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Planning for food and nutrition security in Egypt

Social, economic, and political considerations

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Food crises in less-developed countries have been noted to be the main obstacle to economic development. Egypt suffers from such a crisis because of the population increase, as well as the pressure of increased purchasing power due to its open-door economic policy and the labour force working in oil countries. These factors increase the purchasing power in the market in spite of income distribution. Therefore, the demand for food increases rapidly, while food production cannot respond to such demand. Production is constrained by limited agricultural land, poor technology, low productivity, a shortage of capital, and price distortions due to current economic policies [1].

The result has been an expanding gap between food consumption and production. This gap is translated into increasing food imports. The cost of food imports was about LE 408.7 million in 1979 and increased to more than LE 1,200 million in 1984 (table 1). The deficit would be much larger if calculated at the so-called shadow exchange rate, the value of the local currency on the international financial market. On the other hand, food exports fluctuated over the period 1979-1984, which was attributed to fluctuations in the available surplus of some items as well as the lack of a fixed export policy.

This food gap reflects market demand rather than nutritional requirements. Previous research has showed that depending on income to cover nutritional requirements is not successful in developing countries such as Egypt because of great inequalities in income distribution [3]. Low-income consumers, who are the majority of the population, may spend a large part of their income, in some cases all of it, on food; yet they are unable to afford a nutritionally adequate diet. Hence, a policy aimed at reducing the food gap may require more than a simple increase in agricultural production.

TABLE 1. Food-commodity foreign trade, Egypt-1979-84

	Exports[a]	Imports[b]	Balance
1979	64,188	408,743	- 344,555
1980	77,645	733,937	- 656,292
1981	91,155	1,525,775	- 1,434,620
1982	79,898	1,267,081	- 1,187,183
1983	82,623	1,009,153	- 926,530
1984	94,803	1,239,087	- 1,144,284

Source: Ref. 2.

Values are in thousands of Egyptian pounds (LE 1 = US$ 1.43 at the official exchange rate).

a. Exports include refined sugar, oranges, rice, and potatoes.
b. Imports include wheat, wheat flour, corn, frozen and/or chilled red meat, and milk and milk products.

The objective of the present study was to test a hypothesis for developing agricultural production guided by the nutritional requirements of the Egyptian population for the major food products. Because such a strategy would require a structural change in agricultural policies, the quantitative projections for food production are made for the future, that is, the year 2000.

Methods

Consumption based on nutritional requirements is supposed to be less than that derived from market conditions-that is, the demand and supply that are derived from market equilibrium. It is not practically possible to meet the nutritional requirements entirely through domestic production because of the major constraints on agriculture mentioned above. Therefore, the study followed a normative approach, using two alternative target levels of food self-sufficiency that would imply more achievable production targets. The first would be to maintain the self-sufficiency ratio at its level during the base period 1976-1980 [4]. The second would be to increase the self-sufficiency ratio so as to decrease the relative amount of food imports by the year 2000 to one-half their level during the base period.

TABLE 2. Proposed degrees of self-sufficiency for various food and projected production for the year 2000

	1980 domestic production[a]	Projected consumption in 2000	First alternative[b]		Second alternative[c]	
			Self sufficiency ratio (%)	Projected production	Self sufficiency ratio (%)	Projected production
Wheat	1,826	10,614	19.0	2,017	60.0	6,315.3
Maize	2,938	1.378.6	77.7	1,071	88.85	1,220.1
Sugar	618	895.7	72.0	645	86.0	770.3
Beans	224	381.1	84.8	323	92.4	352.1
Lentils	8	309.7	0.3	0.3	50.15	155.3
Vegetables	6,063	5,741	99.2	5,696	99.61	5,718.6
Fruits	3,849	2,012.9	97.4	1,961	98.7	1.986.7
Red meat	336	271.23	81.8	223	90.9	246.55
Poultry	136	209.15	85.9	197.5	92.95	194.4
Fish	143	729.2	75.2	548	87.6	638.8
Milk & milk products	1,865	2,140.3	69.6	1,486	84.7	1,812.8
Eggs	80	266.3	97.8	260.4	98.9	263.4
Oils & fats (vegetable)	113	938.1	33.3	312	66.6	624.8

Consumption and production values are in thousands of tons.
a. Production for human consumption. Data from ref. 4.

b. Based on fixing the self-sufficiency ratio for each food item at its 1976-80 level [4] up to the year 2000.
c. Based on increasing self-sufficiency so that by 2000 the imports of each food item will be at one-half their 1976-80 level relative to the total consumption of that food.

The projected food consumption for the year 2000 (table 2) was calculated on the basis of a recommended "food model" [5]. which would cover the calculated per capita nutritional requirements in Egypt [6], for a projected population of 67,493,000, an annual growth rate of 2.4% [7].

For the purpose of analysis, the required production targets and their growth rates for each major food product were calculated over a period of two decades. The growth rates according to each hypothesized alternative (table 3) were calculated from the following model:

$$Y_t = Y_0 (1 + r)^t$$

where

r= average annual growth rate of domestic production;
Y_t= projected domestic food production target for the year 2000;
Y_0= domestic food production in the base year 1980;
t= number of years between the base and the target years (i.e., 20 years).

TABLE 3. Annual production growth rates necessary to achieve the proposed levels of self-sufficiency for the year 2000, compared to actual growth rates under the 1982-87 five-year plan (percentages)

	Proposed rates		Actual rates[a]
	First alternative	Second alternative	
Wheat	0.5	6.4	4.6
Maize	-5.0	-4.9	3.8
Sugar	0.21	1.12	3.73
Beans	1.85	2.3	5.12
Lentils	- 10.2	16.0	23.95
Vegetables	-0.31	-0.3	6.4
Fruits	-3.3	-3.25	18.53
Red meat	-2.0	- 1.54	2.0
Poultry	1.4	3.0	3.86
Fish	6.9	8.0	3.13
Milk & milk products	- 1.1	-0.14	12.9
Eggs	6.1	6.14	3.35
Oils & fats (vegetable)	5.2	8.93	6.75

a. From ref. 8.

These projected growth rates were compared with the current performance of the agricultural sector stemming from the implementation of the national five-year development plan for 1982-1987 (table 3). This five-year plan was translated into an

average actual production growth rate for each major food product during three years (1982/83, 1983184, and 1984/ 85) [8].

It is important to point out that the present study deals with a conceptual analysis, and the quantitative measures used provide only some evidence to support the hypothesis.

Results and discussion

The self-sufficiency ratio for each food product according to each proposed alternative is shown in table 2, together with its projected production in the year 2000. Some products, such as vegetables, fruits, and eggs, would reach a very high self-sufficiency ratio, close to full self-sufficiency, under either alternative. Others, such as poultry, beans, and red meat, could reach a high level under the second alternative. The remainder would reach a moderate level under the second alternative. The first alternative would keep the consumption of lentils entirely dependent on the international market. The second alternative would make the domestic share around 50%, which would require a production of 155,000 tons in the year 2000 (155 times the first alternative's production target).

As mentioned above, projected food consumption in the year 2000 is calculated on the basis of per capita nutritional requirements. Therefore, the target of achieving a level of production that will provide a moderate ratio of self-sufficiency to cover these requirements has a sociological objective. It also implies a political objective. The production growth rate needed for each food product to reach the self sufficiency ratio under each hypothesized alternative bears a socio-political objective. This growth rate is compared with the actual growth rate of the agricultural sector stemming from the implementation of the 1982-1987 five-year plan (table 3). The projected production growth rates for the first alternative are much lower than the actual ones for fish and eggs, while those for the second alternative are varied relative to the actual ones.

The economic concept of Egypt's comparative advantage in the production of certain food items (the comparative advantage of one country over another in the production of a given product depending on the relative cost of the inputs and the value of the output) must be taken into consideration. It has been shown that of the sources of animal protein, fish is the cheapest (in Egypt), followed by milk, eggs, and poultry [9]. The most expensive is red meat. Therefore, the production growth rate for red meat should be decreased, even though self-sufficiency in the year 2000 under the second alternative would be only 91%. The proposed high positive production growth rates for both fish (about two to three times the five-year-plan growth rate) and eggs (about two times the actual growth rate) are consistent with the concept of comparative advantage for these food items. The growth in production should give priority to fish and eggs at the expense of red meat. These recommendations would approach simultaneously the sociopolitical and the economic objectives. Providing self-sufficiency in animal protein from fish and eggs would meet the current deficiency in the average Egyptian's diet at the lowest cost, allocating scare agricultural resources according to concepts of efficiency.

On the other hand, the alternatives proposed in this study recommend reducing or levelling off the national milk production growth rate by the year 2000. If we follow this recommendation, nutritional requirements can still be met. In contrast, the actual growth rate in milk production under the 1982-1987 five-year plan was about 13% a year. The case of milk production planning could be applied also to vegetables and fruits, with surpluses directed to export markets.

Other food products such as maize are used not only for human consumption but also for poultry and livestock. The alternatives proposed in the present study recommend a decrease in the production of maize, which would meet human nutritional requirements at a self-sufficiency rate between 78%and 89%. The actual growth rate in maize production under the five-year plan was about 4%. Even if the actual growth rate were followed, however, the surplus above human needs would not cover livestock and poultry requirements. A recent study by the National Production Specialized Council in Egypt [10] showed that maize requirements for poultry and livestock will be only 3.5 million tons by the end of the second five-year plan (1987-1992). Therefore, expansion in maize production, particularly yellow maize, at a higher rate than the current 4% (e.g., 15% a year) is recommended.

Conclusions

An important consideration in determining Egypt's food production plan should be the sociological objective of meeting per capita nutritional requirements, as well as the political objective of moderate food self-sufficiency. Also, Egypt's comparative advantage in the production of certain food items should be taken into consideration as an economic objective. These value judgements could be used simultaneously for the orientation of the national development plan. The hypotheses raised in the present study could be further developed using additional techniques, such as multi-objective mathematical programming. which can quantify the food production goals identified herein.

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