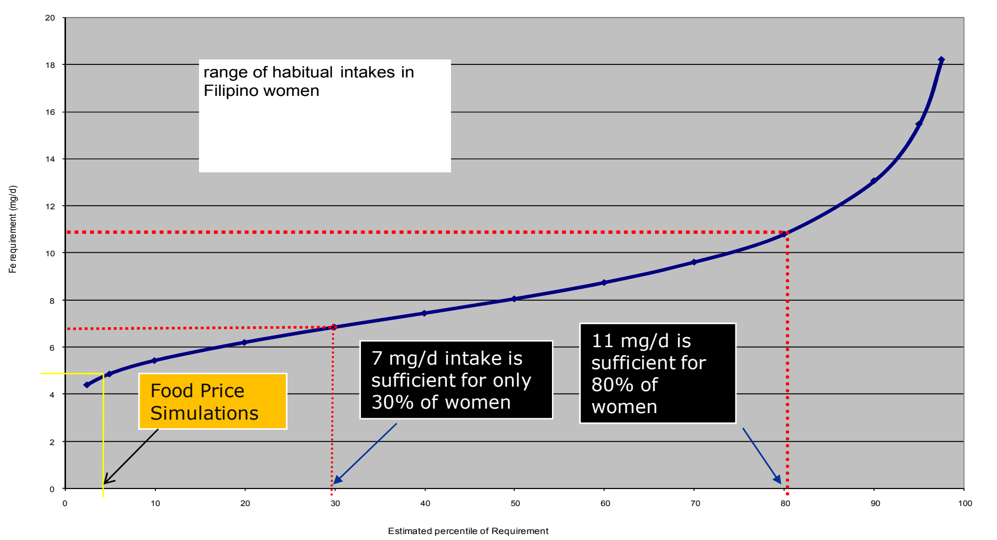
- To the extent that non-staple foods are considered a "luxury" (non-staple income elasticities at the high end near 1.4), the poor adjust by reducing non-staple food expenditures and non-food expenditures are little affected; to the extent that non-staple foods are considered more of a necessity (non-staple income elasticities at the lower end near 1.0), the poor adjust by reducing expenditure on both non-staple foods and non-foods.

THE ROLE OF BIOFORTIFICATION IN MITIGATING THE IMPACT OF RISING FOOD PRICES ON WOMEN'S IRON INTAKE: CASE OF THE PHILIPPINES

Finally, how significant is a 30% decline in iron intakes? To obtain some sense of this, the figure below shows the cumulative distribution of women meeting their iron intake requirements at various levels of average iron intake. Because individual-specific requirements for iron (and other nutrients) vary, some women meet their requirements at an average intake of 7 mg Fe/day (30% in the diagram) and others do not (70% in the diagram). The two sets of reddashed lines simulate a situation in which rice is biofortified to certain iron target levels. Women are assumed to consume the higher-iron biofortified varieties in place of lower-iron commercial varieties. The simulation indicates that iron intakes could be raised by +4 mg Fe/day through biofortification, to a total average intake of 11 mg Fe/day. This would mean that 80% of women could meet their average daily requirement of iron, up from 30%. Thus, percentages of women who meet their daily iron intake requirements, are sensitive to relatively small changes in daily iron intakes.

In the absence of biofortification and given a food price increase of 50%, iron intakes would decline by an estimated 30% from 7 mg Fe/day to about 5 mg Fe/day (this is also simulated in the diagram in yellow). This would mean that only 5% of Filipino women would be meeting their daily requirements – an increase of 25% percentage points in women who are no longer consuming their required iron intakes.

Meeting Dietary Iron Requirements at Two Levels of Iron Density in Cooked Rice



The distribution of Fe requirements is modeled from a factorial accounting for body size, age, menstrual blood loss, and contraceptive use (IOM 2001). A Monte Carlo simulation with n>1000 was used.

Source: Professor John Beard, Nutrition Department, The Pennyslvania State University

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HarvestPlus, c/o IFPRI 2033 K Street, NW, Washington, DC 20006-1002 USA
Tel.: +1-202-862-5600 • Fax: +1-202-467-4439 • www.harvestplus.org