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FACTS, TRENDS AND ISSUES OF OPEN MARKETS AND FOOD
SECURITY

D. Gale Johnson¹

While there remain large numbers of persons in the world who are malnourished, substantial progress has been made in improving food security and availability in the developing world during the past three decades. According to the estimates of the Food and Agriculture Organization (FAO), the percentage of the developing country population malnourished in 1969-71 was 36 while by 1990 this percentage was reduced to 19 (Alexandratos 1994). Due to the growing population of the developing countries, the percentage decline in the absolute numbers were malnourished - from 941 million to 781 million - was smaller than the decline in the percentage of the population that was malnourished.

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I have estimated that in 1948-52 that the average calory supply in developing countries was about 1,700 k/cal/day (Johnson 2000). In 1994-96 the average was 2,580 (Alexandrotas 1999, p. 5908) an increase of slightly more than 50 percent. The 1,700 calories per day in 1948-52 was only modestly higher than what the average had been for several millennia.

Alexandrotas (1999, p 5908) adds another dimension to our understanding of the improvement in per capita availability of food in the developing countries: "...the part of the world population living in countries where per capita supplies are still very low (under 2,200 k/cal/day) decreased considerably to only 10 percent in the mid-1990s, down from 56% 30 years earlier." The population of countries with average consumption below 2,200 in 1995 was approximately 600 million compared to 1.8 billion in 1965 - a reduction of two thirds.

Two comparisons are relevant to the designation of average consumption below 2,200 calories per day. First, this level of supply is substantially greater - by 29 percent - than the estimated daily supply for all developing countries of 1,700 calories per day approximately 50 years ago. Second, the figure is equal to or significantly greater than the available per capita food supply that existed in two European countries just two centuries ago at the beginning of the industrial revolution. Fogel estimated that as of 1800 the average daily calory supply in Great Britain was 2,237 and in France, 1,846 k/cal (Fogel 1996, p. 2). The caloric supply in two of the highest income countries

in Europe in 1800 averaged less than what is now considered to be "very low". In other words, two centuries ago only a small percentage of the world's population had a food intake greater than what is now considered to be the fate of the very poor in the world, the 10 percent of the world's population that live in countries that have less than 2,200 calories per day available. I should note that a shortage of calories may not now be the major source of malnutrition for many in the developing countries. The absence of micronutrients - minerals and vitamins - may be at least as important. And a major source of stunting and wasting in children is diarrhia due to unsatisfactory sanitation and unclean water.

Food security was greatly improved during the 20th Century and, especially, in the last half of that century. The large increase in life expectancy among the world's poorest countries is strong evidence in support of that conclusion. Life expectancy in India in 1900 was 23 years, increasing to 32 years in the 1940s, to 43 years in 1960 and 62 years in 1996. In 33 low-income countries life expectancy was 44 years in 1960 and 64 years in 1996. If the food supply had not improved, these increases would have been impossible.

But I do not want to minimize the significance of large numbers of people who suffer from malnourishment today, whether it is from too few calories or, more, likely, from vitamin and mineral deficiencies. Whatever the number of people affected or the cause of the malnourishment, we need to recognize that the potential

exists for greatly reducing the number who are so afflicted and that the developed countries should give serious consideration to the effects of their decisions and policies on the world realizing that potential.

What has changed

A great deal has changed. The world's population has doubled since 1960, increasing from 3 billion to 6 billion. Fortunately, the world food production has more than doubled and a large share of the increased production has occurred in the developing countries where population growth has been most rapid. Grain production in the developing countries increased from 448 million tons in 1959-61 to 1136 million tons in 1994-96 while world grain production increased from 955 million tons to 1967 million tons over the same period of time. Grain production in the developing countries increased by 154 percent and world grain production increased by 106 percent in 35 years. Nearly all of the increase in world grain output was due to higher yields; the total grain area increased by only 6 percent. From the beginning of the 19th Century until 1940 there was virtually no increase in grain yields in England and the United States and only a modest increase in rice yields in Japan. It is highly probable that grain yield increases did not occur elsewhere. Until about 1940 the increase in grain production relied on expansion of the cultivated area; yield increases had either no or a minor role.

Food security has been greatly enhanced by the increased production of grain and other food, especially by the increase in

production in the developing countries. But it has also been enhanced by the increase in world trade in grain and other food. At the end of the 19th Century, there were many areas of the world that were isolated - these areas were dependent primarily upon their own production of food. When that production declined, famine was a possible outcome because supplies could not be obtained in time. The last quarter of the 19th Century saw several major famines in Asia, especially in China and India. While there have been famines in the 20th Century, except for those famines caused by national policies, either deliberate or unintentional, famines have affected a far smaller percentage of the world's population since 1950 than ever before in recorded human history.

Improvements in transportation and communication have made it possible to move food from where supplies are available to nearly every place in the world.

A major change has been the increase in real per capita gross domestic products in the developing economies in the three continents - Asia, Latin America and Africa - from 1950 to 1992. In Asia the increase was 325 percent, primarily due to China but in India the increase was 125 percent (Maddison 1995). In Latin America, which had much the highest per capita income in 1950, the increase was 94 percent. Unfortunately in Africa the increase from a very low level (\$830) was only 55 percent. In the decade ending in 1992, the per capita GDP actually declined from \$1,392 to \$1,284.

This is not the place to assess the reasons why the economic performance of Africa, especially Sub Saharan Africa has been so poor, but civil strife, wars and bad governmental policies have been the dominant factors responsible for the economic outcome.

The final major change I will note has been the remarkable decline in the inflation adjusted international prices of the major grains - wheat, corn and rice. From 1955-59 to 1998 the unweighted average decline in the prices of these three grains was 50 percent and international prices of these grains have since further declined. The current low real prices are the lowest in the 20th Century, even much lower than during the Great Depression. I do not count these remarkably low prices as all good news. The recent declines in real international prices have resulted, in part, from an imbalance in the recent growth rates of supply and demand. The current low prices adversely affect the incomes of farmers throughout the world where these prices are reflected in domestic prices. Even very efficient and low cost producers, such as those in Argentina, find it difficult to produce wheat and corn at the prices now prevailing in world markets. Of course, for urban consumers the low prices are good news. The recent low prices for grain reflect the enormous gains in productivity in the production of grains that occurred in the last half of the 20th Century.

Access to food

A country has three ways to obtain its food - it can produce it; it can export products and services and import food; it can

receive it as aid. Food aid became an alternative for developing countries following World War II. While the United States provided food for its allies during the war and for its enemies following the war, its substantial food aid program for developing countries was instituted to a considerable degree to dispose of surplus farm products generated by high price supports in the 1950s. While some notable successes can be attributed to the Public Law 480 programs, such as in India during the 1960s and responses to several disasters caused by typhoons and tornados, a recent study of the U.S. food aid programs indicate that it has contributed relatively little in recent decades to providing an offset to food shortfalls in developing countries.

Christopher Barrett of Cornell University has studied the effects of the U.S. PL 480 program in terms of its contribution to the total grain supplies and the degree to which it helped to stabilize food supplies in the recipient countries for 1961 to 1995. In terms of grain supplies, he found that 69 percent came from their own production, 29 percent from commercial imports and only 2.1 percent from PL480. Some food aid from countries other than the United States is included in commercial imports but not more than 2 percent of total use in these countries since the United States has traditionally supplied more than half of the world's food aid in cereals.

Barrett analyzed two of the distributional aspects of food aid - did it go more to countries with low levels of consumption than to those with higher levels and did it serve to stabilize

consumption from year to year. For all recipient countries PL480 food aid flowed "somewhat more to food scarce than food abundant countries, although the associated elasticity at sample means is only -0.04 ." (Barrett 2000). The distributional effect was insignificant for Subsaharan Africa, meaning that the countries with low levels of per capita consumption did not receive more food aid per capita than countries with higher levels of consumption.

But what was the most striking conclusion was that PL480 food aid did not serve to stabilize grain supplies from year to year as other sources of supply varied. This was true for all 124 recipient countries and for Subsaharan Africa and for a group of countries classified as Geopolitically Motivated - countries such as Egypt, Israel, Jordan, and Korea where there was little or no pretense that food aid was designed to offset variability from other sources. Only in South Asia were the aid supplies inversely related to variations around the trend in other supplies. And this seems to have been due mainly to the early years of large scale food aid to India during some difficult years in the 1960s.

In any case the low level of food aid in the world in recent years is insufficient to have any significant stabilizing effect on grain supplies in low income developing countries. In 1994-95 the food aid in terms of grain to all developing countries was only 6.4 million tons compared to 129.2 million tons of net commercial imports. Total grain production in developing countries in the mid-1990s was 1,130 million tons. If one adds

the commercial imports to this figure, we get total use of 1,269 million tons plus 6.4 millions of imports from aid. By the mid-1990s food aid to all developing countries accounted for about 0.5 percent of total grain use in developing countries - much less than the average for 1961 to 1995. There can be no reasonable expectation that food aid will increase significantly in the years ahead nor, given the record of U.S. food aid, any reason why it should be increased.

In 1959-61 net grain imports of the developing countries were 8 million tons and they constituted less than 2 percent of grain production in those countries. In 1994-96 their net imports were 112 million tons and amounted to 9.9 percent of production that had increased by 154 percent. Thus the increased imports, mostly on a commercial basis, were a significant factor in the food supply of the developing countries.

World output of grain varies little from year to year

Can developing countries rely on grain being available from international markets when needed? The answer is affirmative since world grain output varies relatively little from year to year. For the period from 1955 through 1996 there were only three years in which output declined as much as 4 percent from one year to the next and seven years in which there was a decline of approximately three percent.² In two out of the three years in

² The year 1974 was considered to be a year of food crisis and the United Nations held a world food conference in November. In 1974 there were significant increases in the international market prices of grain, but the increases were much smaller than in 1973. The inflation adjusted international price of wheat

which output declined by 4 percent, the next year's output increased by 6 percent or more. There was only one pair of years in which output declined in successive years (1982-83 and 1983-84) - by 3.9 percent and 2.7 percent - and international market prices declined in both years. To summarize, in only 10 out of the 41 years studied was there a decline in world grain production and in no case was there a decline greater than 4 percent.

How to improve food security in low income countries

A large majority of the malnourished people in developing countries are farmers. The most important single measure to reduce the number of malnourished is to increase the incomes of farm people. Most of what is required to achieve higher farm incomes are within the power and responsibility of national governments - increased investments in primary and secondary education, improved rural infrastructure, increased investment in agricultural research and extension, and providing their farmers with access to world markets for both their output and inputs.³

increased by 48 percent while the price of rice increased by 111 percent in 1973 compared to 1972. In 1974 the international price of wheat increased by 38 percent and rice by 30 percent. While it was claimed that the crisis resulted from a decline in world grain production, 1973 was a relatively high production year. In 1974 grain production was only 3.1 percent below that of the previous year. The food crisis of the early 1970s was not primarily the result of low grain production but was due to export restrictions by major grain exporters other than the United States (Johnson 1975).

³ A recent study of the relationships between government spending, growth and poverty reduction in rural India (Fan, Hazell and Thorat 1999) estimates that for an expenditure of Rs 1 million, the largest number of persons moved out of poverty was from the construction of roads, the next largest number was from expenditures on research and extension. The next two activities

Above all else, there must be peace and absence of civil wars and disturbances.

While most of the changes must be domestic, the industrial countries can contribute. The European Union, Japan and the United States could (and should) reduce the barriers to imports of agricultural products, textiles, and other labor intensive manufactured products from the developing countries. One example - in nearly all developed countries the production of sugar is heavily protected - domestic prices are three or more times world market prices. If sugar imports were freed of restrictions, many developing countries could increase their exports and significantly expand the amount of food that they could import as well as have more funds to invest in rural communities.

Some concerns

I noted earlier that a significant source of malnutrition in developing countries was the limited availability of certain vitamins and minerals in the diets of the people generally and of poor rural people, in particular. I fear that those of us living in developed countries often forget that we acquire several of these vitamins and minerals, not from the food as produced on the farms or as a result of our intelligent buying habits but as additives to our everyday food - such as in the United States and I assume elsewhere - iodine in salt, vitamin A and D in milk and

in terms of success in moving people out of poverty were education and rural development. By making rural areas more accessible, roads bring off-farm employment and increased income to poor rural workers.

thiamin, riboflavin, niacin and calcium in cereal products are merely some examples. Where the source of one's food is one's own production, these micronutrients are not available in adequate amounts - they can only be added as the farm product is commercially processed.

But there is a potential source on the horizon, if its development is not greatly inhibited by irrational behavior. I refer to the potential of biogenetics to introduce the relevant micronutrients into the foods produced and eaten without commercial processing in developing countries. Through biogenetics it is possible to introduce these nutrients into commonly grown food products; considerable success has already occurred in this regard. A Swiss geneticist - Ingo Potrykus - at the Swiss Federal Institute of Technology has created a rice variety that provides vitamin A. Vitamin A deficiency is a cause of blindness and limited vision that affects children in the developing world, especially in South East Asia. According to Per Pinstrup-Anderson about 14 million children under the age of 5 have eye damage as a result of Vitamin A deficiency (Pinstrup-Anderson 1994, p. 2). He further reports that between 250,000 and 500,000 preschool children go blind every year due to vitamin A deficiency and two-thirds of these children die within a few months after going blind. Another nutrient deficiency is that of iron, which is said to affect a billion people, particularly children and pregnant women. Some progress has already been made in increasing the iron content of rice. It is difficult to

imagine what the benefit will be if this effort is successful and hard to understand why any one would take actions that would prevent such an outcome. I note these two important developments to indicate a small part of what will be lost if opposition to GMOs develops further and brings such work to an end or greatly diminishes the efforts to find solutions to the problem of nutrient deficiencies in the food supply of hundreds of millions of poor people.

The various efforts, by individuals, groups or governments, to reduce access to GMO products reduces the profitability of the research that is necessary to develop the modifications required to improve the nutritional value of common foods. Some of the measures that have been suggested seem innocuous enough, such as labelling, until you consider the effects. Consider the problem of segregating corn that is non-GMO from GMO corn to make labelling possible. This will be a costly process given the manner in which the enormous quantities of corn are marketed. Corn from Iowa reaches the consumer in Germany after moving in bulk from the farm to the elevator, from the elevator to the ship in New Orleans by being loaded onto a truck or box car and then probably put on a barge. When it arrives in Europe it has to be unloaded from the ship, probably goes to an elevator and then is sent, still in bulk, to a food or feed processor in Germany. Considerable care and expense would be required to segregate the corn to permit labelling of the scores of consumer products derived from it.

And, I have wondered, will the meat from hogs or chickens that are not-GMO modified but that eat GMO corn and soybeans have to be labelled? What is the evidence that such meat carries the slightest danger to the consumer that does not exist in meat generally?

But the important issue is not the additional costs that may be imposed on consumers in rich countries, such as the United States and European Union, but on the lost opportunities for improving the nutritional status of poor people in developing countries. Is any one who promulgates the anti-GMO hysteria thinking about this? Or do they care? Perhaps the problem is that they don't care about what the consequences would be for others less fortunate than they are. For people who allocate little more than a tenth of their consumption expenditures to food, a 5 or 10 percent increase in the cost of that food is of little consequence. But if 50 percent of your consumption expenditures is for food, the consequences would be significant.

Not so long ago I gave a talk to a group of visitors to The University of Chicago; I was asked to discuss two topics - international trade and genetically modified foods. In the course of the discussion of the last subject, I was asked the following question: "Why do we want to change nature?" My response was that if scientists had not been engaged in changing nature for the past two centuries, either she would never have existed because there was a high probability that at least one of her parents or

grandparents would have died as a child or, if she had been born, she would not have had the income that would permit her to come to the United States. The increase in life expectancy from 30 years to 75 years that has occurred in the developed countries in the last two centuries has not come about by accident - it has been accomplished by changing nature - providing clean water and sanitation, inoculations for many diseases that either killed or disabled millions of children annually, discovery and use of antibiotics, increasing grain yields by breeding. Unmodified nature was harsh, stingy and cruel and dominated the conditions of life for nearly all of the time man has resided on earth. Only as there have been those who have changed nature, has it been possible to significantly improve the conditions of life for those of us now occupying this planet.

As Norman Borlaug has told us, each and everyone of us has been eating GMO foods our entire lives. It has been shown that both our bread and pasta wheats were created, in each case, by the crossing of two genetically distinct plants. True, the cross was made by nature thousands of years ago, but the outcome was the same as what scientists are now doing with GMOs. And somehow we have all survived. Quite possibly, had the the GMOs not been created, many of us might not have existed. But that we will never know. But it is not only GMOs that are under attack. There is craziness everywhere - note this from the United States.

A full page advertisement in the New York Times (January 18,

2000)⁴ attacked industrial or modern agriculture and wants to return to small farms that, presumably, would eschew the use of chemical fertilizer and chemical pesticides and thus could obtain little benefit from the high yielding varieties of rice, wheat and maize that have become available over the past four decades. There is no mention of what the yields of grain and other foods would be if the positive yield effects of modern agriculture - high yielding varieties, fertilizers and pesticides - were given up and a return were made to the agricultural technology of the 1960s. Norman Borlaug (1999, p. 15) pointed out: "Had Asia's 1961 average cereal yield (930 kg/ha) still prevailed today, nearly 600 million ha of additional land - of the same quality - would have been needed to equal the 1998 cereal harvest (milled rice

⁴ The New York Times has devoted a number of editorials addressing the adverse influence of money, especially soft money, on elections and actions take by the Congress. What the series of advertisements on globalization and on modern agriculture prove is that The New York Times, if paid enough money, will print anything regardless of how many errors the ad may contain. The response, I assume, would be that the New York Times cannot interfere with the freedom of speech of its paying customers. This is the same response that the supporters of soft money make, namely they are protecting freedom of speech. Have there been egregious errors in this series of advertisements? Consider this: In an advertisement on globalization published on December 6, 1999 it was stated "....

90% (of the world's water) goes to global industry: mostly high tech manufacturing and industrial agriculture." According to World Resources 1998/99, produced by the World Resources Institute and the United Nations Environmental Programme, among others, the agricultures of Asia (excluding Japan and South Korea) plus Africa and Latin American were responsible for 48 percent of the world's annual withdrawal of fresh water. The agricultures of India and China accounted for 23 percent of the withdrawal. Their agriculture can hardly be classified as "industrial agriculture."

Thus it is impossible that "90% (of the world's water) goes to high tech industry and industrial agriculture."

adjusted). Obviously such a surplus of land was not available in populous Asia. Moreover, even if it were, think of the soil erosion, loss of forests and grasslands, wildlife species that would have (disappeared) had we tried to produce these larger harvests with the low-input technology." Asia now uses somewhat less than 300 million hectares of cropland to produce cereals; without the technological advances of the last half century, it would have required 900 million hectares - and this amount of land was simply not available.

This advertisement followed a series of four that attacked globalization and expanded trade - "we want fair trade, not free trade". And this was the message that was carried by several groups to Seattle when the World Trade Organization met last spring. As I have argued, it has been the expansion of trade that has contributed significantly to the improvement in food consumption in the developing countries. So while the groups that sponsor these advertisements claim to want to eliminate hunger, the policies that they support - a return to low-input agriculture and restricting trade - would actually greatly increase the number of malnourished people in the world. Their proposals also would be the cause of vast environmental harm in the developing countries because it would be necessary to greatly increase the cultivated area to provide an adequate amount of food.

The precautionary principle is used to support limitations on GMOs until it is absolutely certain that no harm can result from such products. The precautionary principle is hardly an adequate

guideline for decision making - had it been applied at the turn of the last century, neither the automobile nor the airplane would exist since both are sources of harm to people. The harm resulting from deficiencies of vitamins A and D, iron, and iodine is enormous and well known. Should the precautionary principle be used to prevent reducing and, perhaps, eventually eliminating the serious consequences of these micronutrient deficiencies that we know adversely affects millions every year when there is no scientific evidence that the process that could have this result has caused any harm? This is precaution?

Concluding comments

While much remains to be done to assure that the nearly all of the world's people have adequate nutrition, enormous progress has been made in the last half century in increasing the adequacy of diets in the developing countries. Average daily calory intakes have increased by slightly more than 50 percent following centuries of little or no increase. Today no more than a tenth of the world's population lives in countries with average caloric consumption of less than 2,200, down from 56 percent just 30 years earlier. Is it not quite remarkable that the criterion for a low level of consumption exceeded the average consumption intakes for two of the then richest countries in the world just 200 years before?

The developed countries can have a significant role in improving food security, primarily by promoting free trade that would permit the developing countries to increase their per capita

incomes through expanding their exports and making more profitable use of their resources. Reducing the import barriers for food would have a significant impact on the incomes of millions of the poorest farmers in the developing countries and thus contribute quite directly to the reduction of malnutrition. These countries could also increase their support of agricultural research that is applicable to the problems of developing countries, including the development of plant varieties that will provide the vitamins and minerals that are deficient in current diets.

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