Research Report No. 1
February 1976

MEETING FOOD NEEDS IN THE DEVELOPING WORLD:

The Location and Magnitude of the Task in the Next Decade

1776 Massachusetts Avenue, N.W., Washington, D.C. 20036, U.S.A.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

BOARD OF TRUSTEES

TABLE OF CONTENTS

PREFACE

This report is the first research report of the International Food Policy Research Institute. As its title indicates, it is a partial analysis of the world food problem which attempts to indicate precisely the location and magnitude of possible food deficits in developing market economies.

The report bears no single author because it is a joint effort. However, Nathan Koffsky carried most of the burden for the analysis and writing. Diane Skellie and Pradeep Kotamraju did most of the statistical analysis. Kenneth Bachman, Felix Nweke, M. S. Rao, and James Gavan all contributed to the planning and development of the analysis.

Special thanks are due to the other organizations that contributed in various ways. These include the International Monetary Fund, the World Bank, and the United States Department of Agriculture, all of which made data available. Thanks are also due the Brookings Institution which made its computer facilities available.

With this report, IFPRI is inaugurating a research program on international food policy issues and the alternatives that are available to deal with them, especially the issues of major importance to developing countries. The aim of the IFPRI research is to help clarify the problems and identify solutions to prevent the worsening of what is already a serious problem in most of the developing countries.

Dale E. Hathaway
Director

Summary of Findings

1. This report is concerned with the food needs of more than half the people on earth--those who live in developing countries classified as developing market economies (DME), as distinct from those in the People's Republic of China and other Asian Centrally Planned economies. By 1985, their numbers will exceed 2.5 billion people, of whom 2.2 billion may well be living in food deficit countries, if production performance since 1960 is repeated in the next decade. For most, their present situation is precarious. It is likely to turn much more alarming, unless actions are taken to forestall it.

2. Unless the trend of production in DME countries improves in the future, production of cereals, the major food in most developing countries, will fall short of meeting food demand in food deficit countries by 95-108 million tons in 1985/86 depending on the rate of economic growth. This compares with shortfalls of 45 million tons in the food crisis year, 1974/75, and an average of 28 million tons in the relatively good production period, 1969/71. Asia accounts for some 50 percent of the total projected deficits, North Africa/Middle East about 20 percent, and Sub-Sahara Africa and Latin America about 15 percent each.

3. A total cereal deficit of about 100 million tons in DME food deficit countries could well prove conservative. It is based on projection of the production trend of 1960/74, an average increase of 2.5 percent a year, to 1985. During the last half of that period, 1967-74, the rate has slowed to 1.7 percent. This is too short a period and subject to too much variation from year to year to serve as a reliable base for projecting the future. Nevertheless, the pervasiveness of the slackening in production for all regions and cereal crops (except for wheat in Asia, the most visible evidence of the "Green Revolution") suggests that it may well be difficult for DME food deficit countries to maintain their longer term production trends. In the event performance in the future reflects the more recent trend, cereal production could fall short an additional 100 million tons, doubling the cereal deficit to about 200 million tons. Such a large transfer of food, largely from developed countries, could well be unmanageable physically or financially.

Low-Income Food Deficit Countries

4. The core of the food problem is in the low income food deficit countries (i.e., those with per capita incomes of less than $200) where 60 percent of DME population now live and where most of the increase in population will come. They are projected to incur about half of the total deficit, some 42-48 million tons of cereal by 1985. To finance imports of such magnitude would appear to be beyond any prospect of these countries having the foreign exchange to do so. The only feasible way for most of these countries to meet food demand--and the least costly over the long run--is to

increase production more rapidly. It would require increasing the production growth rate from 2 percent a year to almost 4 percent. To approach this goal would require very substantial increases in investment in resources devoted to food production and greatly improved agricultural performance in the countries concerned. This will not be possible without heavy transfers of capital and technology from developed countries.

5. Nevertheless, it would be unrealistic to look for the growth rate to move rapidly from 2 percent a year to 4 percent, considering that agricultural development is a slow and difficult process and the inevitable lags that occur before investments begin to produce. In the meantime, it is clear that there will be need for food aid from the developed world, very likely in larger amounts than heretofore, to help feed these people.

6. Unless such developments are forthcoming, the inevitable result would be a further decline in per capita consumption, either by higher prices or by rationing. Most countries in this category already have average diets which fall below minimum adequate energy levels. Even if the projected consumption levels for 1985/86 were to be attained, they would allow for only 2-4 percent improvement over the 1969-71 per capita levels. Further, inasmuch as projected consumption levels generally reflect market demand, the number or proportion of malnourished people is not likely to be reduced unless there is major restructuring of incomes or other means of redistributing the food supply. This group of countries contains the bulk of the malnourished in the developing world, estimated by FAO to total some 440 million people in 1970.

7. The principal problem countries or groups that come out of the projections are indicated to be:

	Cereal Deficit 1974/75 (million tons)	Cereal Deficit Projected 1985/86 (million tons)
India	6.7	14-17
Bangladesh	2.3	5-5½
Indonesia	1.1	7½-9½*
Nigeria	0.3	6½-7 *
Sub-Sahara Low Income Group	1.2	3½-4½*

* In the case of Indonesia, if the 1967-74 production trend should prevail, the deficit would largely be eliminated. The deficits for Indonesia, Nigeria, and Sub-Sahara low income countries take into account the projected supply of root crops as an alternate source of calories.

High Income Countries

8. This group, containing 8 percent of DME population and including the North Africa/Middle East OPEC countries, Venezuela and high growth countries in Asia, such as Taiwan and South Korea, has the capacity to generate foreign exchange to meet food demand by imports. They now import about one-third of cereal requirements. By 1985/86 they may be importing two-thirds of their requirements. This group represents a large and expanding commercial market for 30-35 million tons of cereals by 1985/86.

	Cereal Deficit 1974/75 (million tons)	Cereal Deficit Projected 1985/86 (million tons)
Asia High Income Group	6.7	17-20
NA/ME OPEC Group	4.8	11-11½
Venezuela	1.5	2-3

Middle Income Food Deficit Countries

9. Countries in this group represent the range of circumstances between the poor low-income countries and the high foreign exchange earners. They contain about 20 percent of DME population. The average production rate has been much more satisfactory, increasing about 3 percent per year but has not kept up with demand for cereals in which feed is of increasing importance. A rate of over 5 percent a year would be required to meet cereal market demand. While the total deficit is projected to rise from 17 million tons in 1974/75 to 23-25 million tons by 1985, Mexico's deficit is likely to decrease and Egypt's although sizeable, to remain about the same as in 1974/75. This group represents a mixture of countries, some likely able to import commercially and others requiring some concessional food aid. While the needs of some are somewhat less urgent than for others, there is need in most countries for additional investment in food production.

10. Certain problem areas stand out.

	Cereal Deficit 1974/75 (million tons)	Cereal Deficit Projected 1985/86 (million tons)
Sub-Sahara Higher Income Group (above $200/per cap)	0.6	2
Mid America/Caribbean (other than Mexico)	2.9	4¼-4½
Latin America (except Argentina, Brazil and OPEC countries)	2.3	5¼-5½
Egypt	3.5	3.5

Cereal Exporting Countries

11. Only Argentina and Thailand are currently major cereal exporters. If historical growth trends persist, Brazil and Pakistan, presently in deficit, will move to an export position as well. This group with 13 percent of DME population, has more than enough to feed its people. Whereas, DME cereal exports have been about 10 million tons in recent years, the projection of exportable supplies in 1985/86 is in the range of 25-30 million tons. Since these developing countries are likely to hold to commercial sales, their export surplus will represent a small part of the world supply of cereals available to both developed and developing purchasers.

People's Republic of China

12. At the historical production growth rate of 3.4 percent a year in comparison with population growth of 1.5 percent a year, China appears to have the capacity to become a major cereal exporter in the 1980's if that should be its governmental policy decision. However, the more likely route would be toward improving the diet of its people and meeting the deficits of other Asian Centrally Planned economies. For these latter, production is falling significantly behind population growth.

INTRODUCTION

This report builds on the finding of the United Nation's World Food Conference of November, 1974 that the precarious food situation in many developing countries threatens to become much more difficult during the next decade. The Developing Market Economies (DME), excluding the Asian Centrally Planned Group, containing more than half of the people on earth, are generally characterized by high population growth rates which show little tendency to slacken, and lagging food production which has become more pronounced in recent years. The result has been a widening food gap in DME countries which has required greatly increased imports from developed countries in order to feed their people. Even with larger imports (including substantial food aid), one in four of their population is underfed and their numbers are increasing.

Nor have these disturbing trends been significantly altered by good harvests this year in large parts of Asia, a reflection of extremely favorable weather and growing conditions. While the food crisis of the 1974/75 crop-year brought on by poor crops has been alleviated to some extent, import needs of food deficit countries remain much higher than at the beginning of the 1970's. The underlying trends remain.

A better balance to the food/people equation in the next decade depends almost entirely on increasing the availability of food by accelerating production in DME countries and/or increasing food transfers from developed countries. The time interval precludes the possibility of significantly altering the population factor. At best, programs to limit population growth could have only very marginal effects on the numbers likely to be present in the mid-1980's. This should not minimize the overwhelming importance of slowing the rate of population growth as soon as possible. Otherwise, the task of feeding people beyond the next decade could well turn unmanageable.

The purpose of this report is to put concrete dimensions on the food problem as reflected in cereals, the major staple in most of the developing world; the potential shortfalls that loom ahead if things go on as they have, the geography and magnitude of such shortfalls among DME countries, and the relative economic circumstances of those countries with potential food deficits. For these reasons, potential cereal needs and potential cereal deficits, which have been considered in a global context for all DME countries combined by the World Food Conference, have been disaggregated into 23 categories of countries or groups of countries with similar attributes. By so doing, the process of planning to avert the occurrence of potential food shortages can be facilitated.

In the World Food Conference document, Assessment of the World Food Situation, Present and Future,[1/] the Food and Agriculture Organization of the United Nations (FAO) projected for all DME countries

---

1/ United Nations World Food Conference, Rome, Italy, 5-16 November, 1974, E/CONF 65/3.

combined a potential net cereal deficit of 85 million tons by 1985 compared with an average of 16 million tons in 1969-71. These are global figures for DME countries wherein the surpluses generated by exporting countries, such as Argentina and Thailand, are deducted from deficits in other countries.

While the potential net deficit of 85 million tons is important from the viewpoint of achieving a global balance in cereals vis-a-vis the rest of the world, food strategy for the individual country evolves from its own deficit position. Further, export surpluses of exporting developing countries may not be available to importing developing countries. For example, Thai maize is largely exported to Japan for livestock feed purposes. Nor are exports of developing countries likely to be available except on commercial terms. Thus, it is important to consider the situation of food deficit countries as distinct from exporting countries and the different circumstances among food deficit countries. Some, that can afford to do so, will likely purchase a substantial part of their food requirements rather than expand domestic production at very high cost. This may well be the case for OPEC countries in North Africa/Middle East where the agricultural resource base is limited and investment is likely to be used more efficiently in other activities. On the other hand, poor countries with large food deficits, such as in South Asia and Sub-Sahara Africa, have little alternative except to try for self-sufficiency by improving output. Otherwise, they must look to large and continuing food aid transfers.

This report takes into account the possible continued retardation of economic growth in much of the developing world stemming from restructuring of oil prices. This has impacted most severely on low-income non-oil exporting countries. Accordingly, consumption (demand) has been projected under high and low income growth assumptions, the former assuming that historical income trends will be resumed and the latter reflecting significantly slower growth.

Meaning and Limitations of Food Deficit Projections

Deficits (or surpluses) as used in this report and in the FAO projection represent the difference between projections of cereal production based on the historical trend and projections of demand arising from increasing population and per capita income growth assumptions. Therefore, the deficits (or surpluses) reflect projected food demand relative to production, if past production trends continue in the future.

Even under existing circumstances, some countries will likely do better than in the past as improved technology takes hold and some will do worse as the land base is exhausted without compensating improvements in other factors of production. These tend to be offsetting in the process of aggregation, but may miss the mark for individual countries. Nevertheless, the historical record provides some statistical basis for assessing the needs for added investment in food production, the requirements of factors such as irrigation, fertilizers, etc., and the improvement in agricultural performance which could lead to attaining specific food targets.

The deficits that come out of such projections indicate the extent of the adjustments faced by the countries concerned; whether deficits will be met by increased production, by commercial imports if affordable or concessionary food aid if not, and/or by reduction of per capita consumption, in many cases at levels already unsatisfactory, either by higher prices or by rationing.

Even if the projected demand for cereals which is largely a reflection of market demand is fulfilled, many people will still be below an adequate food intake as a result of low incomes and inadequate food distribution systems.

According to the World Food Conference Assessment document, some 440 million people in DME countries were underfed in 1970. Of the number, 70 percent were in the Far East, 15 percent in Africa, eight percent in Latin America, and seven percent in the Near East. These figures give some appreciation of the additional problem involved in providing all the people with an adequate diet; a task which goes beyond meeting the food demands projected in this report. However, the state of knowledge is quite unsatisfactory as to the nutritional standards that are appropriate considering demographic and other pertinent factors, the numbers falling below standards and the extent of deficiencies. Such information, which would require major research, would be needed in order to measure the additional food supply required to assure all of a minimum adequate diet.

It should be noted that the incidence of malnutrition is heavy among the large populations of India and Bangladesh. To eliminate this problem would greatly enlarge the projected cereal deficits for these countries as shown in this report, especially since population will be almost 50 percent higher by 1985 than in 1970 and a significant proportion of the added population will be poor.

Finally, it should be emphasized that the agricultural data base for developing countries from which production and consumption are projected is far from adequate to deal with a matter of such urgency and importance as the food problem. It should be of high priority to improve the basic statistics so that planning to meet this contingency can be more effective.

Sources of Data and Methodology *

The basic data used in IFPRI projections were as follows: Cereal production, consumption, and trade by country for crop-years 1960/61-1974/75, the time period available from U.S.D.A. Human consumption and feed use are shown separately insofar as such data were available. FAO data, the basis for the WFC projections, are on a calendar year, and were available only for production. Hence the choice was made to use the more complete data of the U.S.D.A.

Population projections used are those of the U.N. medium--medium-variant obtained from the World Bank Computer Center. This is the same variant as used in the WFC document but with some subsequent minor revisions.

Income growth rates were derived from World Bank materials. The high income growth assumption for Non-OPEC countries is generally the growth rate of GNP per capita 1965-73. Income growth rates for OPEC countries were adjusted upward to reflect sharply increased oil revenues since 1973. The average increase projected for developing market economies came to 3.0 percent per year per capita compounded to 1985, compared with 3.5 percent assumed in the WFC projection. This assumes that the effect of high oil prices, which has interrupted the growth in per capita income in developing Non-OPEC countries, is gradually overcome and the historical trend is resumed.

The low income growth assumption was derived from analysis of potential continued ill effects of the oil situation on Non-OPEC developing countries, including also the unfavorable effect on their exports resulting from a slower rate of economic expansion in industrial countries. Under this circumstance, the average increase projected in per capita GNP is 1.7 percent a year compounded.

Income elasticities for cereals by countries were largely derived from the FAO study, Agricultural Commodity Projections, 1970-1980,[2/] adjusted for high and low income growth assumptions. In some cases, elasticities were modified, downward for countries anticipated to expand economies rapidly and upward for those with negative elasticities where consumption was clearly outrunning population growth.

Conventional methods of projection were employed. That is, cereal production was projected to 1985/86 from the historical trend of the past 15 years (FAO projected the trend from a 1969-71 base). As is customary in studies of this nature, the demand projections are based on historical price patterns and relationships. Human consumption was projected from the trend value for 1974/75 on the basis of population growth and the alternative assumptions of growth rates of per capita income X income elasticities for cereals. Feed use for countries for which data are available was projected from trend for the full historical period for Non-OPEC countries and for 1971-74 for OPEC countries to give weight to their recent circumstance.

---

* See Annex 2 for detailed description of data and methods.

2/ Volume II, FAO, Rome, 1971.

However, the trend rates for growth in feed use were subject to a constraint related to the projected income growth rates. Feed use was not calculated separately for countries with less than $200 GNP per capita since such use is generally negligible and data are usually unavailable.

Reconciliation of Net Deficits 1985, WFC (FAO) and IFPRI

Despite differences noted above in basic source data, base periods and income growth assumptions, the total net cereal deficits projected by both studies are actually very close. This is largely due to the major role of population growth in determining projected levels of consumption.

To reconcile the two projections, the following major adjustments are in order:

1. FAO data on rice are in terms of paddy whereas the IFPRI data are in milled rice equivalents, roughly two-thirds of paddy weight.

2. FAO projected to the calendar year 1985 whereas IFPRI projections are for the crop-year 1985/86, approximately 6 months later in time. IFPRI projections indicate that deficits will be increasing about five million tons a year by 1985.

3. IFPRI includes pulses in food grains in India, as is the practice of the Indian government. Inasmuch as the trend of production of pulses has not kept pace with population and income growth, the India deficit would be larger under the IFPRI projection than in the WFC/FAO projections.

4. The deficit for the Republic of China (Taiwan) is included under IFPRI among Asian developing market economies whereas FAO includes it as part of the People's Republic of China in category Asian Centrally Planned Economies.

WFC/FAO net cereal deficit	85 million tons
Adj. to milled rice	-13 million tons
TOTAL	72 million tons

IFPRI net cereal deficit	82.6 million tons
Adj. to calendar year	- 2.5 million tons
Adj. for India pulses	- 1.0 million tons
Adj. for Taiwan	- 6.5 million tons
TOTAL	72.6 million tons

A margin so small is negligible, considering that the deficit itself is a residual of two large numbers and thus subject to wide variations.

Root Crops in Relation to Cereal Deficits

In a number of countries, root crops make up an important part of the diet and are a competitive source of calories with cereals. In a band of countries across the center of Africa stretching along the west coast from Guinea on the north to Angola on the south, and eastward through Zaire and Tanzania, cassava, yams, and sweet potatoes provide about as much calories as cereals. In Latin America, a band from Brazil to the west coast, cassava, potatoes, and plantain provide half as much calories as cereals. In Indonesia, cassava provodes one-third as much.3/ Thus, future trends related to root crops affect cereal requirements.

Wide discrepancies are apparent between the production estimates of root crops of FAO and those published by U.S.D.A. The latter, expressed in terms of wheat equivalent in calories, have been used in this report partly to be consistent with the data on cereals, but also because otherwise a significant reduction in per capita calorie intake is implied in some countries which would seem to be contrary to other indications.

Under the assumptions that the production trend of the past decade will continue and that per capita consumption of root crops in 1969-71 will, on average, remain the same (i.e., zero income elasticity), rough calculations have been made as to the increase or reduction that would be involved in the cereal deficit in 1985/86. The assumption implies that increases in per capita income will be reflected more in demand for cereals with their higher energy and protein content rather than for root crops. Thus, in countries where production of root crops is not keeping up with population growth, the cereal deficit is increased and where production of root crops is rising faster, the deficit is decreased.

Sub-Sahara Africa	
Nigeria	1.1 million tons decrease in cereal deficit
Other Low Income Countries	0.4 million tons decrease in cereal deficit
High Income Countries	0.5 million tons decrease in cereal deficit
Latin America	
Brazil	2.0 million tons increase in cereal surplus
Ecuador	0.1 million tons decrease in cereal deficit
Other Latin America	0.2 million tons increase in cereal deficit
Asia	
Indonesia	0.9 million tons increase in cereal deficit

In total, this would not effect the total gross deficit. The surplus in Brazil would be reflected in larger exports of cereals. The cereal deficit for Nigeria would be reduced by more than a million tons, whereas that for Indonesia would be increased by almost the same amount.

3/ Based on country data in Food Balance Sheets, 1964-66, FAO, Rome, 1971.

The Production Record, 1960-74

Projections of cereal production are extensions of trend calculated from the historical experience 1960-74. This is the conventional procedure, the same as that followed in the FAO projections. However, there remains some question as to whether the advent of the "green revolution" occasioned an upward shift in trend of cereal production in the more recent period.

A comparison of the trend rates for 1960-74 and for the last half of that period, 1967-74 (table 1), suggests this is not the case. For DME countries combined, the longer-term trend of 2.50 percent per year is reduced to 1.69 percent in the more recent period. Reductions occur in all regions and in 18 of the 23 IFPRI country/country groups. While the production trends for 1967-74 cover too short a period and are subject to too much variation from intermittent bad weather to be considered valid for statistical projection, the pervasiveness of the recent experience suggests that many countries may have considerable difficulty in maintaining long-term production trend growth rates in the future, unless actions are taken to spur production.

The possibility that the cereal production trend is slowing in most of the developing world is a matter which requires close attention and study.

The production performance of the individual grains in major regions is shown in table 2. In Asia, wheat production has shown strong growth, the most visible evidence of the "green revolution." Nevertheless, growth rates for rice and other small grains, which are by far more important in production and consumption, are lagging considerably behind population increases. This is particularly the case in India and Bangladesh. Furthermore, all cereals, except wheat in Asia, show slower growth rates in 1967-74 than in 1960-74. If the 1967-74 production rate were to prevail, cereal production in DME countries would be almost 100 million tons smaller than at the 1960-74 rate, and the projected cereal deficit would be doubled, i.e., about200 million tons.

In the North Africa/Middle East region, performance of wheat and rice during 1960-74 has been creditable but production of coarse grains, which accounts for 40 percent of regional cereal production, lags.

In Sub-Saharan Africa, both millets and coarse grains, which are the dominant cereals, show production rates much below population growth.

In Latin America, production of coarse grains (maize), the major staple, has increasedquite rapidly, as has rice, but wheat production has not.

For all DME countries combined, the 1960-74 production growth rates for rice, millets and coarse grains which together account for some three-fourths of DME cereal production, fail to come up to the population growth rate projected for the next decade.

TABLE 1

GROWTH RATES: POPULATION AND CEREAL PRODUCTION
(Percent Per Annum Compounded)

Country/Region	Population 1975-85	Cereal Production		
		1967-74	1960-74*	Required to Meet Deficit by 1985/86**
Asia High Income	2.31	.99	2.20	11.31
Asia Low Income:				
India	2.46	1.96	2.59	3.32
Bangladesh	2.88	.41	1.21	4.47
Pakistan	3.26	4.92	5.47	3.91***
Indonesia	2.56	4.11	2.74	5.78
Philippines	3.17	3.07	3.63	5.38
Thailand	3.20	3.69	3.71	.65***
Other Asia	2.30	.97	1.23	2.60
Total Asia Low Income	2.63	2.01	2.44	3.54
TOTAL ASIA	2.61	1.95	2.42	4.16
N.Africa/Mid.East OPEC	3.28	-.98	2.00	7.91
N.Africa/Mid.East Non-OPEC:				
Egypt	2.31	1.92	2.54	5.68
Turkey	2.63	-.69	1.62	2.70
N.Africa/Mid.East High Inc.	3.10	6.69	4.17	6.37
N.Africa/Mid.East Low Inc.	2.99	.76	1.43	3.89
Total N.Af./Mid.East Non-OPEC	2.77	1.46	2.23	4.36
TOTAL N.AFRICA/MID. EAST	2.93	.90	2.18	5.26
Nigeria	2.99	.58	-0.09	6.82
Sub-Sahara High Income	2.76	1.86	2.76	4.46
Sub-Sahara Low Income	2.82	-.33	1.85	3.56
TOTAL SUB-SAHARA	2.88	.32	1.54	4.55
Mexico	3.41	.53	4.32	5.25
Other Mid.American/Caribbean	2.65	2.32	2.69	9.43
Argentina	1.21	2.67	3.28	.98***
Brazil	2.82	3.15	3.94	3.71***
Venezuela	2.93	-2.85	3.20	16.52
Ecuador	3.17	-4.43	.69	11.31
Other Latin America	2.70	2.03	1.87	6.64
TOTAL LATIN AMERICA	2.79	2.23	3.48	3.57
TOTAL DEVELOPING MKT. ECON.	2.71	1.69	2.50	4.25

* Used for projecting production to 1985/86.
** Rate required from 1974 trend value of production to meet 1985/86 high consumption.
*** Exporting country in 1985/86.

TABLE 2

Production Growth Rates for Cereals,
Developing Market Economies, by Regions
(percent per annum)

Region	1960/74				
	Rice	Wheat	Coarse Grains	Millets	All Cereals
Asia	1.98 (1.70)	6.89 (8.23)	1.47 (-0.19)	1.65 (-1.17)	2.42 (1.95)
North Africa/ Middle East	3.36 (-0.93)	2.82 (1.97)	1.23 (-0.08)	0.28 (-5.38)	2.18 (0.90)
Sub-Sahara Africa	3.49 (1.53)	3.57 (0.99)	1.50 (0.64)	0.78 (-0.73)	1.54 (0.32)
Latin America	3.30 (2.30)	1.28 (0.80)	4.17 (2.60)	- -	3.49 (2.23)
TOTAL DME	2.20 (1.67)	4.12 (4.26)	2.50 (1.11)	1.21 (-0.93)	2.50 (1.69)

*Figures in parenthesis are rates for 1967/74

Distribution of Cereal Production, 1974/75
(Percentage)

Region	Rice	Wheat	Coarse Grains	Millets	All Cereals
Asia	59	18	18	5	100
N. Afr/Mid East	6	53	40	1	100
Sub-Sahara Afr.	10	3	56	31	100
Latin America	12	19	69	-	100
TOTAL DME	36	22	36	6	100

The series of charts in this report shows the considerable variability of production in relation to its trend, usually a result of weather factors.

As can be seen from the regional experience (figures 5-9), cereal production during 1967-71 was generally above trend whereas production in 1972-74 was mostly below.

The relative position of production, which was also reflected in consumption to a considerable extent, in recent years is summarized in table 3.

Table 3

Deviations in Cereal Production in Relation to Trend
1969-71, 1974/75, and Prel. 1975/76
(million tons)

Region	1969-71	1974/75	Prel. 1975/76
Asia	+ 7.6	- 7.5	+ 7.0
North Africa/Middle East	+ 0.4	- 0.8	- 0.1
Sub-Sahara Africa	+ 1.3	- 0.8	+ 0.2
Latin America	+ 1.8	- 6.0	- 2.5
TOTAL	+11.2	-15.1	+ 4.6

The crop-year 1975/76 was a very good year in terms of weather and growing conditions in Asia, notably in India, Bangladesh, and Indonesia. Production in Asia was almost 4 percent above trend. On the other hand, Latin America was almost 3½ percent below trend. Total production in all DME countries, which was 3.7 percent above trend in 1969-71 and 4.5 percent below trend in 1974/75, appears to be only 1.3 percent above trend based on preliminary figures for 1975/76. Some magnitudes of possible deviations from trend in relation to the 1985 projection are indicated in the following section.

Potential Cereal Deficits of DME Countries 1985/86

The Global View

Taking all IFPRI Countries/Country Groups together, the projections yield the following deficits:

Table 4

DME Countries: Gross and Net Cereal Deficits
(million tons)

	Actual Average 1969-71	Actual 1974/75	Projected 1985/86	
			High Income	Low Income
Gross deficit * (food deficit countries only)	28.2	44.8	108.3	94.5
Net deficit (deficits-surpluses)	16.7	33.4	82.6	65.5

In 1970, the DME group contained 1.7 billion persons, of whom 1.5 billion were in food-deficit countries. By 1985, projected population would be 2.5 billion, of whom 2.2 billion would be in food deficit countries.

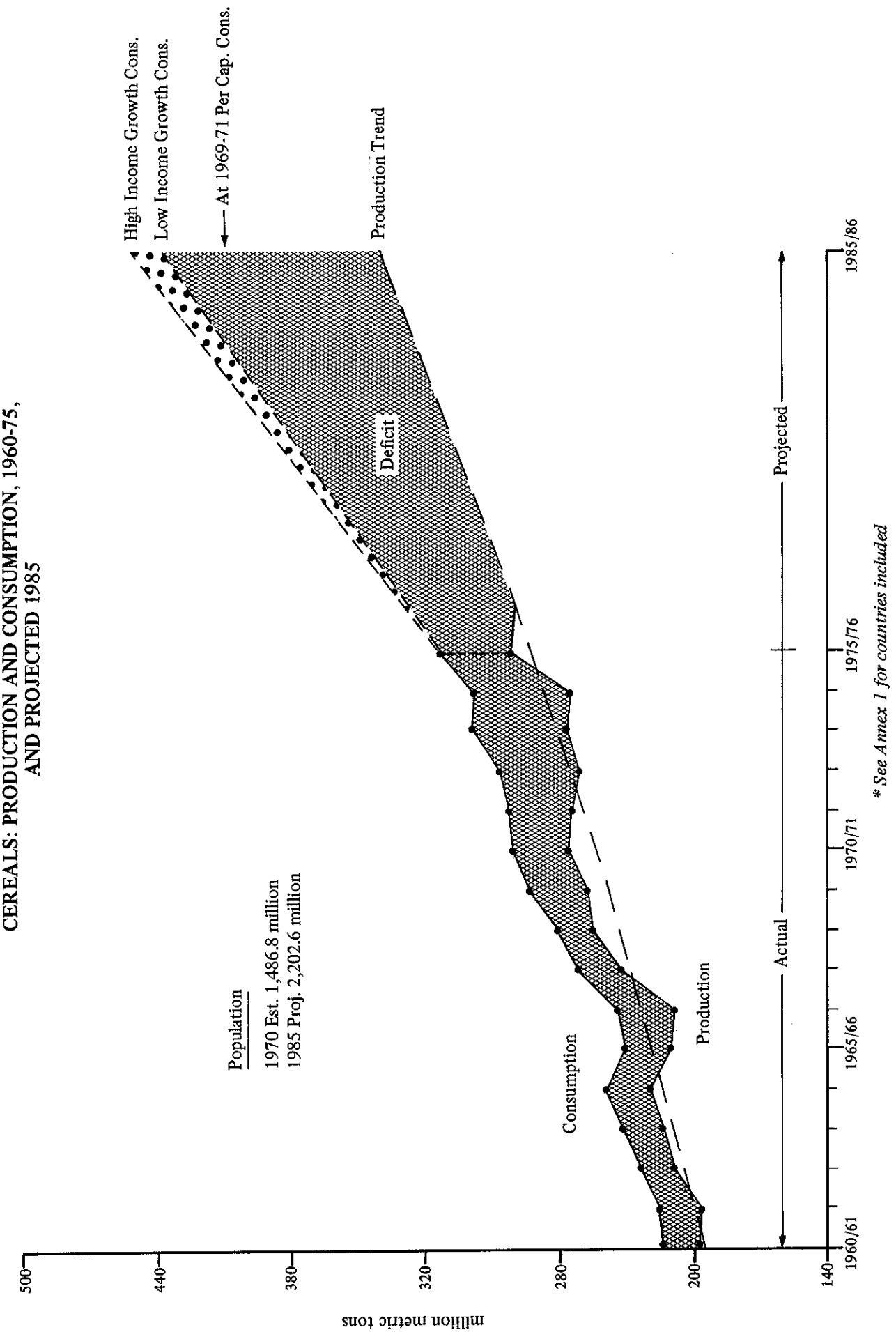
As shown in figure 1, these figures point in the direction of a persistent widening gap between prospective food demand and food production, if the past production trend is repeated.

On a gross basis, the combined deficit of food-short countries by 1985/86 would run 2-2½ times larger than in 1974/75, which was characterized by poor crops, and 3½-4 times larger than the average of 1969-71, when grain harvests and grain consumption were generally quite favorable and above trend.

For food-deficit countries, the projections for 1985/86 yield an increase in production from 1969-71 of only about half of the increase in consumption. Of the projected increase in high income consumption, 80 percent comes from population growth, 12 percent reflected the additional demand from the low income growth assumption, and 8 percent from the added impetus to demand from high income growth assumptions. It should also be noted that projected production by 1985 would fall some 70 million tons short of providing the 1969-71 average level of per capita consumption for the larger population by 1985. In that earlier period, a majority of DME countries had average consumption levels deficient in calories.

* Some IFPRI country groups which are treated en bloc include some grain exporters. Thus, the figures of gross deficit are somewhat understated. The adjustment to exclude all exporting countries would increase the deficit by about 1.3 million tons in 1969-71, 1.4 million tons in 1974/75, and 1.4 million tons under the high income assumption and 1.5 million tons under the low income assumption in 1985/86.

FIGURE 1
ALL FOOD DEFICIT DEVELOPING MARKET ECONOMIES*
CEREALS: PRODUCTION AND CONSUMPTION, 1960-75, AND PROJECTED 1985



** See Annex 1 for countries included*

Deficits Associated with Income Group Categories

Classifying the countries projected to be food-deficit in 1985 according to income groups provides some insight as to the burden of potential food deficits and the capacity of those countries to cope with them.

Table 5

Gross Cereal Deficits by Income Groups
(million tons)

Country Categories	1969-71 Ave.	1974/75 Ave.	Projected 1985/86 High Income Growth	Projected 1985/86 Low Income Growth	Increase from 1969-71 High Income Growth	Increase from 1969-71 Low Income Growth
Low Income	5.4 *	12.6 *	48.0	41.9	42.6	36.5
Middle Income	10.9	17.1	25.2	22.9	14.6	12.0
High Income	9.3	13.0	34.8	29.7	25.5	20.4
TOTAL	25.6 *	42.7 *	108.3	94.5	82.7	68.9

* Does not include deficits for Pakistan and Brazil which are projected to become exporters by 1985.

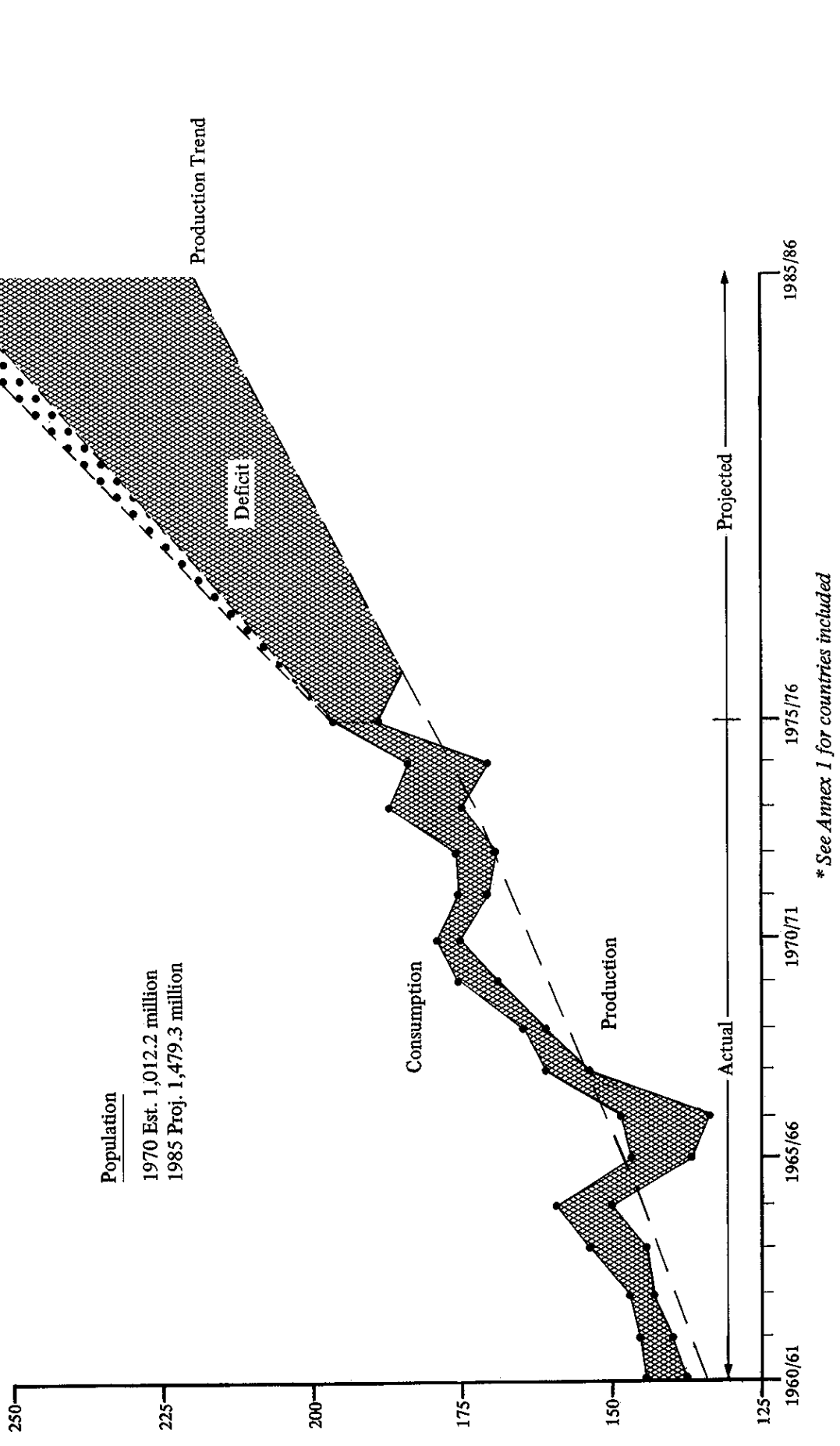
Low income countries are those with per capita incomes of less than $200 in 1972.[1] As shown in Annex 1, Table 1, these include the South Asian countries, Indonesia, a few in North Africa/Middle East, Nigeria, and a large number of Sub-Saharan countries. They encompass close to 60 percent of the total population in DME countries. In most, agriculture is the dominant sector of the economy, but food production is particularly subject to weather and other uncertainties and does not keep pace with food needs. Being poor and underfed, the income elasticity for cereals is high but income growth is relatively slow, Inasmuch as the oil price situation has affected the oil importing countries most severely, economic growth may well lag further in the decade ahead dampening demand for food, with the consequence that any improvement in diets is likely to be little, if at all. More than half of the total increase in deficit from 1969-71 to 1985/86 accrues to this group of countries. In the event of their failure to compensate with increased production, this group would have difficulty in importing supplies commercially and would need to look to a large measure of food aid. Further, as shown in figure 2, large variations in production do occur in these countries.[2] Taking the largest percentage deviations from trend that occurred during 1960-74, production in 1985 could range from plus 16 million tons to minus 24 million tons relative to trend, affecting consumption and/or deficit accordingly.

1/ Based on data in World Bank Atlas, Washington, 1974.
2/ Note the differences in scale charted for the various income categories and regions in making visual comparisons among them.

FIGURE 2

LOW INCOME FOOD DEFICIT DEVELOPING MARKET ECONOMIES*

CEREALS: PRODUCTION AND CONSUMPTION, 1960-75, AND PROJECTED 1985



** See Annex 1 for countries included*

Most countries in this group had average diets in 1970 significantly deficient in energy (calories) and quite likely they contained the large part of the underfed population in the developing world. Even if consumption of cereals attained projected levels in 1985, per capita consumption of cereals would be improved only by two percent under the low income assumption and by 4 percent under the high assumption.

At the other extreme is the high income group (high capacity to earn foreign exchange) which includes the North Africa/Middle East OPEC nations, Venezuela, and the high economic growth countries of Asia, such as Taiwan, South Korea, Malaysia, Singapore, and Hong Kong. Together, they contain some 8 percent of the population in DME countries. Most have limited agricultural resources domestically to meet rapidly rising demand for cereals, including feed grains. The impetus to economic growth comes largely from the non-agricultural sector. About 30 percent of the total increase in deficit projected occurs in this group. Their needs would likely be reflected in commercial imports since they have ability to generate foreign exchange. Considering the largest deviations in production from trend since 1960, production in 1985 could range from trend by plus 3 million tons to minus 2½ million tons, most likely reflected in compensating adjustments in imports.

At projected consumption levels for 1985, per capita consumption of cereals would be increased by 29 percent under the low income assumption and 41 percent under the high. Most of it would reflect increased use for feed. (See figure 3.)

In between in characteristics is the middle income group which encompasses the rest of the food deficit countries, the Philippines, Egypt, Turkey, most non-OPEC countries of North Africa/Middle East, the better-off Sub-Saharan countries and the Latin American deficit countries. Some 20 percent of DME population fall in this group which would account for about 18 percent of the increase in cereal deficit. Some may well represent commercial import markets; others may need some measure of food aid to overcome potential deficits. Again, variations in production could bring a range in 1985 production from plus 6 million tons to minus 9 million tons.

At projected consumption levels for the middle income group, average per capita consumption would rise 5 percent under the low income situation and 8 percent under the high assumption. (See figure 4.)

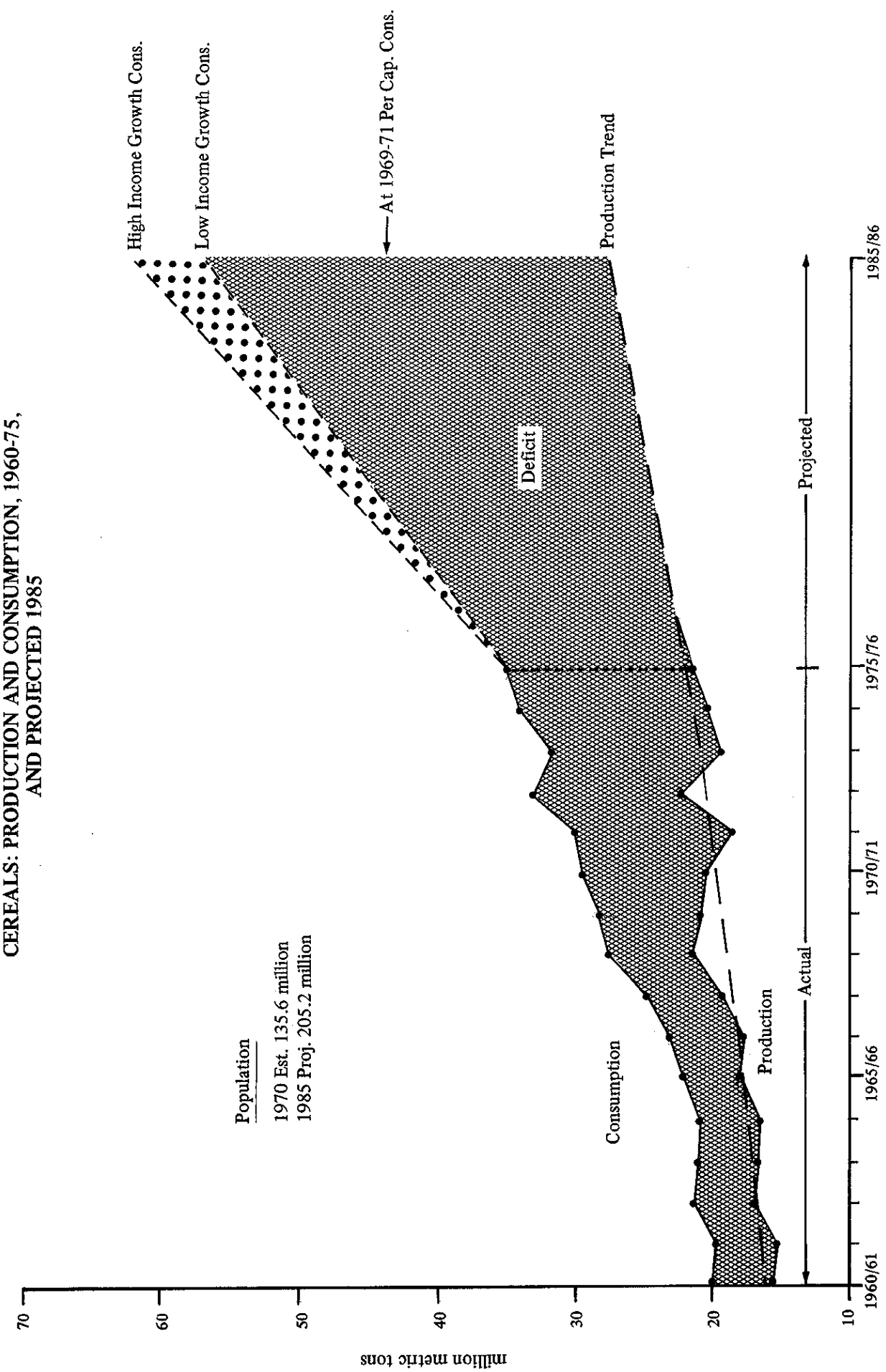
A significant point is that a substantial part of the total deficit, perhaps 40 - 50 percent, can be, and likely should be, met through regular commercial dealings which draw on supplies from exporting countries.

In this connection, the surpluses of developing export countries--Argentina, Thailand, and probably Pakistan and Brazil, which are expected to become exporters within the next 10 years--are projected to increase to about 26 - 29 million tons, roughly one-fourth

FIGURE 3

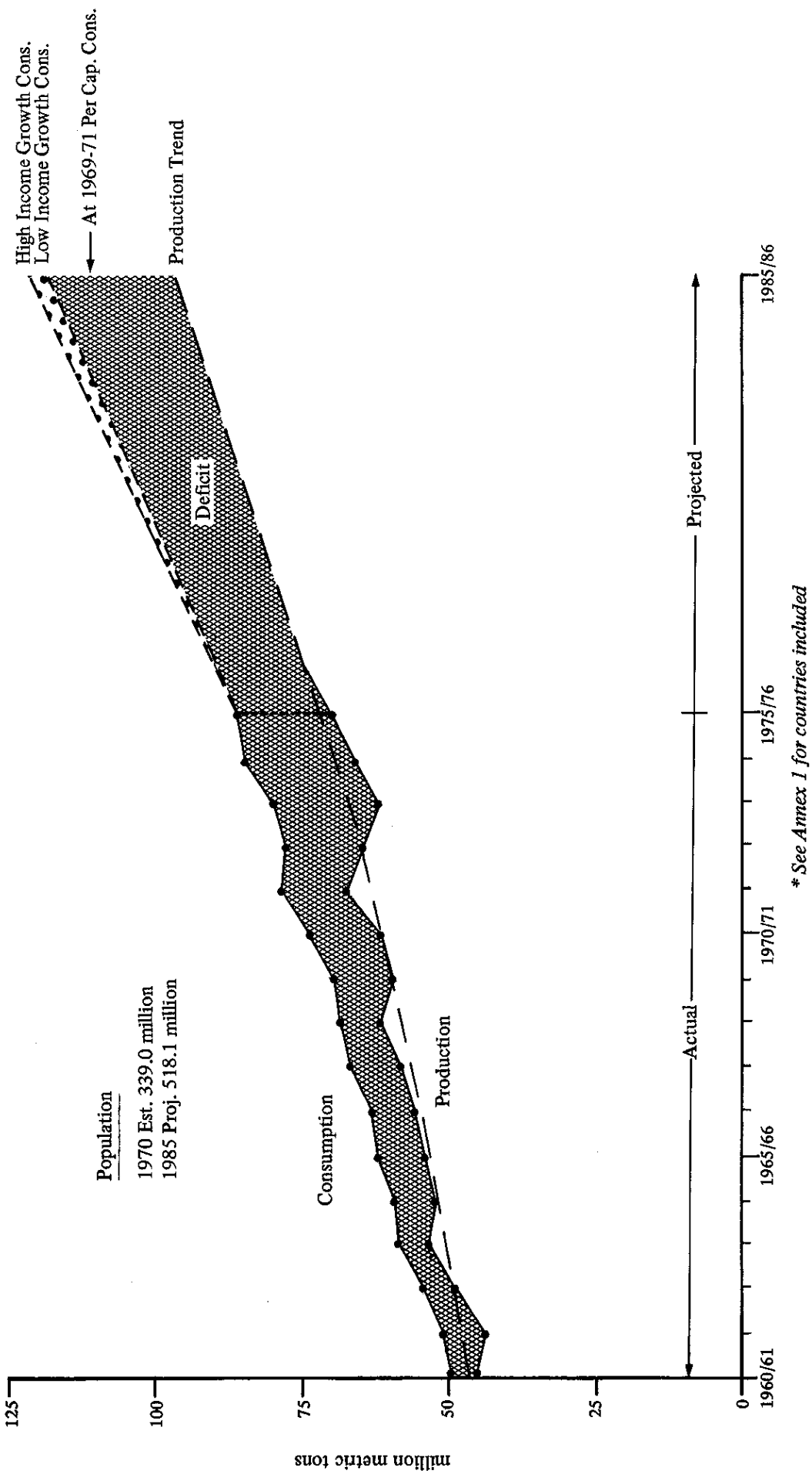
HIGH INCOME FOOD DEFICIT DEVELOPING MARKET ECONOMIES*

CEREALS: PRODUCTION AND CONSUMPTION, 1960-75, AND PROJECTED 1985



** See Annex 1 for countries included*

FIGURE 4
MIDDLE INCOME FOOD DEFICIT DEVELOPING MARKET ECONOMIES*
CEREALS: PRODUCTION AND CONSUMPTION, 1960-75, AND PROJECTED 1985

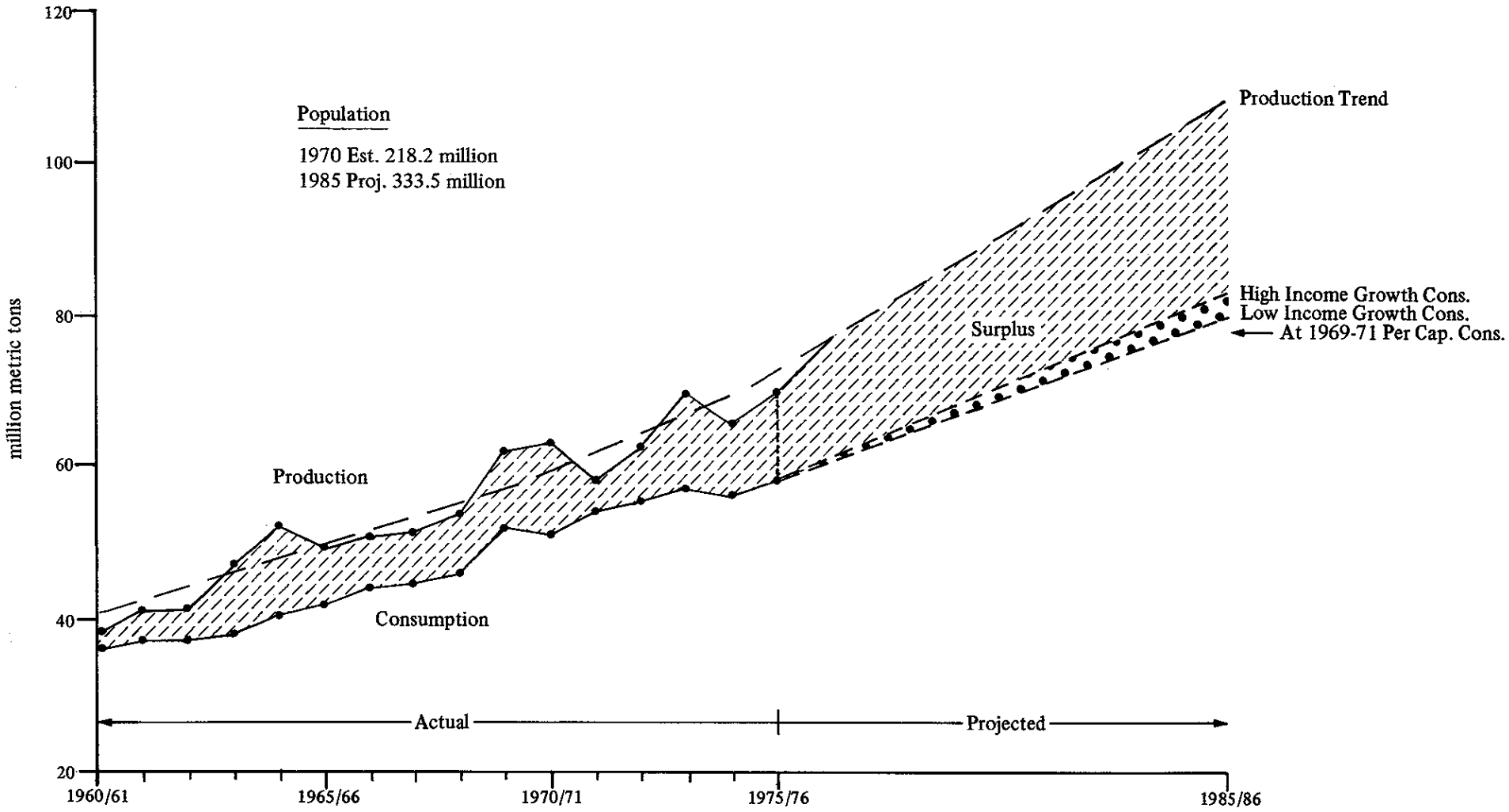


** See Annex 1 for countries included*

FIGURE 5

CEREAL EXPORTING DEVELOPING MARKET ECONOMIES*

CEREALS: PRODUCTION AND CONSUMPTION, 1960-75, AND PROJECTED 1985



** See Annex 2 for countries included*

of the combined deficit. Variations in production for 1985 could bring a range of plus 10 million tons to minus 6½ million tons, probably reflected in changes in export volume. It is likely that the bulk of export supplies in these countries would be available only on commercial terms. Some 13 percent of DME population lives in these countries. (See figure 5.)

The real core of the food deficit problem is in the projected deficits of the low income deficit group, where needs, which more than doubled between 1969-71 and 1974/75, may increase further by three or four fold in the next decade.

The cost of filling deficits by imports in 1985 by the low income group would appear to be beyond their prospective foreign exchange earnings. In this circumstance, a massive increase in food aid would be required just to maintain per capita consumption at recent unsatisfactory levels. The better alternative, and probably much less costly, would be to help these countries improve their own production to meet their food needs. But this, too, would be a large order. It would require raising their cereal production performance from the long-term average of 2.0 percent a year to almost 4 percent during the next decade. Realistically food production in these countries is not likely to increase rapidly enough in the next decade to meet their growing demands, much less overcome the serious nutritional deficiencies of large portions of their populations. Even with production increasing more rapidly than in the past, there would likely be a continuing need for food transfers, though possibly on a diminishing scale.

The Regional View

Table 6 summarizes the regional impact of cereal deficits. While gross deficits increase in all regions, there is a significant shift in relative positions. Asia accounts for about 50 percent of the total projected for 1985/86 compared with 40 percent in recent times. Sub-Sahara Africa's share increases from 5 to 15 percent. Latin America's share declines by half, from 28 to 14 percent, while that of North Africa/Middle East goes from 27 to 23 percent.

Considering the availability of supplies from exporting countries in the region, Latin America alone is projected to be self-sufficient and possibly in a net export position, largely as a result of Argentina's traditional surplus.

For Asia, as a region, to meet its food needs from regional production by 1985, the production growth rate, which has lagged behind population growth, would need to rise from 2.4 percent annually to 4.2 percent. The increase required may be even greater if the 2.0 percent average increase recorded in 1967-74 continues.

For North Africa/Middle East, production also has lagged behind population, and would require an increase from 2.2 percent a year to

TABLE 6

REGIONAL CEREAL DEFICITS
(million tons)

Region	Gross Deficit[1/]			
	Actual Ave. 1969-71	Actual 1974/75	Projected 1985/86	
			High Income	Low Income
Asia	11.5	18.3	54.8	46.3
North Africa/Middle East	7.9	12.0	22.5	21.4
Sub-Sahara Africa	1.5	2.1	14.9	13.7
Latin America	7.3	12.4	16.1	13.2
TOTAL	28.2	44.8	108.3	94.5

Region	Net Deficit[2/]			
	Actual Ave. 1969-71	Actual 1974/75	Projected 1985/86	
			High Income	Low Income
Asia	8.3	15.1	45.9	36.8
North Africa/Middle East	7.9	12.0	22.5	21.4
Sub-Sahara Africa	1.5	2.1	14.9	13.7
Latin America	(1.0)	4.2	(0.7)	(6.4)
TOTAL	16.7	33.4	82.6	65.5

Note: Parenthesis indicates surplus.
1/ Sum of food deficit countries.
2/ Gross deficits minus surpluses of exporting countries in the region.

5.3 percent. Again, the more recent growth rate shows a drastic drop to 0.9 percent.

Sub-Sahara Africa's production record of 1.5 percent per year would need to rise to 4.5 percent. The more recent performance has shown only 0.3 percent rise per year.

Latin America, considering the region as a whole, with a high growth rate of 3.5 percent, significantly above population growth, would not need to accelerate production, unless the drop to 2.2 percent recorded for 1967-74 continues.

Asia
(See figure 6 and table 7A)

High Income Group: These countries are consistently high foreign exchange earners and increasingly urban in character. They presently import about 40 percent of their cereal consumption, which rises rapidly especially for feed. By 1985 commercial imports may well account for 55 - 60 percent of consumption, rising from less than six million tons average in 1969-71 to the range of 17 - 20 million tons according to low and high income growth assumptions. Taiwan and South Korea would account for 75 - 80 percent of the total cereal deficit.

India: With over half of the people in Asia DME countries, India could incur a deficit of 14 - 17 million tons by 1985 if historical production trends prevail in the future. Even if India should be able to bring in 17 million tons, it would barely suffice to make cereal availability per capita equal to that of 1969-71 which was a relatively favorable production period. At that time, moreover, average per capita calorie intake was significantly below minimum adequate standards, with India accounting for perhaps half of the underfed in all DME countries. Their numbers of underfed would likely increase substantially by 1985 even if the deficit is met.

For India to meet the deficit by its own production would require accelerating its rate from 2.6 percent (1960-74 average) to 3.3 percent (see table 1). This may be even more difficult since the more recent rate (1967-74) indicates some slackening.

Bangladesh: The position of Bangladesh is even more difficult than India's, with again a large part of the population ill-fed. The trend of production (1960-74) increases at 1.2 percent per year, whereas the rate of population growth to 1985 increases 2.9 percent. Production increases have been negligible (0.4 percent) in the 1967-74 period. For Bangladesh to meet its deficit from internal production would require a rate of 4.5 percent a year which hardly seems a likely achievement on a sustained basis even under the best of circumstances. The potential deficit by 1985 of 5-5½ million tons, even if met, would still leave an increasing number with inadequate calorie intake.

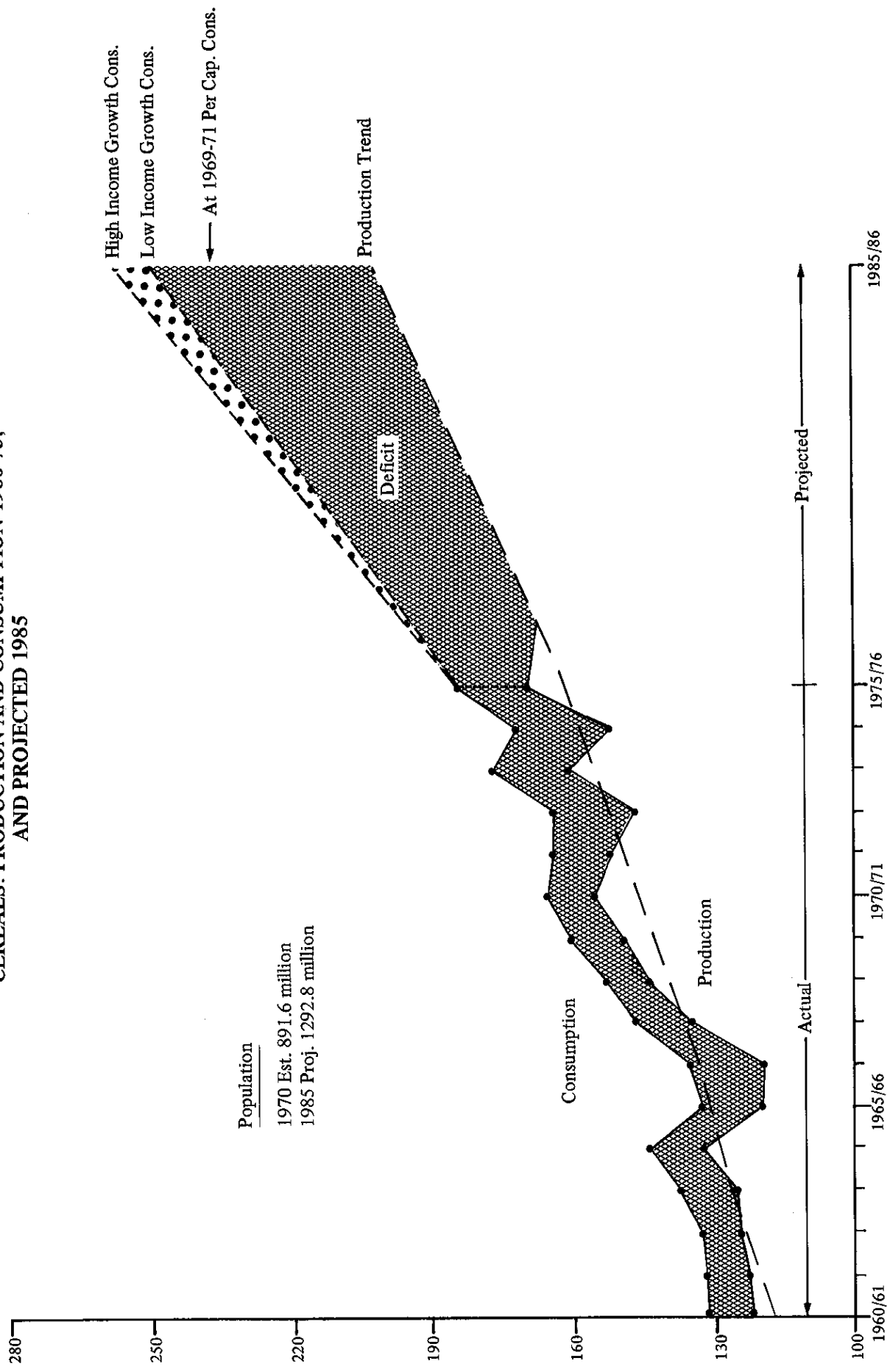
Pakistan: While this country has been an importer for some years, it is projected to become an exporter of 3½-4 million tons by 1985. Its historical production rate (5.5 percent annually) substantially exceeds its relatively high population growth. Even though production increases have slowed in the recent periods, they are still close to 5 percent.

Indonesia: As a recipient of oil revenues, Indonesia's economy might well be expected to grow more rapidly. With a high income elasticity for cereals, demand for cereals is expected to increase very substantially. Compared with its historical production rate, the deficit would increase from 1.3 million tons in 1969-71 to 6½-8½ million tons by 1985. To meet this from internal production

FIGURE 6

ASIA: FOOD DEFICIT DEVELOPING MARKET ECONOMIES*

CEREALS: PRODUCTION AND CONSUMPTION 1960-75, AND PROJECTED 1985



* *See Annex 1 for countries included*

TABLE 7-A

ASIA DEVELOPING MARKET ECONOMIES:
CEREAL PRODUCTION, CONSUMPTION, AND SURPLUS/DEFICIT
(million tons)

Country/Group	Actual 1969-71 Ave.			Actual 1974/75		
	Prod.	Cons.	S/D	Prod.	Cons.	S/D
Asia High Income Group	9.6	15.4	-5.8	9.9	16.7	-6.7
Asia Low Income Group:						
India*	101.7	104.0	-2.2	97.8	104.5	-6.7
Bangladesh	11.1	11.8	-0.7	11.5	13.8	-2.3
Pakistan	10.5	11.3	-0.8	11.6	11.9	-0.3
Indonesia	15.6	16.9	-1.3	18.6	19.7	-1.2
Philippines	5.4	6.1	-0.7	5.9	6.7	-0.8
Thailand	11.0	7.9	+3.2	12.3	9.1	+3.2
Other Asia	9.3	9.3	0.0	9.5	9.9	-0.3
Total Asia Low Income Group	164.8	167.3	(-5.7) (+3.2) -2.5	167.3	175.6	(-11.6) (+3.2) -8.3
TOTAL ASIA	174.4	182.7	(-11.5) (+3.2) -8.3	177.2	192.3	(-18.3) (+3.2) -15.1

Country/Group	Projected 1985/86						
	Prod.	Cons.			S/D		
		High Growth	Low Growth	At 1969-71 per cap	High Growth	Low Growth	At 1969-71 per cap
Asia High Income Group	13.1	33.5	29.9	21.8	-20.4	-16.8	-8.7
Asia Low Income Group:							
India*	133.5	150.3	147.8	149.8	-16.8	-14.2	-16.3
Bangladesh	13.1	18.6	18.4	17.2	-5.5	-5.3	-4.1
Pakistan	22.3	18.6	18.4	18.2	+3.7	+3.9	+4.1
Indonesia	23.3	31.9	30.0	24.8	-8.6	-6.7	-1.5
Philippines	8.7	10.5	10.3	9.9	-1.8	-1.5	-1.1
Thailand	18.4	13.1	12.8	12.7	+5.3	+5.6	+5.7
Other Asia	10.9	12.6	12.5	13.2	-1.7	-1.7	-2.3
Total Asia Low Income Grp.	230.2	255.7	250.2	245.8	(-34.4) (+9.0) -25.5	(-29.4) (+9.4) -20.0	(-25.4) (+9.8) -15.6
TOTAL ASIA	243.3	289.1	280.1	267.6	(-54.8) (+9.0) -45.9	(-46.2) (+9.4) -36.8	(-34.1) (+9.8) -24.3

Note: Parentheses sum deficits and surpluses separately. Net deficit or surplus shown without parentheses. Totals may not add due to rounding.

* India includes pulses.

would require an increased rate of production to 5.8 percent per year compared with the historical rate of 2.7 percent. It might be almost a million tons larger reflecting some lag in cassava production which provides one-third as much calories as cereals in the diet. On the other hand, the recent production trend of cereals has risen to 4.1 percent which, if carried forward, would largely eliminate the deficit.

Philippines: Domestic production of cereals has been about 12 percent short of consumption in recent periods. As a percentage, this is expected to narrow to about 8 percent by 1985, but the deficit will increase in amount from 1.2 - 1.3 million tons to 1.5 - 1.8 million, largely a reflection of demand for feed. In order to meet cereal demand from domestic production, the historical increase of 3.6 percent per year would need to be raised to 5.4 percent. Again, the recent rate (1967-74) has been somewhat reduced.

Thailand: A traditional exporter of rice and maize, with a fairly high production growth rate of 3.7 percent a year, which has also been well-maintained in recent years, Thai exports are projected to increase from some 3.2 million tons to 5.3 - 5.6 million tons annually by 1985.

Other Asia: This group was roughly in balance in 1969-71 as a result of surpluses in Burma and Nepal compensating for a deficit in Sri Lanka. By 1985, all three countries are projected to be in deficit by about 1.7 million tons. To meet this internally would require an increase in rate of production from 1.2 to 2.6 percent a year.

North Africa/Middle East
(see figure 7 and table 7-B)

OPEC: This regional group consists of commercial importers who presently produce about two-thirds of their cereal consumption. Production during 1960-74 grew at the annual rate of 2.0 percent; during the 1967-74 period, it declined on average by 1.0 percent a year. With high food demand, the food deficit (imports) is projected to increase from 2.6 million tons in 1969-71, 4.8 million tons in 1974/75 to about 11 million tons in 1985. This would bring an appreciable increase in per capita consumption.

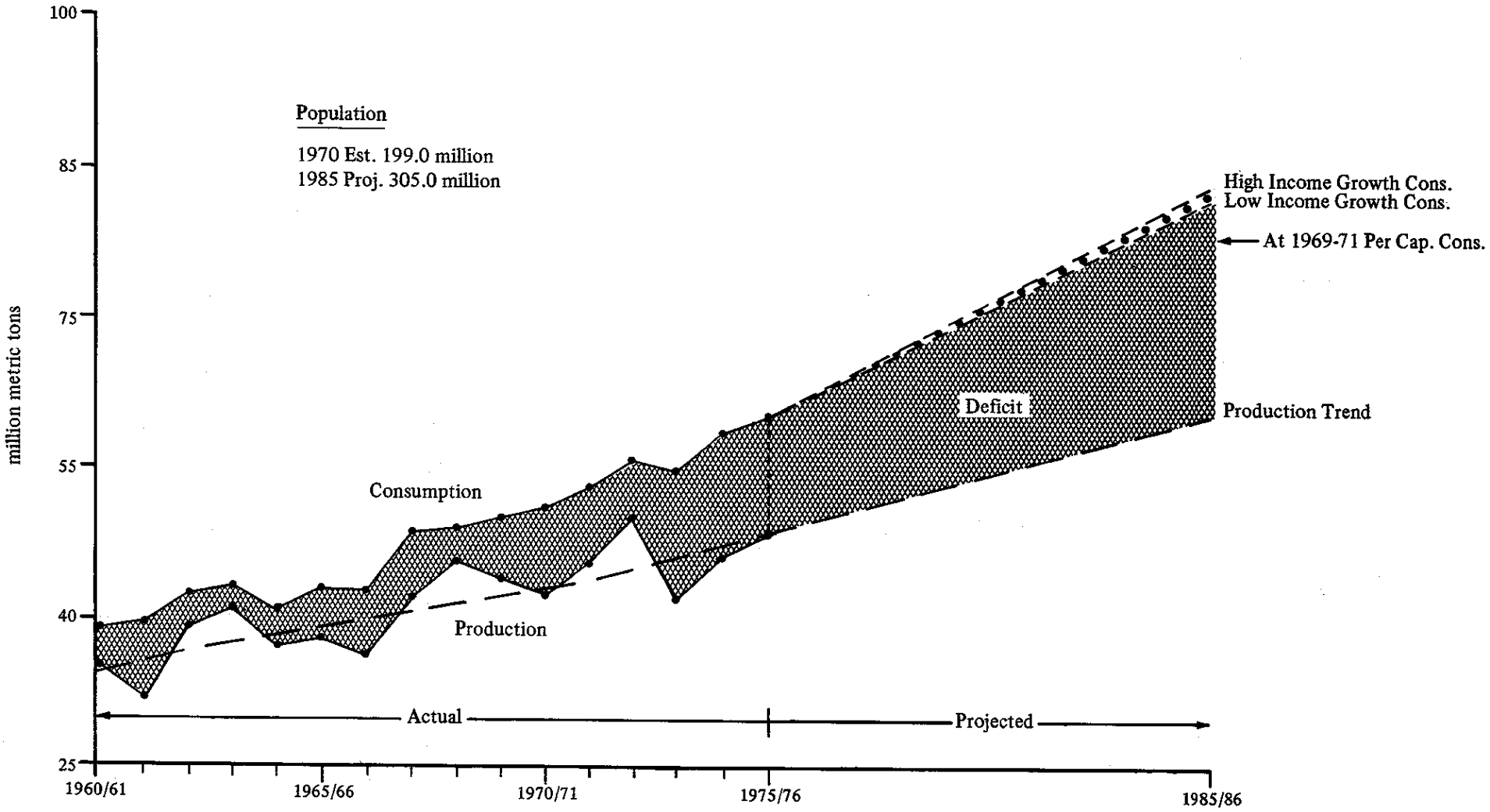
Egypt: This country is a consistent importer. In 1969-71 imports accounted for one-fourth of cereal consumption and in 1974/75 about one-third. The historical production growth rate of 2.5 percent would hold the deficit within this range, about 3½ million tons. Egypt also has shown some slowing in production in recent years. To meet food demand internally would require an annual increase of 5.7 percent.

Turkey: A slow rate of production growth (1.6 percent), which in recent years has turned negative, is bringing increasing import requirements. The cereal deficit by 1985 would rise to about 2 million

FIGURE 7

NO. AFRICA/MIDEAST: FOOD DEFICIT DEVELOPING MARKET ECONOMIES*

CEREALS: PRODUCTION AND CONSUMPTION 1960-75, AND PROJECTED 1985



* *See Annex 1 for countries included*

TABLE 7-B

NORTH AFRICA/MIDDLE EAST: GRAIN PRODUCTION, CONSUMPTION, SURPLUS/DEFICIT

(million tons)

Country/Group	Actual 1969-71 Ave.			Actual 1974/75		
	Prod.	Cons.	S/D	Prod.	Cons.	S/D
N.Afr./Mid. East OPEC	9.7	12.2	-2.6	10.0	14.8	-4.8
N.Afr./Mid. East Non-OPEC:						
Egypt	6.5	8.5	-2.0	7.1	10.6	-3.5
Turkey	15.2	15.6	-0.4	13.9	15.0	-1.1
Other High Income Grp.	5.9	8.3	-2.4	8.9	10.8	-2.0
Other Low Income Grp.	6.3	6.7	-0.4	6.6	7.2	-0.6
Total N.Afr./Mid. East Non-OPEC	33.9	39.2	-5.3	36.5	43.7	-7.2
TOTAL N.AFR./MID. EAST	43.6	51.4	-7.9	46.5	58.5	-12.0

Country/Group	Projected 1985/86						
	Prod.	Cons.			S/D		
		High Growth	Low Growth	At 1969-71 per cap	High Growth	Low Growth	At 1969-71 per cap
N.Afr./Mid.East OPEC	13.2	24.5	23.9	19.7	-11.4	-10.7	-6.5
N.Afr./Mid.East-Non-OPEC:							
Egypt	9.7	13.4	13.3	12.1	-3.6	-3.6	-2.4
Turkey	18.3	20.5	20.3	22.9	-2.2	-2.0	-4.6
Other High Inc.Grp.	11.7	14.6	14.4	13.0	-2.9	-2.7	-1.3
Other Low Inc.Grp.	7.8	10.2	10.1	10.4	-2.4	-2.3	-2.6
Total N.Afr./Mid.-East Non-OPEC	47.5	58.7	58.1	58.4	-11.2	-10.6	-10.9
TOTAL N.AFR./MID.EAST	60.7	83.2	82.0	78.0	-22.5	-21.4	-17.4

Note: Totals may not add due to rounding.

tons compared with one million in 1974/75 and an average of less than ½ million tons in 1969-71.

Non-OPEC High Income: Excluding OPEC countries, these include the band of North Africa along the Mediterranean from Lebanon to Morocco. Most are consistent cereal importers, but occasionally some export. They have a high production growth rate (4.2 percent) which would yield a deficit of somewhat less than 3 million tons by 1985 compared with 2½ million tons in 1969-71. However, the more recent production of 6.7 percent (1969-74), if maintained, could well make them self-sufficient as a group. The major deficit countries projected for 1985 are Lebanon and Syria.

Non-OPEC Low Income: The production growth rate of 1.4 percent is substantially below population growth. In recent years (1967-74) it has fallen by a half. The deficit is projected from about ½ million tons in recent years to approach 2½ million tons by 1985. It would require production increases of almost 4 percent annually to meet the deficit. Afghanistan and Sudan are the major countries involved.

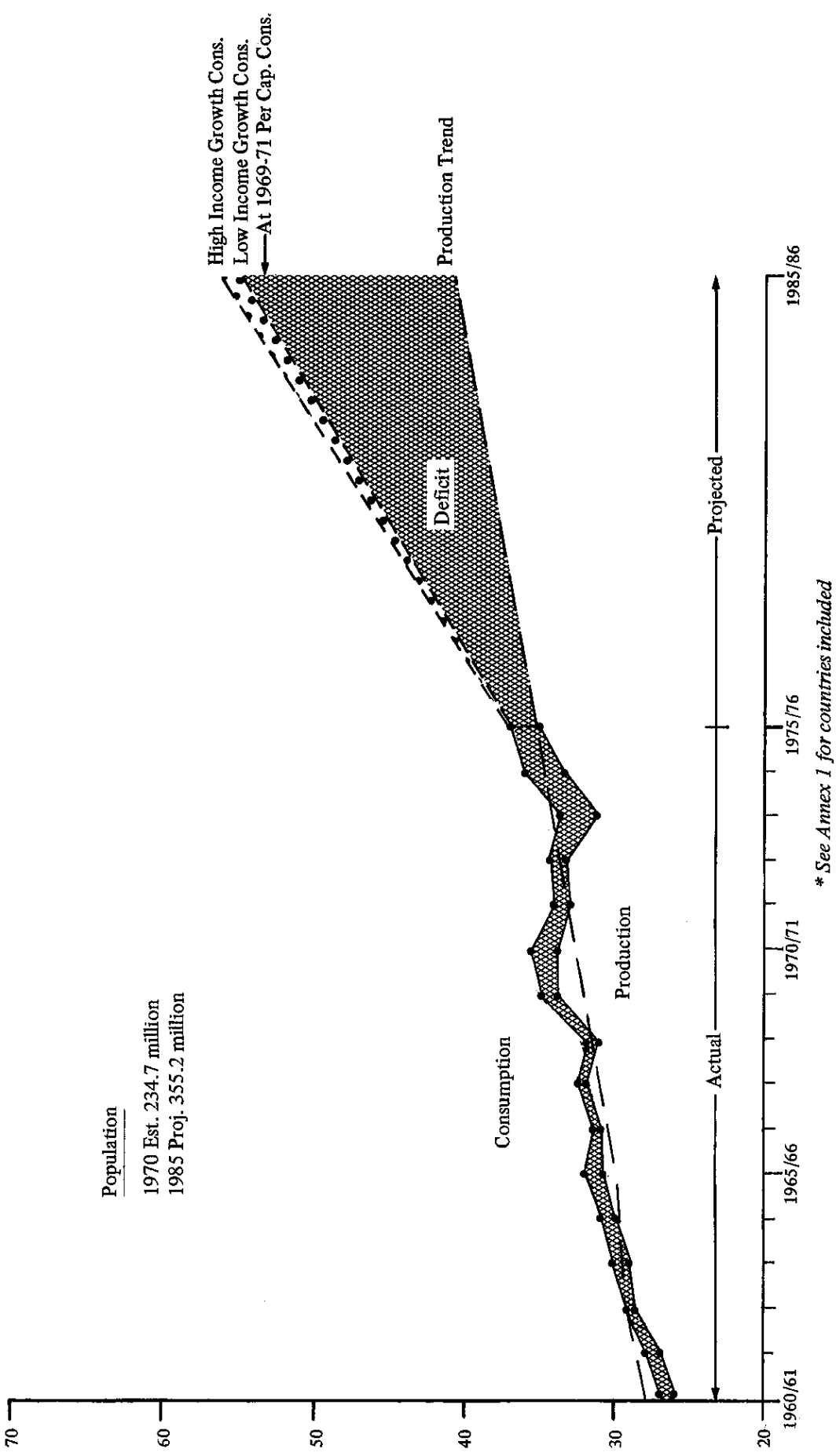
Sub-Sahara Africa
(see figure 8 and table 7-C)

Nigeria: The production record for cereals is slightly negative for 1960-74 (slightly positive for 1967-74). With relatively high income growth from oil revenues, a high income elasticity, and population growing at 3 percent a year, a large deficit of 7½ - 8 million tons of cereals is projected for 1985 compared with less than ½ million in recent years.

However, production of cassava and yams, which is a preferred food (and calorie substitute) in much of Nigeria increases somewhat faster than population and thus reduces the cereal deficit in 1985 by the equivalent of about one million tons. It may well be easier, particularly over the short-run, to increase production of root crops faster than cereals in order to meet food demand. However, since these root crops require much larger bulk to provide calories than do cereals, and are low in protein, demand may shift toward cereals, as has occurred in other countries. A cereal production growth rate of almost 7 percent annually would be required to meet food needs projected for 1985.

Sub-Sahara High Income: These countries, with per capita incomes over $200, are mostly in West Africa and, in many cases, are oriented toward plantation export crops. Cereal production increases about 2.8 percent a year (1.9 percent in 1967-74), a rate which will increase the deficit of less than one million tons in 1969-71 to about 2 million tons by 1985. A rate of 4.5 percent annually would be required to meet the cereal deficit. Taking root crops into account would reduce the deficit by ½ million tons. Senegal, Ivory Coast and Cameroon would likely account for a major part of the deficit. Depending on the terms

FIGURE 8
SUB-SAHARA AFRICA: FOOD DEFICIT DEVELOPING MARKET ECONOMIES*
CEREALS: PRODUCTION AND CONSUMPTION 1960-75
AND PROJECTED 1985



** See Annex 1 for countries included*

TABLE 7-C

SUB-SAHARA AFRICA: GRAIN PRODUCTION, CONSUMPTION, SURPLUS/DEFICIT
(million tons)

COUNTRY/GROUP	Actual 1969/71 Ave.			Actual 1974/75		
	Prod.	Cons.	S/D	Prod.	Cons.	S/D
Sub-Sahara Africa:						
Nigeria	8.4	8.7	-0.4	8.0	8.4	-0.3
Other High Income	6.6	7.4	-0.8	7.5	8.1	-0.6
Other Low Income	18.6	18.9	-0.3	18.2	19.4	-1.2
Total Sub-Sahara	33.5	35.0	-1.5	33.7	35.8	-2.1

COUNTRY/GROUP	Projected 1985/86						
	Prod.	Cons.			S/D		
		High Growth	Low Growth	At 1969/71 per cap	High Growth	Low Growth	At 1969/71 per cap
Sub-Sahara Africa:							
Nigeria	7.5	15.5	15.1	13.4	-8.1	-7.6	-6.0
Other High Income	10.0	12.0	11.9	11.1	-2.0	-2.0	-1.1
Other Low Income	24.0	28.8	28.1	28.5	-4.8	-4.1	-4.5
Total Sub-Sahara	41.4	56.3	55.1	53.0	-14.9	-13.7	-11.6

Note: Totals may not add due to rounding.

of trade for their exports, these countries could well be commercial importers.

Sub-Sahara Low Income: This large group of countries with less than $200 income per capita is mostly located in Central and East Africa. The production growth rate of 1.9 percent runs substantially below population growth. During 1967-74 it was slightly negative. The cereal deficit is projected to rise from less than half a million tons in 1969-71 and over one million in 1974/75 to 4 - 5 million tons by 1985. Even if the deficit is met, per capita consumption will hardly be improved over 1969-71 levels. To meet the deficit internally, a production growth rate of 3.6 percent a year would be required. Again, increasing production of root crops would reduce the cereal deficit by about ½ million tons. Tanzania and Ethiopia would likely incur the largest deficits in this group.

Latin America
(see figure 9 and table 7-D)

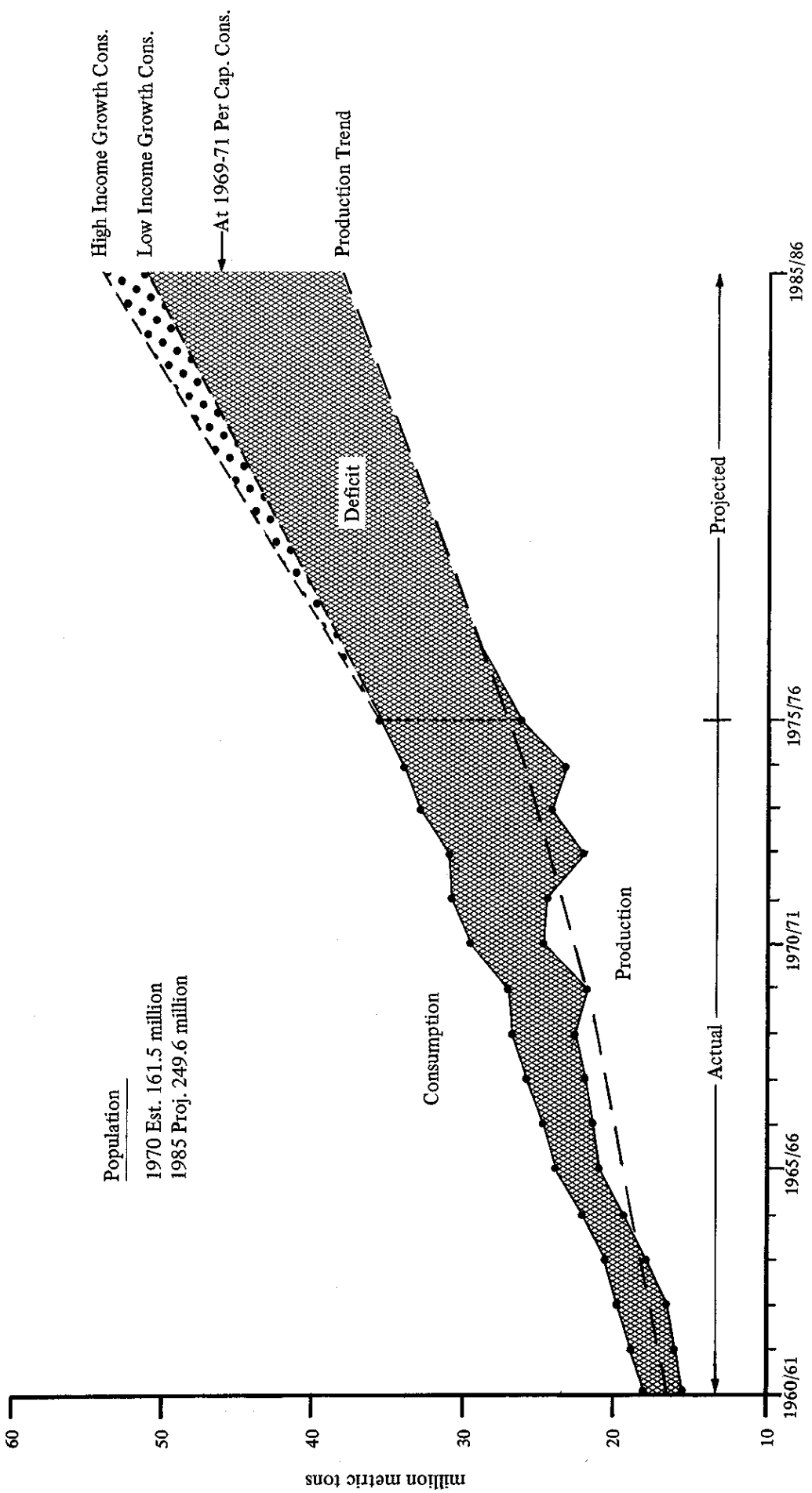
Mexico: The historical production growth rate has been among the highest in developing countries, 4.3 percent a year. Yet, with one of the highest population rates, 3.4 percent, and increasing demand, particularly for livestock feed, generated by income growth, Mexico is projected to continue to run a deficit of 1 - 2 million tons in 1985. To come to a cereal balance, the production rate would need to be raised to 5.2 percent. Again, this may be difficult to reach considering that more recently production has barely increased.

Other Mid-America/Caribbean: All the major countries in this group are cereal importers. In total, in recent years they have brought in about 45 percent of their consumption. With a production growth rate of 2.7 percent (roughly the same as population), the cereal deficit is projected to rise from 2½ - 3 million tons to 4 - 4½ million tons. This would be equivalent to almost half of their food needs in 1985. To make up the deficit internally would require a production rate of almost 9½ percent a year. The largest deficit would likely be incurred by Cuba.

Argentina: A large exporter of cereals, with production growth of 3.3 percent and population growth of only 1.2 percent, the exportable surplus is projected to double from about 8 million tons to 16 million tons by 1985.

Brazil: While Brazil has imported about 1.5 million tons of cereals in recent times, it is projected to export 1 - 3 million tons by 1985. It could export perhaps 2 million tons more if its increasing supply of root crops, which provide half as much calories in the diet as cereals, should substitute for cereal consumption internally. The historical production growth rate of 3.9 percent shows some reduction in the more recent period.

FIGURE 9
LATIN AMERICA: FOOD DEFICIT DEVELOPING MARKET ECONOMIES*
CEREALS: PRODUCTION AND CONSUMPTION 1960-75,
AND PROJECTED 1985



** See Annex 1 for countries included*

TABLE 7-D

LATIN AMERICA: GRAIN PRODUCTION, CONSUMPTION, SURPLUS/DEFICIT
(million tons)

COUNTRY/GROUP	Actual 1969/71 Ave.			Actual 1974/75		
	Prod.	Cons.	S/D	Prod.	Cons.	S/D
Latin America:						
Mexico	13.0	13.1	-0.1	12.3	15.9	-3.6
Other Middle Amer./Carib.	3.1	5.5	-2.4	3.2	6.1	-2.9
Argentina	19.3	11.1	+8.2	19.4	11.5	+7.8
Brazil	21.0	22.7	-1.7	22.6	24.1	-1.5
Venezuela	0.8	1.8	-0.9	0.8	2.3	-1.5
Ecuador	0.5	0.6	-0.1	0.3	0.6	-0.3
Other Lat.Amer.	6.5	8.5	-2.0	7.1	9.4	-2.3
Total Lat. Amer.	64.1	63.2	(-7.3) (+8.3) +1.0	65.7	69.9	(-12.4) (+8.1) -4.2

COUNTRY/GROUP	Projected 1985/86						
	Prod.	Cons.			S/D		
		High Growth	Low Growth	At 1969/71 per cap	High Growth	Low Growth	At 1969/71 per cap
Latin America:							
Mexico	23.7	25.8	24.4	21.5	-2.2	-0.8	+2.1
Other Middle Amer./Carib.	4.5	8.9	8.7	8.2	-4.4	-4.2	-3.7
Argentina	31.7	16.1	15.6	13.4	+15.7	+16.1	+18.3
Brazil	36.3	35.1	32.9	34.6	+1.1	+3.4	+1.7
Venezuela	1.2	4.3	3.3	2.7	-3.1	-2.1	-1.5
Ecuador	0.5	1.3	1.1	0.9	-0.8	-0.7	-0.4
Other Lat.Amer.	8.4	14.1	13.8	12.5	-5.6	-5.4	-4.0
Total Lat. Amer.	106.2	105.5	99.9	93.8	(-16.1) (+16.8) +0.7	(-13.2) (+19.5) +6.4	(-9.7) (+22.1) +12.4

Note: Parentheses sum deficits and surpluses separately. Net deficit or surplus shown without parenthesis. Totals may not add due to rounding.

Venezuela: This country depends on commercial imports for its major source of cereals. By 1985, imports could well account for three-fourths of its consumption. An oil-exporting high-income country, Venezuela's demand for livestock feed is rising rapidly. Production growth rates of its relatively small cereal base are 3.2 percent for the 1960-74 period and -2.8 percent for 1967-74.

Ecuador: Also an oil-exporting country, but with relatively lower income levels, Ecuador is likely to depend more on imports than domestic production for its cereal supply. A very low historical production growth rate (0.7 percent) leads to a deficit of about 3/4 million tons by 1985. The trend of production during 1967-74 was sharply negative.

Other Latin America: With a production growth rate of 1.9 percent a year, (slightly higher in 1967-74), which is considerably lower than population growth, the deficit for this group is projected to rise from 2 - 2½ million tons to about 5½ million tons. Most of it will likely be incurred in Chile, Peru and Colombia. The overall effect of taking root crop into account would make for only a minor reduction in the cereal deficit.

Asian Centrally Planned Economies
(see table 7-E)

Projections for the Peoples Republic of China and other countries in this group have not been made. China's historical production rate of 3.4 percent per year (2.4 percent in 1967-74) and population growth of 1.5 percent suggest a shift from recent deficits to a substantial surplus. However, essentially it is assumed that the direction of policy will be toward self-sufficiency within the group. This may have some validity, since China, according to FAO data, would need to increase per capita consumption of food by 10 percent over 1969-71 levels in order to attain an average adequate energy intake level. Further it would be logical to go considerably beyond that in improving diets. Additionally, the deficit position of other centrally planned countries is projected to widen as a reflection of a production trend of 1.5 percent a year compared with population growth of 2.4 percent a year.

Nevertheless, if the historical growth rate should prevail, it would not be out of the question for China to assume a major grain exporter role if that should be their policy decision. If the more recent growth rate continues, China's flexibility to adopt such a course would be quite limited.

TABLE 7-E

TOTAL DEVELOPING COUNTRIES: GRAIN PRODUCTION, CONSUMPTION, AND SURPLUS/DEFICIT
(million tons)

COUNTRY/GROUP	Actual 1969-71 Ave.			Actual 1974/75		
	Prod.	Cons.	S/D	Prod.	Cons.	S/D
Developing Market Economies	315.6	332.4	(-28.2) (+11.5) -16.7	323.0	356.5	(-44.8) (+11.4) -33.4
Asian Centrally Planned Econ's.						
China, Peoples Republic of	135.1	138.2	-3.1	150.2	154.6	-4.4
Other Centr'ly Planned Asia	11.1	12.7	-1.6	11.5	12.7	-1.2

COUNTRY/GROUP	Projected 1985/86						
	Prod.	Cons.			S/D		
		High Growth	Low Growth	At 1969-71 per cap	High Growth	Low Growth	At 1969-71 per cap
Developing Market Economies	451.6	534.2	517.1	492.5	(-108.3) (+25.7) -82.6	(-94.5) (+29.0) -65.5	(-72.9) (+31.9) -40.9
Asian Centrally Planned Econ's.							
China, Peoples Republic of	220.4			173.8			+46.6
Other Centr'ly Planned Asia	13.0			18.1			-5.1

Note: Parentheses sum deficits and surpluses separately. The net deficit or surplus shown without parenthesis. Totals may not add due to rounding.

* * * * *

This report is the first step toward bringing deeper understanding of the food problem in the developing world. Some serious questions emerge from the analyses, questions that have no answers now but need to be pursued.

First, there is need to determine whether the slowdown in production of cereals noted for the 1967-74 period represents in fact a significant change in trend or is largely a temporary aberration due to weather. If the former, the task ahead is even more difficult than the figures portray.

Second, there is the question of how to come to grips with the problem of the large mass of malnourished people. It is clear that meeting food demand which arises from economic growth will do little in most low income countries to alleviate their condition.

Finally is the question of the appropriate strategies, policies and programs by which food and nutrition needs can be met most effectively. The historical trend of production is an insecure base to project the future. What is needed is an inventory of resources and policies and some measure of their effectiveness. From this, it is possible to come to some judgement as to the additional resources, changes in policies and in performance, which would be required to meet production goals.

Annex 1

IFPRI COUNTRY CATEGORIES

A. DEVELOPED EXPORTERS

1. United States
2. Canada
3. South Africa
4. Australia

B. DEVELOPED IMPORTERS

1. Japan
2. U. S. S. R.
3. Other Importers:

Austria	Norway
Finland	Portugal
Greece	Spain
Iceland	Sweden
Israel	Switzerland
Malta	(New Zealand)

4. East Europe:

Albania	Hungary
Bulgaria	Poland
Czechoslovakia	Romania
East Germany	Yugoslavia

5. EEC: Euro-Six:

Belgium	Italy
France	Luxembourg
Germany	Netherlands

EEC: Euro-Three:
- Denmark
- Ireland
- United Kingdom

C. DEVELOPING COUNTRIES WITH FOREIGN EXCHANGE

1. Asia Group:

Brunei	Singapore	Macao
Hong Kong	South Korea	
Malaysia	Taiwan	

2. North Africa - Middle East OPEC:

Iran	Algeria	Saudi Arabia
Iraq	Libya	Kuwait
Bahrain	Oman	Qatar
United Arab Emirates		

Annex 1

(IFPRI Country Categories cont'd.)

D. DEVELOPING COUNTRIES WITH FOREIGN EXCHANGE CONSTRAINTS
(Countries asterisked are oil exporters which are likely to improve reserve positions.)

1. Asia Market Economies:
   a. India
   b. Bangladesh
   c. Pakistan
   *d. Indonesia
   e. Philippines
   f. Thailand
   g. Other Asia: Bhutan, Nepal, Sri Lanka, Burma, Pacific Islands, Papua-New Guinea, Sikkim, Maldive Islands

2. Centrally Planned Asia:
   a. People's Republic of China
   b. Other Centrally Planned Asia: Mongolia, Khmer, Laos, S. Vietnam, N. Vietnam, N. Korea

3. North Africa-Middle East (Non-OPEC):
   a. Egypt
   b. Turkey
   c. Remaining Countries (from Afghanistan to Morocco):
      (1) High Income ($200 +):
         Jordan
         Lebanon
         Morocco
         Syria
         Tunisia
         Cyprus
      (2) Low Income (less than $200):
         Sudan
         Yemen (Sana)
         Yemen (Aden)
         Afghanistan

4. Sub-Sahara Africa
   *a. Nigeria
   b. Remaining Sub-Sahara:
      (1) High Income ($200 +):

Mozambique	Mauritius
Rhodesia	Reunion
Zambia	Senegal
*Angola	Spanish Sahara
Cameroon	French Terr. Afaro & Issas
Congo	
*Gabon	Guinea-Bissau
Ghana	Cape Verde Isles
Equatorial Guinea	Ceuta & Melilla
Ivory Coast	Sao Toma & Principe
Liberia	Seychelles Isl.

Annex 1

(IFPRI Country Categories cont'd.)

(2) Low Income (less than $200):

Kenya	Mali
Malagasy Republic	Mauritania
Malawi	Niger
Tanzania	Rwanda
Uganda	Sierra Leone
Burundi	Somalia
Central Africa Rep.	Togo
Chad	Upper Volta
Dahomey	Zaire
Ethiopia	Lesotho
Gambia	Comoro Islands
Guinea	

5. Latin America:
   - a. Argentina
   - b. Mexico
   - c. Brazil
   - *d. Venezuela
   - *e. Ecuador
   - f. Other Middle America and Caribbean:

Bahamas	Guatemala	Panama
Bermuda	Haiti	*Trinidad & Tobago
Costa Rica	Honduras	Other Caribbean Isles (Martinique, etc.)
Cuba	Br. Honduras	
Dominican Rep.	Jamaica	
El Salvador	Nicaragua	

6. Remaining Latin America:

Bolivia	French Guiana	Peru
Chile	Guyana	Surinam
Colombia	Paraguay	Uruguay

ANNEX 1

TABLE 1

POPULATION IN IFPRI CATEGORIES
BY INCOME GROUPS, 1970 EST. AND 1985 PROJECTED

Income Group	1970 Est. (millions)	1985 Proj. (millions)
Low Income-Food Deficit (under $200 per capita):		
India	549.8	792.4
Bangladesh	68.3	99.4
Indonesia	121.0	177.7
Other Asia	52.1	73.7
NA/ME Non-OPEC Low Income	34.6	53.4
Nigeria	55.8	85.7
Sub-Sahara Low Income	130.6	197.0
Total Low Income	1,012.2	1,479.3
Middle Income-Food Deficit ($200+ per capita):		
Philippines	38.2	61.8
Egypt	33.7	47.7
Turkey	35.7	52.4
NA/ME Non-OPEC High Income	32.3	50.7
Sub-Sahara High Income	48.3	72.5
Mexico	51.1	84.2
Other MA/Carib.	37.0	54.6
Ecuador	6.1	9.8
Other Latin America	56.6	84.4
Total Middle Income	339.0	518.1
High Income-Food Deficit (high foreign exchange capacity):		
Asia Group High Income	62.2	87.8
NA/ME OPEC	62.7	100.8
Venezuela	10.7	16.6
Total High Income	135.6	205.2
Total DME-Food Deficit	1,486.8	2,202.6
Grain Exporters:		
Pakistan	61.4	98.9
Thailand	36.3	58.7
Argentina	23.9	28.8
Brazil	96.6	147.1
Total Exporters	218.2	333.5
TOTAL DME	1,705.0	2,536.1

Source: United Nations Projection for 1985 is U.N. medium-medium variant 1974.

ANNEX 2

PROJECTION METHODS

1. Projections of the demand for cereals during the 1975-85 period were based upon assumptions with respect to growth rates in population, growth rates in real per capita GDP, estimates of income elasticities in cereal consumption, and trends in the use of cereals for feed. They also assume historical patterns of price relationships are not altered significantly. Centrally planned Asian countries were excluded from the analysis. It was assumed that these countries would follow a policy of self-sufficiency more or less. The principal assumptions and the related methodology used in estimating demand growth rates in the developing market economies are briefly summarized below.

2. The 1974 UN medium--medium-variant population projection was selected for use in the study. The projected mid-year population for study countries and country groupings at 5-year intervals from 1970 to 1990 were made available from the IBRD computer program. Compound rates of growth for each of the 5-year periods were used to derive year-end estimates for 1970, -75, -80, and -85. These rates of growth were also used to estimate population for the intervening years in the 1975-85 period. Population estimates for 1970 and projections for 1985 are shown by IFPRI categories in Annex 1, Table 1.

3. The basic sources for projecting growth rates of real GDP per capita for developing countries and country groupings were (1) the 1965-73 rates as derived from IBRD estimates of total real GDP and population, and (2) IBRD estimates of projected oil revenues in 1980 to OPEC countries and the net effect of continued high oil prices on economic growth, 1976-80, in Non-OPEC developing countries, treating low-income countries as a group (less than $200 GDP per capita in 1972) and middle/higher-income countries as a group ($200 per capita and above).

High- and low-income growths were assumed. These are shown in Table 1.

For Non-OPEC countries, the high-income assumption was generally the growth rate of GDP per capita as derived from the IBRD estimates noted in (1) above. The low-income assumption for NON-OPEC countries was that taken from the IBRD analysis (2) above which, under conditions of low import demand by OECD countries, would yield 0.5 percent annual growth rate in GDP per capita for the low-income country group and 1.8 percent annual rate for the middle/high-income country group. However, in those instances where the 1965-73 growth rate fell below the projected low-income growth rate, the rate for the high-income assumption was adjusted upward to exceed the low rate by 0.5%.

For most OPEC countries, the high-income growth rate was assumed to be 10 percent. For Indonesia, Nigeria, Venezuela, and Ecuador 7 percent was assumed because at their level of development, progress is likely to be slower. Oil revenues for OPEC countries as a whole are estimated to increase by 25 percent annually from 1973-80. The low-growth for OPEC countries was assumed to be the historical rate 1965-73.

A special adjustment was made for the low-growth situation for the Asia high-income group -- Hong Kong, Singapore, Taiwan, South Korea, Malaysia -- to a rate approximately one-fourth below the high-growth situation. This is the percentage reduction involved in the Bank report for middle/higher-income countries under the alternatives of high and low economic growth for OECD countries to which the economic activities for the Asia group are linked.

In some countries, agriculture is the dominant sector of the economy, accounting for about half of the GNP. The question may be raised as to whether the historical production trend which is projected for cereals is consistent with the assumptions as to economic growth which enter into the demand projections. For the high-income growth assumption this is not a matter of concern since that assumption is generally based also on the historical trend of GNP. But it has some bearing in relation to the low-income growth assumption as to whether such assumption could be fulfilled without a reduction in the growth rate of cereal production and thus bring a somewhat wider food deficit than projected.

Since the low-income growth assumption is linked to disruptions stemming from the oil situation, it would appear reasonable to assume that the effect would be borne more in the non-agricultural sector than in the agricultural sector. Even in the case of India where cereal production accounts for most of agricultural production, and agriculture in turn accounts for about 45 percent of total GNP, the reduction required in the non-agricultural sector rate to accommodate the low income growth assumption would be at most from 4.6 percent a year to 3.4 percent. Such a slowing of the non-agricultural sector would reduce opportunities for employment outside of agriculture, but conversely would increase manpower in agriculture. Thus, a lower economic growth rate need not significantly affect production in the agricultural sector.

4. The income elasticities (Table 2) used in the study were based on FAO estimates contained in the publication Agricultural Commodity Projections 1970-80, Volume 2, Food and Agriculture Organization, Rome, 1971. For the low growth Non-OPEC countries FAO projection of elasticities in reference period 1970-75 was generally used, for higher growth Non-OPEC countries the reference period was 1970-80, and for the OPEC countries the FAO projection reference period for 1975-80 was used in view of the accelerated rates of economic growth projected for these countries. Adjustments for high and low income assumptions were introduced. The

derived estimates of elasticities, however, were subject to the general assumption that for the study countries and regions the cereal income elasticities for human consumption would not be negative during the projection period. Thus, whereas FAO projected slight negative elasticities for Argentina and Turkey, zero elasticities were used in this study. Mexico and Thailand were adjusted from slight negative to slight positive elasticities. In both countries grain consumption has been increasing faster than population. Unpublished analyses made by the USDA of cereal income elasticities were also consulted in finalizing the income elasticities. The elasticities are assumed to prevail throughout the projected period.

The U.S. Department of Agriculture consumption data used in this study does not attempt to estimate post-harvest cereal losses and amounts of cereals used for seed. Instead, these data are included in the consumption estimates, and it is, therefore, implicitly assumed that rate of growth in these uses would be the same as the projected rate of growth in human consumption.

5. The cereal supply/utilization data provided by the Department of Agriculture include estimates of grain used for feed for a limited number of major developing countries. These data were used in making projections of grain used for feed for countries and regions where data were available and trends in the use of grain for feed were presumed to differ significantly from trends in human or total consumption. In particular it was assumed that the total consumption and feed consumption trends would not differ significantly in all Non-OPEC countries with less than $200 GDP per capita in 1972 and feed consumption was not calculated separately for these countries. For the remaining countries and groups of countries projections were made of the grain used for feed on the basis of historical trends in the rate of growth in grain used for feed subject to a maximum constraint that the rate of growth would not exceed the rate of growth in population plus the rate of growth in GDP per capita X 2. Inasmuch as the historical trend in GDP was adopted for most countries as the high income growth assumption and the historical trend in feed use was related thereto, the latter was used to determine feed use under the high income growth assumption. For the low income growth assumption, the rate of growth in feed use was adjusted downward according to the reduced growth in GDP per capita. For Non-OPEC countries the 1960/61-1974/75 period was used for calculating the compound rate of growth trend. For OPEC countries the 1971/72-1974/75 period was used.

In countries where projections were not made of the grain used for feed, total consumption was projected on the basis of the growth rates in population, and growth rates in GDP per capita X the estimated cereal income elasticities. Also, in all countries no separate projections of feed use of rice and minor grains were made since no estimates were available of the amount of these commodities that were used for feed. They were included in the projections of total consumption.

6. Projections of cereal production for the 1975-85 period were made on the assumption that historical rates of growth would continue. The 1960/61-1974/75 compound rates of growth in production for these study countries and regions were computed from USDA annual crop-year cereal production estimates. These rates of growth were then extrapolated for the 1975-85 period from the 1974 trend estimate of production. Production growth rates were also computed for 1967/68-1974/75.

(See following Note for mathematical formulation of projection methodology.)

ANNEX 2

NOTE ON METHODOLOGY

Production:
Production of foodgrains was projected to 1985/86 according to a logarithmic time trend fitted by ordinary least squares, i.e.,

Fitted $y = a_0 + a_1 t + e$

Predicted $\hat{y}_t = a_0 + a_1 t$

where y = logarithm of production

$\hat{y}_t$ = estimated value of the logarithm of production in year t.

a_1 = estimated growth rate of production

e = random error component.

The growth rate of production a_1, was estimated for two different base periods, 1960-74 and 1967-74.

Consumption:
Per capita human consumption was projected as:

$$\hat{c}_t = \hat{c}_{74} + gzt$$

where $\hat{c}_t$ = predicted value of the logarithm of per capita consumption in year t

$\hat{c}_{74}$ = logarithm of the estimated value of consumption per capita in the year 1974.

g = assumed rate of growth of per capita income

z = assumed income elasticity

t = year (i.e. current year - 1974)

Per capita consumption in 1974 was taken as the fitted trend value from the logarithmic time trend of total human consumption estimated for the period 1960-1974, i.e.

Fitted $C = b_0 + b_1 t + e$

Estimated $\hat{C}_{74} = b_0 + b_1 (t=74)$

$\hat{c}_{74} = C_{74} - P_{74}$

where C = logarithm of total consumption

$\hat{c}$ = logarithm of per capita consumption

b_1 = estimated growth rate of consumption

P_{74} = logarithm of population in 1974

ANNEX 2

TABLE 1

ASSUMPTIONS OF GDP PER CAPITA GROWTH RATES
FOR PROJECTING DEMAND FOR CEREALS
IN DEVELOPING COUNTRIES

	High	Low
Asia Group with Foreign Exchange		
Taiwan, South Korea, etc.	7.3%	5.5%
North Africa-Middle East (OPEC)		
Algeria, Iran, Saudi, etc.	10.0%	6.5%
Developing Exporters		
Thailand	5.0%	1.8%
Argentina	2.4%	1.8%
Developing Food Deficit (low income)		
India	1.2%	0.5%
Bangladesh	1.0% 1/	0.5%
Pakistan	1.2%	0.5%
Philippines	2.9%	1.8%
Indonesia	7.0%	4.3%
Other Asia	1.0%	0.5%
North Africa-Middle East (Non-OPEC)		
Egypt	1.0% 1/	0.5%
Turkey	4.8%	1.8%
Other Non-OPEC High Income	2.6%	1.8%
Other Non-OPEC Low Income	1.0% 1/	0.5%
Sub-Sahara Africa		
Nigeria	7.0%	5.9%
Other Sub-Sahara High Income	2.04%	1.8%
Other Sub-Sahara Low Income	1.6%	0.5%
Latin America		
Mexico	2.9%	1.8%
Other Middle America/Caribbean	3.4%	1.8%
Brazil	6.0%	1.8%
Venezuela	7.0%	1.3% 1/
Ecuador	7.0%	3.4%
Rest of Latin America	2.3% 1/	1.8%

1/ Adjusted upward as noted in Paragraph 3 of text.

ANNEX 2

TABLE 2

ESTIMATED CEREAL INCOME ELASTICITIES

1970-1985 STUDY COUNTRY/REGIONAL CATEGORIES

COUNTRY/REGIONAL CATEGORIES	ESTIMATED CEREAL INCOME ELASTICITY	
	Low-Growth Assumption	High-Growth Assumption
A. Developing Countries with Foreign Exchange:		
Asia Group	.050	.045
NA/ME OPEC	.080	.078
Venezuela	.190	.154
B. Developing Exporters:		
Argentina	.000	.000
Thailand	.050	.049
C. Developing Countries with Foreign Exchange Constraints:		
India	.450	.442
Pakistan	.230	.228
Bangladesh	.450	.444
Indonesia	.420	.396
Philippines	.180	.176
Other Asia	.120	.119
Turkey	.000	.000
Egypt	.160	.159
NA/ME Non-OPEC - Low Income	.430	.425
NA/ME Non-OPEC - High Income	.170	.169
Nigeria	.500	.486
Sub-Sahara - Low Income	.410	.399
Sub-Sahara - High Income	.280	.279
Mexico	.100	.094
Other Middle America	.210	.205
Brazil	.100	.094
Ecuador	.420	.379
Other Latin America	.230	.227

STATISTICAL SERIES:

DATA FOR FIGURES 1 - 9

DATA FOR FIGURE 1

ALL FOOD DEFICIT DME COUNTRIES:
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	197.8	196.6	214.0
61-62	197.7	200.8	216.9
62-63	208.8	205.2	223.4
63-64	213.7	209.6	232.0
64-65	218.8	214.2	238.8
65-66	209.0	218.8	231.6
66-67	207.4	223.3	234.3
67-68	231.0	228.5	253.8
68-69	243.7	233.5	260.8
69-70	248.2	238.7	272.7
70-71	257.5	244.0	281.6
71-72	255.8	249.4	284.0
72-73	251.9	255.0	286.9
73-74	257.8	260.7	298.2
74-75	257.1	266.5	300.2
75-76	280.7	273.0	314.2

					At 69-71 per cap cons.
1985-86 projected		342.9	High 451.3	Low 437.4	413.7

DATA FOR FIGURE 2

LOW INCOME-FOOD DEFICIT DME COUNTRIES:
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	137.1	134.6	144.3
61-62	139.0	137.2	145.4
62-63	142.9	139.9	147.1
63-64	144.1	142.6	153.0
64-65	149.8	145.3	159.3
65-66	136.7	148.2	147.4
66-67	134.2	151.0	148.4
67-68	153.5	154.0	161.4
68-69	161.0	157.0	165.1
69-70	168.0	160.0	175.0
70-71	175.0	163.2	178.6
71-72	170.0	166.4	175.6
72-73	166.4	169.6	175.8
73-74	175.9	173.0	187.4
74-75	170.2	176.4	182.9
75-76	189.0	179.9	196.1

		High	Low	At 69-71 per cap cons.
1985-86 projected	220.1	268.1	262.0	257.4

DATA FOR FIGURE 3

HIGH INCOME-FOOD DEFICIT DME COUNTRIES

CEREAL PRODUCTION, TREND, AND CONSUMPTION

1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	15.9	16.1	20.0
61-62	15.6	16.4	19.9
62-63	17.3	16.8	21.6
63-64	16.8	17.1	21.2
64-65	16.8	17.5	21.1
65-66	18.0	17.9	22.1
66-67	18.0	18.3	23.3
67-68	19.5	18.7	25.1
68-69	21.7	19.1	27.7
69-70	21.1	19.5	28.3
70-71	20.7	19.9	29.7
71-72	18.6	20.3	30.3
72-73	22.3	20.8	33.3
73-74	19.4	21.2	31.9
74-75	20.7	21.7	34.0
75-76	21.7	22.1	34.9

		High	Low	At 69-71 per cap cons.
1980-85 projected	27.4	62.3	57.1	44.2

DATA FOR FIGURE 4

MIDDLE INCOME-FOOD DEFICIT DME COUNTRIES
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	44.8	45.9	49.7
61-62	43.2	47.2	51.6
62-63	48.7	48.5	54.6
63-64	52.8	49.9	57.8
64-65	52.2	51.3	58.4
65-66	54.3	52.8	62.2
66-67	55.2	54.0	62.6
67-68	57.9	55.9	67.3
68-69	61.0	57.5	68.1
69-70	59.0	59.2	69.4
70-71	61.8	60.9	73.3
71-72	67.1	62.7	78.0
72-73	63.3	64.6	77.8
73-74	62.4	66.5	78.9
74-75	66.2	68.4	83.3
75-76	70.0	70.6	85.2

		High	Low	At 69-71 per cap cons.
1985-86 projected	95.4	120.9	118.3	112.1

DATA FOR FIGURE 5

DME CEREAL EXPORTING COUNTRIES
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual		
1960-61	38.5	40.5	36.3		
61-62	41.4	42.1	36.9		
62-63	41.6	43.7	37.0		
63-64	47.4	45.5	38.4		
64-65	52.4	47.3	40.6		
65-66	49.3	49.2	42.1		
66-67	51.2	51.1	44.2		
67-68	51.9	53.2	44.5		
68-69	54.4	55.3	46.5		
69-70	62.8	57.5	52.2		
70-71	63.9	59.8	51.8		
71-72	58.7	62.2	54.8		
72-73	63.3	64.7	55.9		
73-74	70.0	67.3	57.9		
74-75	66.0	70.1	56.6		
75-76	70.1	72.9	58.4		
				High	Low	At 69-71 per cap cons.
1985-86 projected		108.7		82.9	79.7	78.9

DATA FOR FIGURE 6

ASIA FOOD DEFICIT COUNTRIES
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	121.2	117.5	130.3
61-62	122.4	120.0	131.1
62-63	124.7	122.6	132.2
63-64	125.8	125.3	137.9
64-65	132.1	128.0	143.9
65-66	118.8	130.8	132.0
66-67	118.6	133.6	135.2
67-68	134.9	136.5	146.5
68-69	143.9	139.5	152.8
69-70	148.7	142.5	160.5
70-71	156.4	145.6	165.3
71-72	153.4	148.8	164.9
72-73	146.9	152.0	165.0
73-74	160.1	155.3	177.2
74-75	153.3	158.7	171.6
75-76	170.6	162.2	183.9

			High	Low	At 69-71 per cap cons.
1985-86 projected		202.6	257.4	248.9	236.7

DATA FOR FIGURE 7

NA/ME-FOOD DEFICIT COUNTRIES
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	34.9	34.8	38.6
61-62	32.3	35.6	39.1
62-63	38.8	36.3	42.2
63-64	40.6	37.1	43.1
64-65	36.8	37.9	41.3
65-66	37.9	38.7	43.3
66-67	36.4	39.6	42.9
67-68	41.9	40.4	48.7
68-69	45.5	41.3	49.2
69-70	43.6	42.2	49.7
70-71	42.2	43.2	51.1
71-72	44.9	44.1	53.4
72-73	49.7	45.1	56.0
73-74	41.9	46.1	54.4
74-75	46.5	47.1	58.5
75-76	48.3	48.2	59.7

		High	Low	At 69-71 per cap cons.
1980-86 projected	60.7	83.2	82.1	78.1

DATA FOR FIGURE 8

SUB SAHARA AFRICA: FOOD DEFICIT COUNTRIES:
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual
1960-61	26.2	27.7	27.0
61-62	27.1	28.2	27.8
62-63	28.6	28.6	29.2
63-64	29.4	29.0	30.4
64-65	30.3	29.5	31.1
65-66	30.9	29.9	32.2
66-67	30.8	30.4	31.4
67-68	32.1	30.8	32.4
68-69	31.2	31.3	31.8
69-70	34.1	31.8	35.2
70-71	33.7	32.3	35.6
71-72	32.8	32.8	34.3
72-73	33.2	33.4	34.6
73-74	31.4	33.9	33.6
74-75	33.7	34.5	35.8
75-76	35.3	35.0	36.7

			High	Low	At 69-71 per cap cons.
1985-86 projected		41.4	56.3	55.1	53.0

DATA FOR FIGURE 9

LATIN AMERICA FOOD DEFICIT COUNTRIES
CEREAL PRODUCTION, TREND, AND CONSUMPTION
1960-75 AND PROJECTED 1985

(million tons)

Year	Cereal Prod. Actual	Cereal Prod. Trend Est.	Cereal Cons. Actual		
1960-61	15.6	16.5	18.1		
61-62	15.9	17.1	18.9		
62-63	16.6	17.6	19.8		
63-64	17.8	18.2	20.7		
64-65	19.7	18.8	22.5		
65-66	21.3	19.4	24.2		
66-67	21.6	19.8	24.8		
67-68	22.0	20.7	26.0		
68-69	23.1	21.4	27.0		
69-70	21.8	22.1	27.2		
70-71	25.2	22.9	29.6		
71-72	24.7	23.7	31.4		
72-73	22.1	24.5	31.4		
73-74	24.4	25.3	33.0		
74-75	23.7	26.2	34.3		
75-76	26.5	27.1	35.9		
				High	Low
1985-86 projected		38.2		54.3	51.4

At 69-71 per cap cons.
45.8