SYRIA
Agricultural Sector Assessment

Volume 5
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Syria: Agricultural Sector Assessment

Volume 5: Human Resources and Agricultural Institutions Annex

CHAPTER VII

NUTRITION

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1 Introduction--Nutrition Assessment and the Five Year Plan

The purpose of this nutrition assessment is to provide information and recommendations as background material for 1980-85 Five Year Plan.

The 1980-85 Five Year Plan (the 5th Five Year Plan for Syria) could be the first such plan to explicitly state a national food and nutrition policy for Syria. Previous plans have had as "general aims":

a) to achieve self-sufficiency of main foodstuffs, and

b) to raise the food standard in particular respect to animal and high-class foodstuffs.

It is possible to achieve the above "general aims" and still have serious malnourishment among members of the Syrian society.

Each of the past Five Year Plans has had stated aims, goals, and programs which interact in important ways with the nutritional status of the Syrian population and certainly, the programs resulting from the 1980-85 Plan will also interact significantly with nutritional status.

Some examples of the programs in the Five Year Plans which interact with nutritional status are:

1.1 Agricultural Production

Generally, increases in agricultural food production result in increases in nutrients (proteins, calories, minerals, vitamins, etc.) and, if these increases lead to greater consumption by the population, the expectation is improved nutrition for the population. However, negative effects of agricultural production on nutritional status of the population could occur. For example, if the agricultural increases are achieved by increasing the lands irrigated with water containing raw sewage,* gastro-intestinal diseases can reduce the expected nutritional gains.

The 1980-85 Plan is expected to have as a goal to increase the animal production in Syria. The general nutritional effect of such a program is to increase the quality of the protein (generally, meat products have a better amino acid balance than other foods), but the program may reduce the overall quantity of nutrients available to people. This is especially the case if animals are fed food suitable for human consumption, or, if land is diverted from the production of food for human consumption to the production of food for animal consumption. The effect of increasing animal production could be to lower the nutritional status of the Syrian population below expectations.

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*All of the irrigated lands around Damascus are said to be irrigated with water containing untreated sewage.

1.2 Health and Sanitation Programs

Health and sanitation programs, which have as their objective to reduce the gastro-intestinal tract diseases and other infectious diseases (the diseases which are responsible for the high infant mortality rate in Syria), will have their impact upon nutritional status of Syrians by permitting the body to better assimilate the nutrients consumed and to allocate the assimilated nutrients to bodily growth.

The public utilities and housing programs to increase the number of beneficiaries of clean drinking water and to create treatment stations and sewer networks (1975-80 Plan) are also expected to improve nutritional status of the Syrians.

1.3 Food Storage and Preservation

Food storage and preservation programs will increase nutrient availability for consumption and thus would be expected to improve nutritional status.

1.4 Food Subsidies and School Lunch Programs

Such programs allow the poorer segments of the Syrian society to compete more equally with the richer segments for the available nutrients. These programs are expected to improve nutritional status. The effect on nutritional status may not be all positive; to fix the price of a commodity low without rationing could possibly lead to large wastages of the commodity by some segments of the society and thus reduce the overall availability of nutrients.

2 The Assessment of Nutritional Status

The nutrition assessment team consisted of two members, D. Wilson and M. Salameh (Syrian counterpart). The time for the assessment was limited to a five-week period in Syria in February and March 1979, and a three-week period in May 1979. In that amount of time, no primary data could be collected, so the study was limited to the data available from previous studies, from the Central Bureau of Statistics, and from interviews with the relevant Ministry personnel. From these sources the information was obtained which follows.

2.1 Measurement of Nutritional Status

Nutritional status is primarily measured by growth. Growth is most easily observed in children. Generally, in the nutrition assessment of countries, it is assumed that if the children of the country exhibit standard* or better growth, the adults of the country are also well nourished. This correlation has been tested in several countries and has been found to be valid except for pregnant and lactating mothers.

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*The most commonly used standard is the growth of children as has been measured in Boston or Iowa, U.S.A.

For Syria, we found very little data on growth of children. One study by the Ministry of Health covered 630 children from the rural areas around Damascus. These children were from 0-60 months' old. It was reported that after 6 months of age the rate of increase of mean weight of sampled children was not as rapid as the standard, and the sampled children's weight equaled 75 percent of the Boston mean weight in the period between 18 and 21 months. By the 60th month (five years of age), the mean height of the 630 children reached its lowest level (88 percent of the Boston mean height at the age of five years), but by the end of the 71st month, the growth in height recovered to the level of 91 percent of the Boston mean height. This study suggests that the critical age of children (in rural Damascus) is between 6 months and 2½ years.

In a study of malnourishment in 1974, reported in the same document,* 773 children from rural and urban Damascus were investigated. Again, these children were from 0 to 60 months of age. This study showed that over 50 percent of the children suffered some degree of protein malnourishment and the most critical period was between 7 months and 2 years of age.

In another study, it was shown that the iron intake of sampled children remained below the iron requirement during and after the critical period (6 months to 2½ years), thus strongly suggesting a lack of protein from 6 months to 2½ years.

A health survey** is being initiated in 1979. This survey, designed during 1978 and currently (May 1979) in the pre-test stage, is an excellent beginning for a nutrition surveillance system. The survey includes the following:

1) Height and weight measurements of children 0-60 months of age.
2) Five regions of Syria are to be covered on a sampled basis: North (Idleb), South (Sweida), East (Hassakeh), West (Lattakia), Central (Homs). One Mohafaza is randomly selected from each region each time the survey is repeated in the region. Seasonal variation (four different seasons) in data collection will help in the testing of hypotheses concerning the causes of malnourishment and associated diseases.
3) Urban-rural variations are designed into the sampling procedure.
4) The survey has been designed as a continuous survey to be repeated at two-month intervals throughout the year.

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*Source: Quoted by Dr. Hisham Ghebeh and Dr. Khaled Madini, "Present Status of Child Health in Syria," Mimeo. Document prepared for the International Year of the Child, 1978, p. 7.

**Design and implementation by the Ministry of Health, Dept. of Research and Statistics. See Appendix 2 for data from the pre-test of this survey.

5) The survey is at the household level of the community. This is a necessary condition for a nutrition surveillance system.

A preliminary tabulation of 250 pre-test questionnaires in the five Mohafazat (see Appendix 2) indicates that up to 20 percent of the children (ages 0-6) in these areas are not growing according to standard expectations. Although these data are only from a pre-test, they indicate that a malnutrition problem exists.

2.2 Health Status, Infectious Diseases and Sanitary Environment

As noted above, the team could make no direct assessment of the nutritional status of the Syrian population as a whole from measurements of growth. But, according to the theory of the causes of malnourishment, the growth of children in a population can be predicted from a knowledge of consumption of nutrients as well as the incidence of certain diseases (especially diarrhea and measles, and whooping cough). With this in mind, we collected morbidity and mortality data from the Central Bureau of Statistics (CBS).

We discovered in the CBS, however, that the morbidity and mortality data are possibly under-reported by 50 percent. Even in this case, perhaps we could assume that all mortality and morbidity were more or less equally under-reported for all age groups, which is of course a rather weak assumption. (The importance of the 1979 health survey by the Ministry of Health, Dept. of Research and Statistics, again comes to mind as a critical source of data for enabling analyses to implement a nutrition policy.)

Nevertheless, we found the highest mortality rate for the country as a whole to be for the young children. The causes of death were primarily diseases which the current theory classifies as nutrition-related diseases. Also, the morbidity data indicate a high incidence of nutrition-related diseases. See Appendix 1 for a presentation of these data on diseases.

We must be careful of the conclusion that is drawn here, but the available data (morbidity and mortality) can be taken as a warning flag that when the results of the nutrition and health survey begin to be available, some areas of the country may well indicate a relatively serious malnourishment problem.

2.3 Food Balance Sheets for Syria

The assessment team found that Food Balance Sheets* for Syria have been calculated since 1962. This work appears to have been well done. A food balance sheet estimates the availability of nutrients in the market place for the population. Since 1962, the food balance sheets for Syria can be summarized as follows in Figure 1:

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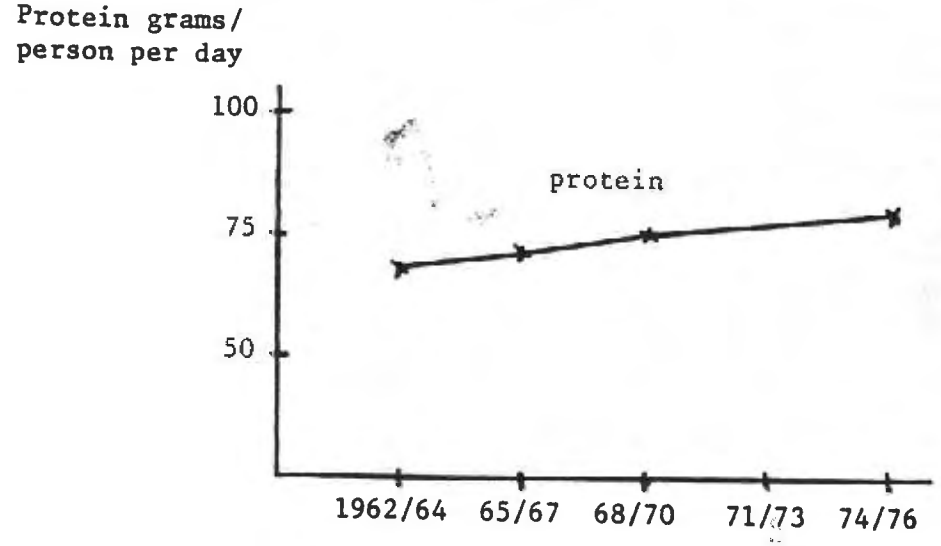
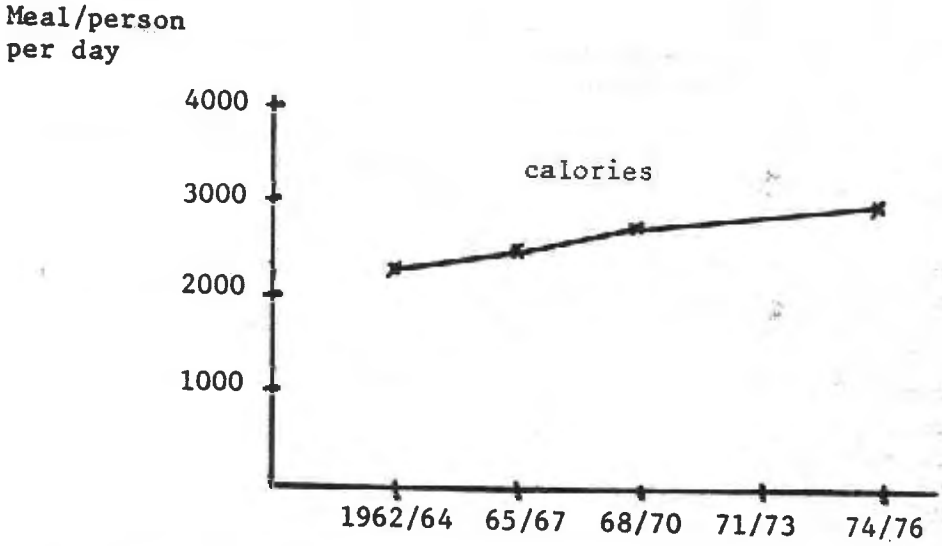
*Prepared by Directorates of Technical Affairs and Research, Ministry of Supply and Home Trade.

FIGURE 1: Results from Food Balance Sheets, 1962-1976*





*Prepared by Directorates of Technical Affairs and Research, Ministry of Supply and Home Trade.

A conclusion one can draw from these graphs is that agricultural policy, foreign trade policy, and the food storage and transport programs are generally capable of delivering sufficient nutrients to the market in Syria. Moreover, increases in the volume of commodities which the various agencies handle have been sufficient to meet the demand as the population increases.

The assessment team also found that data are available for the Mohafaza level on the production within Mohafazat as well as on the movement of commodities into and out of each Mohafaza. Should these data be accurate, it should be possible to do FBS-type analysis for Mohafazat grouped into five different health regions. With these data and the data from the Health Survey, analyses could be made which could be used to construct arguments for setting nutrition priorities for programs of health, sanitation, food production and food pricing policies among Mohafazat (and/or groups of Mohafazat).

2.4 Nutrient Consumption - Family Level

The nutrition assessment team found no past or current studies of nutrition consumption at the household level.*

The food balance sheet for Syria is prepared each three years and has been prepared since 1962. The output of these FBS calculations is called the average per capita consumption (currently, for 1978, 85 grams of proteins and 2700 calories per person per day). While this information is valuable, a food balance sheet is not an estimate of the nutritional status of a population, and should not be used as such. A measure is lacking of how the average figures (85 g., 2700 cal. per capita per day) are distributed among the population of Syria. For example, if daily consumption of proteins relative to their minimum daily requirement (MDR) is plotted versus the number of people who consume that amount, the distribution seen in Figure 2 could result. (See Figure 2.)

Depending on the width of the distribution shown in Figure 2, we may find that as many as 10-20 percent of the population are consuming only 50 percent of their minimum daily requirement of protein. The nutrition assessment team searched for data from which the spread of this curve could be estimated, but no reliable and direct data could be found (neither for protein nor for the similar curve for calories).

It is important to know the shape of the Figure 2 curve for different regions of Syria. (One should use the same regional boundaries for which the nutritional status is presently being measured in the Ministry of Health survey as well as for the whole country.) The importance of the curve is derived from the fact that methods exist to change the curve's shape, i.e., to channel the distribution

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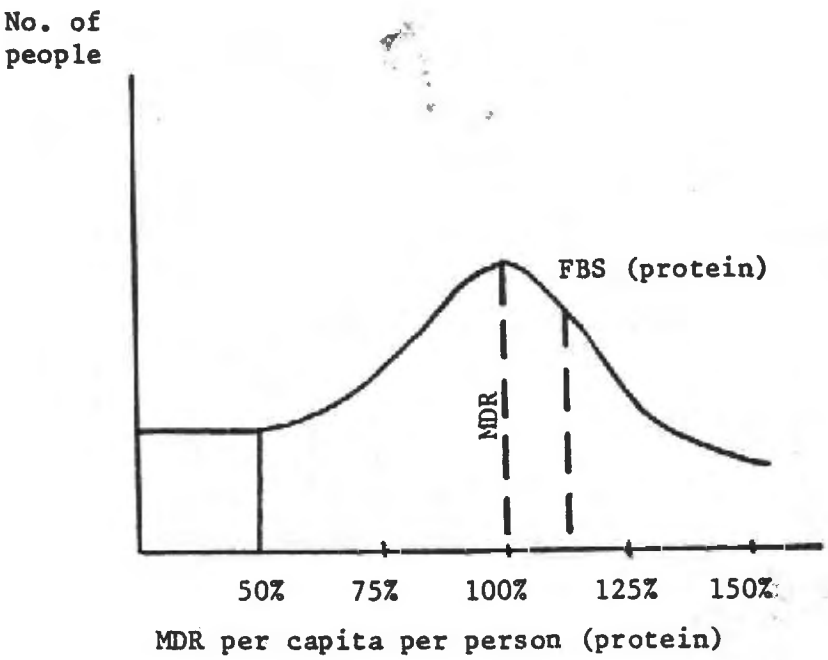
*The Household Consumption Survey done by the CBS in 1971-72 does not permit the calculation of nutrient consumption.

FIGURE 2: Hypothetical Distribution of Protein Consumption, where Average Consumption as Indicated by the Food Balance Sheet (FBS) Exceeds Minimum Daily Requirements (MDR)



of nutrient consumption among the members of the population in order to improve nutritional status. The most common types of intervention are:

1) wage rates and taxation to control distribution of income;
2) price controls on basic food commodities (bread, rice, oil, etc.) at the retail level;
3) access to free or inexpensive public transportation; and
4) access to marketing centers in rural areas for rural people, perhaps through mobile stores.

If the distribution of nutrients among the families of Syria could be known from a household consumption survey, the average consumption of nutrients from this survey can be compared with the average quantities of nutrients available in the market place (as calculated by the Food Balance Sheet Method). Comparison of these two independent measures can serve as a check on the food balance sheet calculations (or errors in the household consumption survey).

The collection of nutrient consumption data* at the family level is an important component in the recommended nutrition surveillance system (Section 5, Recommendation 1).

2.5 Analysis of Nutrient Demand

Using available data on the consumption of foodstuffs in Syria and data on elasticities of income and population changes in coming years, the demand for commodities can be projected. The marketing assessment team, in Volume 4, Chapter I, has prepared such projections for the years 1985 and 2000 using 1975 as the base year. Based on these commodity demand projections, nutrient consumption projections could be prepared. The data would permit us to estimate the global nutritional status of the Syrian population in the coming years and to propose dietary and production shifts to improve that status at least cost. For example, the contributions to nutrition of certain foods in 1975 are shown in the following table.

TABLE 1: A COMPARISON OF THE NUTRITIONAL COMPONENTS OF WHEAT, POTATOES, LENTILS AND EGGS

	Protein gr/cap/day	Fat gr/cap/day	Calories Kcal/cap/day
Wheat	51.3 g	9.8 g	1,579 Kcal
Potatoes	0.68 g	0.04 g	30.6 Kcal
Lentils	5.84 g	0.32 g	86.5 Kcal
Eggs	1.30 g	1.20 g	16.5 Kcal

* The Household Consumption Survey carried out by the CBS in 1971 and 1972 does not permit estimates of the distribution of nutrients by income strata.

Wheat provides 75 times the amount of protein in the diet as do potatoes and over 50 times as many calories. Wheat provides 9 times the amount of protein and 18 times the number of calories as lentils. Eggs provide 2 times the protein as potatoes but only half the calories as do potatoes.

Generally, planning decisions which could affect the nutrition of the population would involve changes in the policies of:

1) imports and exports for specific foods;
2) incentives for production of specific foods;
3) designation of land areas for specific food production;
4) improvements in storage facilities to reduce losses; and
5) reduction in food contamination.

One of the factors to be considered in making such planning decisions is the potential impact of the decision on the nutritional status of the population.

The commodity demand projections for years between 1975 and 2000 indicate that the greatest demand increase will be in meat (106% increase) and dairy and poultry products (98%). The per capita demand for wheat is reduced by approximately 17 percent from the year 1975 to the year 2000. For fruits and vegetables the increase in demand is around 30% while the increase in per capita demand for pulses will be around 5%. These commodity demand projections are based on the estimated increases in income and population for Syria. Also, it is assumed that the commodities are of unlimited availability.

In summary of these demand projections for food, it can be said that food supplies are adequate in Syria today and should be adequate from now until the year 2000. But, this statement does not mean that there is no nutritional problem. On the contrary, the other data we have presented show that there is a nutritional problem now and it may get worse despite favorable supplies of foodstuff. The food supplies themselves may be less than initially estimated.

Some evidence exists, especially the Ministry of Health's Survey, to indicate that equal distribution of nutrients is not being achieved and that malnutrition is a serious problem. Clearly, many of the sampled children are not growing as the average per capita consumption of nutrients would indicate. One possible conclusion is that there exists some families which are not consuming the average per capita nutrients. We have guessed that the poorest 25 percent of the Syrian population may have a nutrient deficit of 30-35 percent below the Syrian average, and it is likely that the 25-percent most-well-to-do segment of the Syrian population is overeating the Syrian average by 30-35 percent. It is recommended that the distribution of nutrients among the population be measured.

The demand figures assume that the nutrient storage and transportation losses are minimal in Syria. In most countries of the world, however, these losses are underestimated. In the United States, the post-harvest wheat losses are over 10 percent. In Africa, grain losses have been estimated to be nearly 40 percent. The loss estimates for the Mid-East (6-8 percent) are used by Syria and they are probably too low, meaning that net supply estimates may be high.

3. The Price of Nutrients

Another problem which has to be faced concerns the relative prices among commodities in the projections. We assumed that the same price differential will exist between wheat, pulses, and meat and dairy products in the year 2000 that existed in the year 1975. This is very unlikely. Between 1975 and 1979, for example, the increase in prices of meat and dairy products has been significantly greater than the increase in prices of cereals and pulses.

According to Table 1 of Appendix 3, in 1975 £1 (Syrian) would purchase 143 grams of wheat protein and only 14 grams of protein from relationships for other goods in 1975.

TABLE 2: £1 (SYRIAN) WILL PURCHASE (IN 1975):

	Grams of Protein	Kilocalories
Wheat	143 g	3853
Lentils	128 g	1388
Broad beans	150 g	1537
Meat	14 g	106
Cheese	32 g	284
Milk	20 g	388
Eggs	16 g	137

Today in Syria (1979), £1 (Syrian) will still purchase 143 grams of wheat protein (at the subsidized price), but only 9 grams of protein from meat (lamb)--a difference of 15:1. The factor of 15 (1979 prices) between meat and wheat is large and may well increase to a level of 20:1 in the next few years. As the price ratio between cereals (and pulses) and meat rises to the levels of 10:1, 15:1 or 20:1, it becomes very difficult to have people include more meat in their diets. At these ratios, only the upper 10-25 percent of the income levels will increase their intake of animal products. During the past 3-4 years in the United States, the price of meat increased from 2 to 2½ times its previous price. During this period, the consumption of meat has declined by almost 20 percent.

The demand projections only concern demand and not the actual supply of nutrients. A number of unforeseen events can radically change the composition of diets and the ability of the food system to meet the projected demands.

Given these limitations, perhaps the best procedure would be to take the data as presented and develop a number of scenarios, each with different assumptions. The focus on nutritional status of various segments of the population will enable the planner to evaluate these scenarios in terms of their impact on the well-being of the Syrian population.

Table 2 of Appendix 3 extends the price concept to include the biological value of the protein (all protein is not of equivalent value due to limiting amino acids) and combines the equivalent protein content with the caloric content of the food into a single index (see column 5 of Table 2). This single index is roughly equivalent to the minimum daily requirement of protein and calories (X100) that can be purchased for £1 (Syrian) (at 1975 retail prices). The foods in Table 2 are rank ordered from high Index (best nutrition buy) to low Index (poorest nutrition buy). The ratio between any two index numbers in the ranking is directly proportional to the increased nutrients that can be purchased for £1. For example, the index for beans is 72 and the index for milk is 24. Thus, beans have about 3 times the nutritional value per Syrian pound as does milk. And, broad beans have 60 percent the nutritional value per Syrian pound as wheat but 8 times the nutrient value per Syrian pound as meat.

The above index is for single foods. That is, if one tries to minimize the cost of nutrients, it indicates which food is best to buy. But, people seldom eat just a single food. Diets are mixtures of foods. When foods are mixed, the effectiveness of the protein (NPU) of the mixture can increase greatly. To explain this further, the ability of the body to use the protein in a particular diet depends upon the amounts of nine amino acids (called the "essential amino acids") in balanced quantities. If one of the amino acids is deficient (say by 50 percent), then the body can only make use of 50 percent of the protein for all the amino acids contained in the food (the most deficient amino acid is called the "limiting amino acid").

The deficient amino acids in beans are methionine and cystine. Beans contain only 55 percent of the amount of these two amino acids as necessary. Thus, if one eats only beans, the protein content of which is about 27 percent (a good serving of beans would contain about 30 grams of protein), the body would only make use of 55 percent of the protein contained in the beans. Now, suppose that instead of eating only beans, the beans are eaten with wheat (say par-boiled or bread). In wheat the limiting amino acid is lysine (about 45 percent of the amount required for complete use of the protein). If one eats wheat alone, for every 10 grams of protein in wheat, the body can effectively use only 4.5 grams. But, wheat has a large amount of the same amino acids of which beans are short, and beans have a surplus (about 130 percent) of the lysine which is short in wheat. So when we eat the two together, the body is capable of utilizing 82 percent of the protein in the beans and in the wheat. Thus, the mixture of wheat and beans yields a protein utilization which is better than meat (meat, if eaten alone, is limited to 79 percent utility).

4. Traditional Syrian Diets

Traditional diets in any country are not explained simply by, "that's what the people like to eat." It is true that they "like" to eat those diets, but there is often a fundamental reason for these preferences. Those families with diets based on easily available and nutritious foods have survived times of scarcity of food. These diets are typically well balanced with low-cost nutrients, at least during times of environmental and political stability.

Syrian traditional diets probably have these characteristics. They should be analyzed for their cost for nutritional protein units, calories, minerals and vitamins. As Syria develops its food processing industries, new processed foods will appear in the market. Women, who will then have jobs (working in the food processing plants, no doubt), will no longer have time to prepare the traditional foods, and these will tend to be replaced by processed foods with very high costs for nutrients. More malnourishment will likely result.

We suggest that the analysis of the traditional foods be carried out for their cost per unit of nutrition, and we suggest that these be compared to the unit cost of nutrients in processed and packaged foods. To safeguard the nutritional status of the population, the State Planning Commission may want to specify cost per nutritional unit for processed foods.

Thus, we propose the development of an index for comparing Syrian diets in the same manner that we have suggested our index for the Syrian foods in Annex V, Table 1. Such indices can be very useful in evaluating the nutritional effect of planning decisions.

5. Recommendations

5.1 We believe that nutritional considerations should be explicitly introduced into the planning process. We strongly suggest that a project be launched which would be oriented directly to nutritional analysis which contributes to planning decisions.

Some surveys will be necessary and perhaps even some research, but only those surveys and research activities that can be justified as necessary to be able to analyze the nutritional effects of alternative plans. In other words, research results would be a by-product of the project--a means to the end, not the end in itself.

Such analyses would be greatly aided by some sort of data-processing capability which can reduce analysis time from months to hours. It is suggested that a small team (say, three to seven people) begin such a project--to begin to analyze selected planning or alternative decisions for nutritional impact--for the 1980-85 Plan. After a year or more of experience, some of the team members may benefit from advanced training in some other country. We are

proposing on-the-job training first and then, for those who show some aptitude, skill and interest, to invest in broadening their knowledge and obtaining some credentials.

5.2 It is recommended that the SAR undertake the design and the implementation of a nutrition surveillance (or monitoring) system.

Some of the functions of a nutrition surveillance system are sketched as follows. Generally, observations are made periodically at the family level through the use of sample surveys for measuring growth of children, 0-6 years' old (as in the current health survey in the Dept. of Research and Statistics of the Ministry of Health). Such observations can be grouped for analysis at the levels of:

1) Mohafazat;

2) regions;

3) country.

At the Mohafaza level comparisons can be made of levels of undernourishment among Mohafazat. These comparisons can help establish priorities for possible subsequent actions within Mohafazat. Similar comparisons can be made among regions to determine if regional priorities are required. And for the country as a whole, comparisons can be made with other nations or countries.

The above comparisons can help the Government of Syria specify nutritional policy aims (goals or objectives) at the national, regional and Mohafaza levels.

If the surveillance system indicates that all nutritional goals or objectives (at each level) have been met, no remedial actions are necessary. In this case, the system need only analyze the trends:

1) nutrient availability (at all three levels);

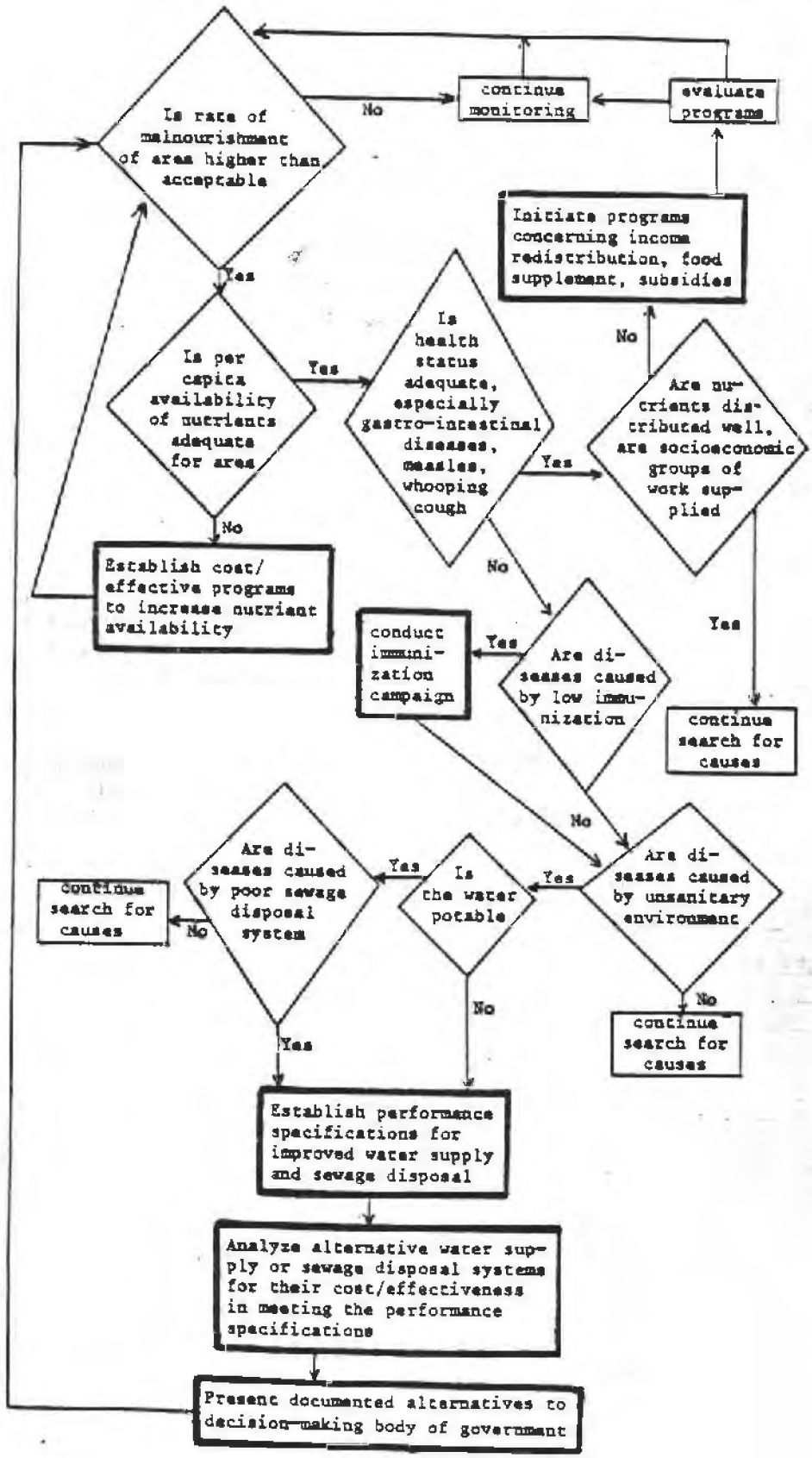
2) nutrient distribution among families;

3) health status.

These analyses attempt to detect changes in the above three factors which could cause the undernourishment rate in the Syrian population to drop below the stated goals or objectives in the near future.

If the nutrition surveillance system indicates that the nutritional goals or objectives are not being met for a Mohafaza (or a region), a diagnosis of the area is required. The function of the diagnostic procedure is to analyze the area for causes of the malnourishment and to establish priorities among possible remedies. Briefly, the diagnostic procedure which is described in the following flow chart (Figure 3, p. 16) attempts to detect possible nutrition problems in a step-by-step manner, and not launch large-scale,

FIGURE 3: Flow Chart of Nutrition Diagnostic Procedure



complex surveys. The identified problems can then be addressed in specific programs.

If action is taken on one of the alternatives suggested in the analysis (those indicated in the heavily outlined boxes in the chart), the costs and the effects which are explicitly stated in the analysis are predictions of the changes that will occur when the implementation has been completed. The comparison of these predicted costs and effects with the actual costs and effects serves as an evaluation of the above procedures.

It is important to note that extensive, and therefore expensive, studies are in general not being advocated here. For example, only at certain points in the decision model would a consumption survey be done. The objective is to minimize expensive data gathering and analysis and try to focus what is gathered on specific issues facing the planner.

5.3 Control and Measurement of Food Contamination

Some types of food contamination are closely related to undernourishment (such as irrigation with raw sewage, etc.). These have been discussed above. Other types of food contaminations such as might occur in processed food and food contamination in the preparation of food in institutions (including restaurants, school lunch programs and industry) may not have their effects become evident in nutritional status but more likely in emergency medical care units.

The extent of food contamination is not known for Syria. It is likely to be small but also is likely to increase with the increased uses of processed food and more advanced agricultural techniques. Greater use of pesticides, insecticides and fungicides in agriculture, more food processing plants, more technical preservation methods will require food inspection and quality control systems that protect the public from intoxication from such products.

At this time, we only suggest that food standards for purity be set and a monitoring system be designed and implemented as a pilot operation for a small set of selected foods.

5.4 Incorporation of Science-Based Planning Procedures into Health and Nutrition Planning

The lack of documentation of studies and analyses was the greatest difficulty for the assessment team. Apparently important decisions are being made without detailed analyses or diagnoses. Some examples of decisions for which no systematic studies or analyses could be uncovered were:

a) Decisions on price setting of basic food commodities. No documentation was found which analyzed the effect of the prices on nutrient consumption. No analysis was detected concerning effects of subsidized pricing systems on rural area consumption versus urban area consumption. While the

CBS survey is instructive, neither it nor any other study addresses the question of eating habits and food wastage. It is easy to observe, at least in the urban areas, a large wastage of bread but no analysis seems to exist which relates the amount of waste to the price (neither for bread nor for any of the other foods for which prices are controlled by the government). Even if for political reasons the decision is to keep the prices fixed at their present low values, the knowledge of the cost (monetary as well as wastage) of such a policy is valuable.

b) Decisions on the selections of food for lunch programs. There exist classical scientific methods for selecting optimum diets (by linear programming). No evidence was found that such analyses had been done for the SAR school program.

c) No studies were located on: (i) the relationship between livestock production and the quality and quantity of nutrients available for consumption at the family level; (ii) the relationship between health and sanitation programs and undernourishment (or morbidity and mortality); and (iii) the relationship between food storage and preservation programs and nutrient availability for the citizens.

Yet, decisions have been made in the past and will be made in the future (for the next Five Year Plan) on livestock production, health and sanitation, storage and preservation, and prices for basic food commodities. It appears as if the planning process consists all too often of the presentation of personal opinions in committee meetings, when more precisely knowing the costs and benefits of nutrition-related programs would be of great use to the decision-makers.

The general orientation of all the above recommendations is to emphasize techniques for making the planning process more efficient. By adopting such an orientation, it is hoped that a foundation would be laid for improving the planning process by comparing the predictions of the analyses which are carried out with the actual results of implementation of the decisions. The difference between predictions and results would then feed back into the implemented programs or into the analysis methods to determine where the errors have occurred. In effect, with properly designed analyses, it becomes possible to build the scientific learning model into the government function of planning. Of course, macroeconomic planning models currently attempt to build in the same learning process, but what seems not to be realized is that this scientific learning process can be built into all levels of planning, and especially into planning which affects the nutritional status of the people of Syria.

5.5 It is recommended that a program be established to begin to develop the human resources of SAR in the area of Scientific Nutrition Planning.

This recommendation relates to personnel in the government bureaus (central as well as Mohafaza level), institutes which currently train planners, and universities.

a) Science-based practical courses in social problem-solving in SAR universities and institutes. The short time allocated for this nutrition assessment prevented the assessment team from adequately surveying the universities and training institutes which produce planners. However, many interviews suggest that a certain deficiency exists especially concerning nutrition planning. A detailed study of current curricula in various training institutions is called for. Such a survey should start with the schools of public health, preventative medicine, epidemiology. Also, to be included are economics, sociology, anthropology, engineering, and planning in the SAR institutes.

b) Further training outside of the SAR at the M.S. and Ph.D. levels. Programs at each level (M.S. and Ph.D.) are available at many universities. Also available but not usually recognized for its relevance to nutrition planning is training in the field of epidemiology. The epidemiology of malnourishment is precisely the subject matter which is most directly applicable to the production of scientific-based analyses to aid administrators and politicians in decisions about food and nutrition policies.

c) Interdisciplinary teams for social problem-solving. Food and nutrition problems (and, in general, most social problems) are not solved by people of a single discipline. In a number of countries it has proven useful to develop interdisciplinary teams. In most governmental bureaucracies, such teams are usually selected from across ministries and attached to the Prime Minister's Office or the State Planning Commission.

Financial resources have been generally used as the incentive for inter-ministerial cooperation. Also, when universities and other institutes (such as those which train planners) are involved in the makeup of the team, the practicality and usefulness of the educational programs are enhanced.

The morale of many of the workers in the government bureaus and the universities of Syria appears to be generally low. In view of this, the "brain drain" from Syria is not surprising. To some degree the stress on scientific-based planning could help reverse this trend. Interesting work, scientific analysis of social problems, the chance that such analysis can be integrated with

political factors and play a role in the decisions, all can serve as encouragement to the technical staff of the government to energetically carry out their technical function. The citizens of SAR could be better served by competition between interdisciplinary teams attempting to lower the infant mortality rate in Syria, for example, rather than competing for large "empires" within the government.

APPENDIX I: DATA RELEVANT TO ESTIMATING MALNUTRITION IN SYRIA*

A) Main Causes of Children's Deaths from 1-4 Years, Damascus, 1972:

Measles	23.8%
Digestive system/diarrhea	21.4%
Accidents	16.6%

B) Prevalence of Protein-Energy Malnutrition (PEM) in Damascus, According to Weight/Height Ratio:

Nutritional Condition	Males		Females		Total	
	No.	%	No.	%	No.	%
Normal growth and more than normal growth	229	56.0	139	38.19	368	47.0
PEM (mild)	95	23.32	76	20.88	171	22.0
PEM (mod.)	55	13.84	92	25.27	147	19.0
PEM (sev.)	30	7.33	57	15.66	87	11.2

C) Percentage of Deaths in Relation to the Mortality during the First Year of Life in Damascus:

	1967	1969	1971
Deaths of first week, 0-6 days	30.7	28.0	36.9
Deaths of first month, 7-28 days	10.6	10.6	6.0
Deaths of infants from 1-12 months	58.7	60.5	57.1

D) Deaths of Infants and Children in Damascus:

	1967	1969	1971
% of first-year deaths in relation to total children deaths	82.4	78.7	78.0
% of children deaths 0-4 years in relation to total children deaths	98.4	97.6	99.5

(continued)

*Taken from: Dr. Hisham Ghebeh and Khaled Mardini, "Present Status of Child Health in Syria," Mimeo. document prepared for the International Year of the Child, 1978.

E) Prevalence of Anemia in 927 Children, Aged 0-60 Months, after a Routine Checkup in Damascus by Dr. Mardini:

Age	No. of Children Examined	No. of Anemics	Percentage
10-12 months	175	79	45.14
1-2 years	330	196	59.4
2-5 years	422	232	55.0

F) Cause of Death by Age Group, 1977

Age	Nutritionally Related Deaths (enteritis, diarrhea, whooping cough, measles)	Other Diagnosed Causes of Death	Total
Under 1 year	628 (24.4%)	1,949 (75.6%)	2,577 (100%)
1-4 years	326 (20.9%)	1,136 (79.1%)	1,462 (100%)
Total	954 (23.6%)	3,085 (76.4%)	4,039 (100%)

SOURCE: CBS Statistical Abstract, 1977.

Appendix 2: NUTRITIONAL STATUS MEASURED BY MINISTRY OF HEALTH SURVEY (PRE-TEST)

GRAPH 1: Levels of Malnutrition According to Weight Found in the Field Test

OVER THE 90th PERCENTILE . . . . . .

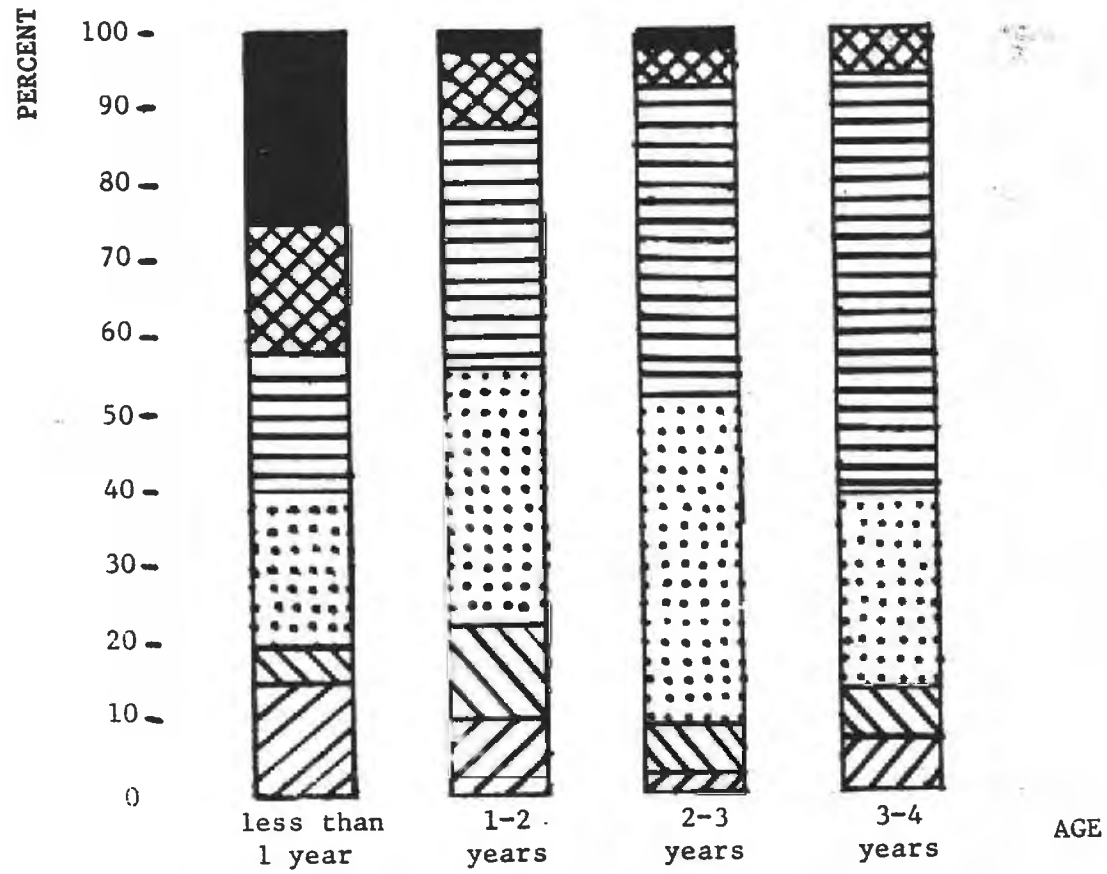
BETWEEN THE MEDIAN AND THE 90th PERCENTILE . . . .

BETWEEN THE 10th PERCENTILE AND THE MEDIAN . . . .

FIRST DEGREE MALNUTRITION
(below the 10th percentile) . . . . . .

SECOND DEGREE MALNUTRITION
(below 70% of normal weight) . . . . . .

THIRD DEGREE MALNUTRITION . . . . . .
(below 60% of normal weight)



APPENDIX 3: NUTRIENTS AND THEIR COST

TABLE 1: NUTRIENTS PER £1 (SYRIAN), 1975

	Protein (g)	K/Cal.
Wheat	143+	3853
Rice	90+	4065
Maize	94+	3134
Barley	135+	4998
Flour	92+	2704
Lentils	128+	1388
Beans	115+	1171
Chick-peas	84+	1320
Broadbeans	150+	1537
Pistachios	9+	253
Walnuts	1+	319
Tomato	7+	195
Eggplant	6+	168
Green beans	14+	461
Okra	8+	156
Cucumber	5+	100
Cauliflower	30+	267
Cabbage	7+	214
Red onion	15+	445
Garlic	15+	337
Apple	1+	251
Oranges	4+	234
Lemons	4+	207
Grapes	3+	396
Apricot	3+	218
Peach	3+	202
Date	9+	1594
Pear	1+	226
Cherry	5+	182
Fish	23+	141
Meat	14+	106
Eggs	16+	137
Milk	26+	388
Cheese	32+	284
Olive oil	0+	1150
Butter	0+	625
Peanut	25.5+	487

TABLE 2: INDEX FOR JUDGING RELATIVE NUTRITIONAL WORTH OF DIFFERENT COMMODITIES

	Protein			Calories	
	NPU	Eg. Prot. (1)	% MDR (2)	% MDR (3)	Index (4)
Wheat	55	78.6	131	160	145
Rice	57	51.3	85	169	127
Flour	67	61	102	112	107
Maize	49	46	76	130	103
Broadbeans	47	70	117	64	90
Lentils	56	71	119	57	88
Beans	51	58	97	48	72
Chick-peas	60	50	84	55	69
Dates	100	90	15	66	40
Milk	75	19	39.5	16	24
Cheese	72	23	38	11	24
Olive oil	--	--	--	47	23.5
Peanuts	47	11.98	19	20	20
Fish	83	190	31.8	54	18
Eggs	100	16	26	5	15.5
Butter	--	0	0	26	13
Walnuts	65	6.5	10.8	13	12
Potatoes	71	9.2	15.3	17.3	11.3
Meat	80	11.2	18.6	4	11
Pistachios	65	58	9.7	10.5	10.1

(1) Eg. Protein = gram of protein purchased by £1 Syrian x NPU.

(2) % MDR = eg. protein ÷ 60 x 100 (60 is considered UDR of reference).

(3) % MDR = K/Cal. purchased by £1 Syrian (from Annex VIII) ÷ 24 (2400 K/Cal. is considered MDR of calories).

(4) Index = (2) + (3) ÷ 2.