

BASIC

STUDY

Freedom from Hunger Campaign

**THIRD
WORLD FOOD
SURVEY**



FREEDOM FROM HUNGER CAMPAIGN

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PREFACE

Perhaps one of the most arresting conclusions to be drawn from this publication, which is the third of a series of world food surveys, is that while the world food consumption level has improved over the last decade, up to half the world's population is still hungry or malnourished or both. The survey shows that most of the improvement occurred in the developed areas while the improvement made in the less developed areas was hardly enough to regain the unsatisfactory prewar level. It thus confirms once again that the gap between the developed and the less developed regions tends to increase rather than to decrease.

The survey presents a comprehensive picture of the present and past world food situation. It is based on food balance sheet data for over 80 countries covering some 95 percent of the world's population. It also draws upon the food consumption and dietary surveys conducted in various parts of the world and introduces new statistical techniques in the study of food supplies and needs.

FAO had only been established a few months when it produced the first *World food survey*. This was a pioneer effort to appraise the world food situation, based on data from 70 countries representing about 90 percent of the world's population at that time. While there were gaps in the statistical information then available and much of the material used was in the nature of intelligent guesswork, it did show that food supplies were inadequate over large areas of the world.

A somewhat more reliable and more detailed picture of the food situation was presented by FAO's *Second world food survey* which was issued in 1952. It was based on data for food supplies in the postwar period and revised data for the prewar period. Further, more realistic standards for calorie requirements had been established, taking into account such factors as age, sex, body weight, and average activity of populations living in differing environmental temperatures. The analysis showed that in areas containing some 60 per-

cent of the world's population food supplies at the retail level were not sufficient to provide even 2,200 Calories per day.

In this latest report, the *Third world food survey*, the point that emerges time and again is that, by any measurement, the diets of the mass of people in the less developed countries and regions remains appallingly low. The people in the less developed countries are found to have a Calorie intake of 2,150 per day compared with 3,050 for the people in the developed countries. The differences in quality of diet are even more striking. For instance, the intake of animal protein in these countries and regions is only one-fifth of that in the more developed areas. The intakes in the less developed countries are considerably short of the requirements and in fact it is estimated that at least 20 percent of the population in these areas is undernourished and 60 percent malnourished. Nobody, then, should be astonished by the conclusion reached by the survey that 10-15 percent of the people in the world are undernourished "and up to half suffer from hunger or malnutrition or both." These facts, together with the rapidly expanding population, present a very serious challenge to mankind. Even looking only to the needs of the development decade (i.e., by 1975), the world food supplies will have to be increased by more than 35 percent merely "to sustain the world's population at its present unsatisfactory level of diet." If, as we should, we are to achieve a reasonable improvement in the level of nutrition, then world food supplies will have to be increased by more than 50 percent. The figures for the less developed countries will have to be much higher. It is estimated that by 1975 total food supplies in these countries will need to be increased by about 80 percent and that the production of animal products, in particular, will need to be raised by more than 120 percent.

Even more demanding are the long-term requirements. By the year 2000 it is expected that the world's population will be at least double the present figure, while the population in the less developed countries will have increased by 150 percent. If this proves true, then these less developed countries will need to increase their total food supplies to four times the present volume and their supplies of animal food products to about sixfold. These figures give some indication of the magnitude of the task confronting us, and indicate how timely and urgent is the Freedom from Hunger Campaign.

The Campaign, which is supported by all the member nations of FAO, has already contributed widely toward knowledge and understanding of the world hunger problem. It has greatly helped to bring the problem to the forefront in international discussions which have led to many valuable developments. Among these is the setting up of the World Food Program, which is being operated jointly by the United Nations and FAO. The campaign can also be expected to do much to help promote the UN Development Decade. Indeed, the Freedom from Hunger Campaign will be FAO's contribution to the Development Decade.

There is one overriding consideration to be kept in mind. It is this: the Freedom from Hunger Campaign is an effort which must be continued for many years. Even with a climate of opinion which would enable the hunger problem to be met on the national and international scale required, the magnitude of the task, as shown by this survey, is such that decades and generations of work and effort lie ahead.

B. R. SEN
Director-General

1. BACKGROUND AND CONCLUSIONS

Like the first and second world food surveys, the third world food survey is concerned with these fundamental questions: What is the food consumption of the populations of the different countries? How does it compare with their needs? Where are the most serious shortages? What kinds of food and what quantities of each are needed to achieve improvement in nutrition throughout the world? What are the technical, economic, and social factors underlying this aim?

The first *World food survey* was published in 1946, only a few months after FAO had been established, at a time when statistical services of many countries were still disrupted and the prewar period was the latest for which information on a world-wide basis was available. Admittedly, there were large gaps in the statistical information relating to this period. For many countries the prewar figures of food supplies and sometimes of population were in fact mostly guesses based partly on a critical examination of whatever material was obtainable in scattered sources and partly on the subjective judgment of informed experts. Nevertheless, the first world food survey served a useful purpose. A pioneer attempt to appraise the world food situation, it gave a more studied and detailed picture of prewar conditions than had until then been available. It disclosed the main gaps between consumption and nutritional requirements and called attention to the possibilities for closing these gaps. On the basis of data for 70 countries whose people made up some 90% of the world's population, it was found that

“In areas containing over half the world's population, food supplies at the retail level (not actual intake) were sufficient to furnish an average of less than 2,250 Calories* per caput daily. Food sup-

* Calorie = kilocalorie.

plies furnishing an average of more than 2,750 Calories per caput daily were available in areas containing somewhat less than a third of the world's population. The remaining areas, containing about one sixth of the world's population, had food supplies that were between these high and low levels."

The *Second world food survey* was published in 1952. It was essentially concerned with the same basic questions as the first, viewed in the light of changes that had occurred and the greater knowledge available. By that time current statistics from many countries were more readily obtained than in 1946 and the food balance sheet method of estimating food supplies for human consumption had been considerably improved. Data on food supplies for the postwar period and also revised data for the prewar period could be prepared for 52 countries covering some 80% of the world's population. Moreover, a distinct advance had taken place in establishing standards for calorie requirements for individual countries based on age and sex composition of the population, the reference body weight, average physical activity and the mean environmental temperature. While in the first world food survey a uniform figure of 2,600 Calories per person per day was recommended for the determination of the adequacy of calorie levels, the analysis in the second world food survey was based on this newly devised calorie-requirement scale, recommended by a group of international experts convened by FAO.

The results of the survey showed that in areas covering 59% of the world's population, food supplies at the retail level were not sufficient to furnish an average of 2,200 Calories daily. Food supplies furnishing an average of over 2,700 Calories per caput daily were available in areas containing 28% of the world's population. The remaining areas, containing 13% of the world's population, had food supplies that were between these high and low levels, the corresponding prewar figures being 39, 30, and 31%. Thus, five years after the second world war when most countries were still engaged in repairing war ravages, the average calorie supply per person over large areas of the world was still lower than before the war. This was particularly so in the less developed areas, contributing to further widening of the already large gaps between them and the more developed areas. Nevertheless, the gaps between the actual and the

desired appeared much less in 1952 than in 1946 because the new calorie-requirement scale for individual countries, and particularly for those with low intake levels, implied lower calorie-requirement figures than the global figure of 2,600 Calories used in the first world food survey. As regards the qualitative aspect of the diet, it was found that in the areas with low calorie intake the animal protein content of the diet fell well below the already low prewar levels. Evidence of poor quality diet was also afforded by the proportion of calories derived from cereals, starchy roots, and sugar, which appeared unduly high and exceeded two thirds for most of the low-calorie countries. The high proportions of prewar years were maintained, and in some regions like the Far East and the Near East they tended to increase, indicating again that the position compared with prewar noticeably worsened.

The *Third world food survey*, like the second, compares the present situation with the past and takes account of the trends and changes that have taken place since prewar. It thus covers three periods, prewar, postwar, and recent; and gives an outlook of the needs and possibilities for the future. In general, prewar data refer to the period 1934-38, postwar data refer to the period 1948-52, and the recent to 1957-59.¹ Deviations from these time references were dictated by the availability of information. Since the preparation of the second world food survey, more and better data have become available, though they still vary a good deal between the different parts of the world with regard to coverage, concepts, and reliability.

For example, food balance sheets, admittedly provisional, have been prepared for the U.S.S.R. and Mainland China and many other countries for which information had previously been scanty or for which estimates were based on mere intelligent guesses. This survey has been based on food balance sheet data for over 80 countries covering some 95% of the world's population. Food consumption and dietary surveys conducted in various parts of the world have provided a wealth of supplementary information. Current statistics of food production and utilization have improved in quality as a result of

¹ Although agricultural data in general refer to split years, the usual stroke notation (e.g., 1957/58-1959/60) has been omitted in text and text tables for reasons of simplification.

the introduction of objective methods of collecting data in a number of countries. Better methods of analysis have also become available. Thus, in the first world food survey the determination of the quantitative adequacy of diets had to be made against a uniform standard of 2,600 Calories per caput per day and in the second survey such analysis was confined to countrywise comparison of the levels of intake and requirements based on the FAO calorie-requirement scale. Recently more refined techniques based on the concept of variation in requirements among individuals and the revised FAO requirement scale have become available for estimating the incidence of undernutrition from data collected in household food consumption surveys. Much the same conditions are true regarding the estimation of the incidence of malnutrition.

The broad conclusions of the third world food survey are as follows:

1. The world food supply available per caput, though higher than in the postwar years, is only slightly above the prewar level. The progress over the last decade has mainly taken place in the developed areas with the result that the gap between the developed and the less developed areas has tended to increase rather than to decrease.
2. The calorie content of the diet has generally regained the prewar level in both the developed and the less developed areas. Nevertheless, the current calorie supply per caput in the less developed areas falls short of the corresponding requirement and it is estimated that at least 20% of the population in these areas is undernourished.
3. The nutritional quality of the diet has shown a distinct though small improvement over the prewar level. However, this improvement has again mainly taken place in the developed areas, while in the less developed areas the quality of diets has barely regained the unsatisfactory prewar level. Reports of dietary and clinical surveys show that nutritional deficiency diseases are still common in large parts of the world. Retarded growth of children, poor physique and health of adults, low resistance to disease, particularly in children below 5 years, and low working efficiency together with high mortality rates among young children and low expectations of life are an indication of widespread malnutrition in the less developed

areas. This is not surprising, since in these areas the level of animal protein intake is only one fifth of that in the more developed areas.

4. It is generally agreed that if more than about 80% of the calories in a diet are derived from cereals, starchy roots, and sugar, there is a risk that the nutritional quality of diet is inadequate. If this percentage is less than about 80, the diet is likely to be adequate. In well-fed countries like the United Kingdom and France hardly any households derive more than 80% of their calories from cereals, starchy roots, and sugar, whereas some 60% of the households in the less developed countries have a proportion exceeding 80%. In other words, it appears probable that some 60% of the households in the less developed areas live on diets which are inadequate in nutritional quality.

5. Presenting the results of undernutrition and malnutrition for the world as a whole, the survey concludes that 10 to 15% of its people are undernourished and up to a half suffer from hunger or malnutrition or both.

6. If the world's population were to grow according to the United Nations projections under the "medium" assumption (and recent indications are that the population growth is likely to be larger), then by 1975 world food supplies would need to be increased by over 35% merely to sustain the world's population at its present unsatisfactory level of diet. If, in addition, a reasonable improvement in the level of nutrition is to be brought about, world food supplies would have to be increased by over 50%, and in particular, food supplies of animal products would have to be increased by some 60%. In the less developed areas where the population increase will be faster, the corresponding figures are much higher. In these areas total food supplies will have to be increased by some 80% and those of animal foods by over 120%.

7. In order to achieve these targets by 1975 the less developed countries would need to aim at an annual rate of increase in per caput food supplies approaching 2%. Since the income elasticity of the demand for food in these countries may be expected to be of the order of .7, this in effect implies a rate of growth in per caput income approaching 3%. Should the population grow at a rate of

about 2.0% suggested by the United Nations projections, the aim should be to increase the aggregate national income by some 5% per annum, which is compatible with the target for the decade 1960/70 in the plans for activating economic development through the joint efforts of the United Nations and its Specialized Agencies.

8. The targets for 1975 are only a first step in improving the level of food consumption and nutrition. The survey also looks further ahead and concludes that should the population grow according to the United Nations "medium" projection, the world's total food supply would have to be trebled by the year 2000 in order to provide a reasonably adequate level of nutrition. For the less developed areas total food supplies would need to be quadrupled and the supplies of animal products should be raised to six times the present volume.

It is hoped that the facts presented in this survey will be found of assistance in formulating plans and programs for more intense and comprehensive action to combat hunger and malnutrition in the world.

2. DEVELOPMENTS IN THE WORLD FOOD SITUATION

Population growth

The world's population was estimated to grow at about 1% per annum when the first world food survey was published in 1946. There was no appreciable increase in the rate of growth in population even when the second world food survey was published in 1952. The successful control of epidemics and diseases in large parts of the world since the beginning of the last decade has, among other causes, led to a marked lowering of death rates and as a result to an accelerated growth in the world's population, as indicated in Table 1.

TABLE 1. - POPULATION AND POPULATION GROWTH, BY GROUPS OF REGIONS

Area	1938	1950	1960	Annual percentage rate of growth (compound)	
				1938-50	1950-60
	..... <i>Millions</i>				
Less developed regions ¹	1 478	1 733	2 161	1.3	2.2
Developed regions ²	717	751	852	0.4	1.3
World	2 195	2 484	3 014	1.0	1.9

¹ Included here and in the following tables: Far East, China, Mainland; Near East; Africa; Latin America.

² Included here and in the following tables: Europe, U.S.S.R.; North America; Oceania.

As against a growth rate of 1% per annum during the period 1938-50, the population grew at nearly *twice* that rate during the last decade. In particular, Table 1 shows that the rate of growth in the less developed regions shot up from an estimated 1.3% per annum during 1938-50 to 2.2% during 1950-60. Although the devel-

oped regions also show a comparable increase in growth rate, the current estimated growth rate in these areas is still not higher than that in the less developed regions a decade ago. Of the total increase of 800 millions between 1938 and 1960 in the world's population, the less developed regions account for over 650 millions, with the Far East alone responsible for nearly 500 millions (Appendix 1). The figures point to the increasing share of the less developed areas in the world's population. Whereas in 1938 the less developed areas accounted for some 67% of the world's total population, the estimated share today is some 72%. This unprecedented rate of population growth in less than a decade is the most striking feature of the developments since the publication of the second world food survey. As we shall see later it has tremendous implications for future food needs if we are to ensure a reasonably good level of nutrition to the peoples of the world.

Food production

Appendix 2 shows the trends in food production by regions since prewar years. Table 2 summarizes these trends for the less developed and the developed regions.

TABLE 2. - INDEX NUMBERS OF FOOD PRODUCTION, BY GROUPS OF REGIONS¹
(PREWAR = 100)

Area	Average 1948-52	Average 1957-61
Less developed regions (excl. China, Mainland) . .	115	150
Less developed regions (incl. China, Mainland) . .	107	145
Developed regions	117	152
World (excl. China, Mainland)	116	152
World (incl. China, Mainland)	112	149

¹ These index numbers have been calculated by applying regional weights, based on 1952-56 farm price relationships, to the production figures, which are adjusted to allow for quantities used for feed and seed. The same holds for Tables 5-7. The index numbers in Tables 2 and 5 are also shown excluding Mainland China for reasons of consistency with other FAO publications.

Since prewar years, world food production has increased by some 50%. The percentage increase is about the same in both the less developed and the developed regions. In the developed regions this increase is mainly due to a rise in yields; in fact, area under many

TABLE 3. - INDEX NUMBERS OF AREA, YIELD, AND PRODUCTION OF MAJOR CROPS BY GROUPS OF REGIONS (PREWAR = 100)

Item	Less developed regions		Developed regions		World	
	Average 1948-52	Average 1957-60	Average 1948-52	Average 1957-60	Average 1948-52	Average 1957-60
<i>Wheat</i>						
Area	103	128	99	117	101	121
Yield	86	102	109	129	101	120
Production	89	129	108	152	101	145
<i>Rice, paddy</i>						
Area	119	139	160	140	119	139
Yield	91	109	89	120	91	110
Production	108	151	143	168	109	151
<i>Other cereals</i>						
Area	122	135	94	93	106	111
Yield	85	105	113	146	100	124
Production	104	141	106	135	105	137
<i>Starchy roots</i>						
Area	168	263	94	95	115	143
Yield	100	110	106	113	98	100
Production	169	289	99	107	113	143
<i>Total pulses</i>						
Area	117	141	102	93	130	130
Yield	94	94	90	103	82	95
Production	110	133	91	96	106	125

cereals, starchy roots, and pulses has declined, while in the less developed regions the increase in production is more often achieved along traditional lines by bringing more land into cultivation (Table 3).

The corresponding developments for livestock products are illustrated in Table 4 by the example of cattle.

TABLE 4. - INDEX NUMBERS OF CATTLE NUMBERS, CATTLE PRODUCTS OUTPUT¹ AND YIELD, BY GROUPS OF REGIONS (AVERAGE 1948-52 = 100)

Area	Cattle numbers	Yield	Output
	Average 1958-60	Average 1958-60	Average 1958-60
Less developed regions	114	106	122
Developed regions	117	114	133
World	115	113	130

¹ Meat and milk in terms of milk equivalent taking 1 unit of meat as equal to 10 units of milk.

The increases in output in the less developed areas have been brought about mainly by increases in the cattle numbers; and increases in their yields are of a much smaller order relative to those in the developed areas. Although other reasons have contributed to these trends, it appears that technical progress has been more rapid in the developed countries.

Table 5 summarizes the picture for per caput food production.

TABLE 5. - INDEX NUMBERS OF PER CAPUT FOOD PRODUCTION, BY GROUPS OF REGIONS¹ (PREWAR = 100)

Area	Average 1948-52	Average 1957-61
Less developed regions (excl. China, Mainland) . .	93	102
Less developed regions (incl. China, Mainland) . .	88	100
Developed regions	110	127
World (excl. China, Mainland)	100	111
World (incl. China, Mainland)	97	109

¹ See note to Table 2.

As can be seen, per caput food production for the world as a whole regained the prewar level in the early 1950s and is now about 10% above this level. The improvement however has been largely in the more developed parts of the world. In these areas, per caput

food production has risen by 27% above the prewar level. In contrast, in the less developed regions, it has barely exceeded the prewar level.

Table 6 brings out the striking disparity in the levels of per caput food production between the developed and the less developed regions.

TABLE 6. - LEVELS OF PER CAPUT FOOD PRODUCTION IN THE DEVELOPED AND THE LESS DEVELOPED REGIONS AS PERCENTAGES OF THE WORLD PER CAPUT AVERAGE LEVELS ¹

Area	Prewar	Average 1948-52	Average 1957-61
Less developed regions	64	58	59
Developed regions	174	194	203
World	100	100	100

¹ See note to Table 2.

Per caput food production in the developed regions was about 2.7 times as high as in the less developed regions during prewar years compared with a ratio of 3.5 for the average 1957-61. This large disparity has further widened due to the increased share of the less developed regions in the world's population (from 67% to 72%) while their contribution to the world's food production has decreased from 43% to 42% (Table 7).

TABLE 7. - PERCENTAGE CONTRIBUTION OF THE DEVELOPED AND THE LESS DEVELOPED REGIONS TO WORLD FOOD PRODUCTION ¹

Area	Prewar	Average 1948-52	Average 1957-61
Less developed regions	43	41	42
Developed regions	57	59	58
World	100	100	100

¹ See note to Table 2.

Appendix 3 shows levels and trends in the index number of per caput food production, by regions. Food production per caput in Oceania is the highest in the world, four times the world average and eight times the level in the Far East. There is, however, no upward trend in the level of per caput production in this region. The level of per caput production in North America ranks only next to that in Oceania, being three times the world average. The level is now about 15% higher than before the war owing to the large expansion during the war and in the immediate postwar years, though more recently production per caput has levelled off because of restrictions on areas.

In both western and eastern Europe, per caput production is higher than the world average and has been growing at a faster rate. During postwar years increases were particularly high in eastern Europe, in fact higher than in any other region, mainly because of the rapid growth of production on largely expanded areas in the U.S.S.R.

In Latin America the per caput production level is close to the world average. After a considerable decrease during the war, the prewar level was approximately regained with the big expansion in output in the four years 1956 to 1959, but per caput food production has subsequently fallen back again to slightly below the prewar level.

In the other three underdeveloped regions, per caput production is lower than the world average by some 10% in the Near East, by more than 40% in Africa and more than 50% in the Far East. Among all the less developed regions, only in the Near East has per caput production been consistently maintained at more than the prewar level, whereas in each of the others this level seems to have been reached or exceeded sometime during the last decade. In Africa per caput food production increased above the prewar level and by the middle of the last decade was some 5% above it, but there has since been a decline. By contrast, food production per caput in the Far East in 1957-59 was still some 4% less than before the war, with little signs of improvement except possibly in the last two or three years. In Mainland China per caput production has been steadily increasing since the early 1950s, reaching its peak in 1958, the year of the "great leap forward," al-

though the near-famine shortage of food reported recently resulting from the successive bad crops of 1959 and 1960 and the lack of stocks from previous years threw some doubts on the reliability of the high levels of per caput production reported for the late 1950s.

Food supplies

Trends in per caput food production do not fully reflect trends in per caput food supplies available for human consumption, because of external trade, changes in stocks and nonfood utilization.

Table 8 presents the index numbers of total food supplies per caput by regions. It also gives the index numbers of per caput food supplies of vegetable origin and of animal origin excluding oils and fats. Furthermore, the table summarizes the index numbers for two groups of countries, namely the low-calorie countries and the high-calorie countries. In keeping with the distinction made in the earlier world food surveys, the former comprise the Far East, Near East, Africa, and Latin America, excluding the River Plate countries, and the latter the remaining areas. The table shows that the world food supply per caput is some 6% above the prewar level compared with 9% in per caput food production. Part of the difference is explained by differences in time coverage and geographical coverage while part is due to accumulated stocks since prewar. The index numbers of per caput food supplies refer to the period 1957-59 and are based on available data for individual countries, while those of per caput production relate to regional estimates for 1957-61. The increase in the world per caput food supply level reflects mainly the improvements which have taken place in the high-calorie countries where per caput food supplies are some 20% higher than before the war. Those of the low-calorie countries, on the other hand, have barely exceeded the prewar level in spite of a large increase in net imports, resulting in further disparity in the supply levels of the two groups of countries. Thus, in prewar years the per caput supply level in the high-calorie countries was about 2.9 times as high as that in the

TABLE 8. - INDEX NUMBERS OF PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION, BY REGIONS¹ (Price weighted; prewar world average = 100)

Regions	Period	Crops, excl. vegetable oils and fats	Livestock and fish, excl. animal fats and oils	Total food (incl. vegetable and animal fats and oils)
Far East Incl. China, Mainland	Prewar	84	38	57
	Postwar	75	30	49
	Recent	83	38	56
Excl. China, Mainland	Prewar	80	35	53
	Postwar	69	27	44
	Recent	80	35	53
Near East	Prewar	112	72	90
	Postwar	108	71	88
	Recent	125	72	102
Africa	Prewar	...	...	...
	Postwar	...	...	...
	Recent	87	44	65
Latin America	Prewar	77	123	95
	Postwar	86	97	88
	Recent	93	110	99
Europe (incl. U.S.S.R.)	Prewar	120	154	141
	Postwar	120	147	137
	Recent	120	199	168
North America	Prewar	178	394	313
	Postwar	172	460	339
	Recent	157	495	351
Oceania	Prewar	181	355	284
	Postwar	194	346	283
	Recent	179	354	282
Low-calorie countries ²	Prewar	84	47	61
	Postwar	78	39	55
	Recent	87	46	62
High-calorie countries	Prewar	131	205	177
	Postwar	132	220	184
	Recent	128	269	211
World ²	Prewar	100	100	100
	Postwar	94	95	95
	Recent	99	112	106

¹ These index numbers have been calculated by applying regional weights, based on 1952-56 farm price relationships, to estimated regional per caput supplies of major food groups.

² Includes estimates for Africa for prewar and postwar.

low-calorie countries while the disparity is now 3.4 to 1.¹ Levels are highest in North America and Oceania, more than 3 times the world average and 6 to 7 times the low level in the Far East.

The table also shows that the increase in the index number of per caput food supply for the world since prewar is due to an increase of some 12% in the food supplies of animal origin while those of vegetable origin are still slightly below the prewar level. However, the increase in the index number of foods of animal origin took place in the high-calorie countries; the figure for the low-calorie countries remains below the prewar level. In contrast the index number of food supplies of vegetable origin remained relatively stable with a small decrease in the high-calorie countries and a similarly small increase in the low-calorie countries. In other words, the quality of the diet improved only in the high-calorie countries while the low-calorie countries were barely able to maintain the quantity of the diet.

The table brings out strikingly the large disparity between the two groups of countries in the levels of supplies of foods of animal origin against a relatively small difference in those of vegetable origin. The former are 6 times higher in the high-calorie countries while the latter are only 1½ times higher compared with the low-calorie countries.

The disparities between regions in per caput food supplies are best brought out in Table 9 which shows region by region the share in the world's population against the corresponding share in food supplies.² The shares are shown separately for food supplies of vegetable origin and of animal origin.

Over half of the world's population in the Far East is seen to live on only about a quarter of the world's total food supplies made up of only 19% of the world's animal food supplies and 44% of the world's crop food supplies. This is in striking contrast with the position in Europe, Oceania, and North America which with a share in population of 29% account for 57% of the total world's food sup-

¹ The figure is not directly comparable with the figure of 3.5 to 1 for the disparity in per caput food production found in the previous section, due to the different geographic and time coverages. The same holds for a comparison of Tables 9 and 7.

² See footnote 1.

TABLE 9. - DISTRIBUTION OF WORLD'S POPULATION AND FOOD SUPPLIES, BY REGIONS (1957-59)

Regions	Percentage of population	Percentage of food supplies		
		Total	Animal	Crops
Far East (incl. China, Mainland)	52.9	27.8	18.5	44.2
Near East.....	4.4	4.2	2.8	5.5
Africa	7.1	4.3	2.8	6.3
Latin America.....	6.9	6.4	6.7	6.5
Europe (incl. U.S.S.R.)..	21.6	34.2	38.4	26.2
North America	6.6	21.8	29.2	10.4
Oceania.....	0.5	1.3	1.6	0.9
World	100.0	100.0	100.0	100.0

plies, 69% of the total animal food supplies, and 38% of the total crop food supplies.

In Africa the ratio of the shares of population and food supplies is 1.7:1 for total food supplies and 2.5:1 for animal food supplies. In the Near East it is 1:1 for total food supplies and 1.6:1 for animal food supplies while in Latin America it is 1:1 for both.

Underlying economic and social factors

The disparities in per caput food supplies between the developed and less developed regions are, to an appreciable extent, associated with the disparities in per caput food production which are in turn associated with the disparities in various measures of agricultural productivity, in farm incomes, and in over-all population densities. Table 10 illustrates the disparities in the levels of production per unit of land and of cattle. Yields in the developed regions for some of the crops are seen to be nearly twice as high as in the less developed areas and the disparities in the output of meat and milk per unit of cattle is even 5 to 1. This is of course partly due to the preponderant practice in the less developed regions of using cattle as draught animals (and sometimes by keeping cattle for other reasons than production), but even when this factor is allowed for, the disparities in

TABLE 10. - TRENDS IN YIELDS OF MAJOR CROPS AND CATTLE PRODUCTS,¹ BY GROUPS OF REGIONS

Commodity	Less developed regions			Developed regions			World		
	Prewar	Average 1948-52	Average 1957-60	Prewar	Average 1948-52	Average 1957-60	Prewar	Average 1948-52	Average 1957-60
<i>Crops</i>	..... 100 kg/ha								
Wheat	9.2	7.9	9.4	10.3	11.2	13.3	9.9	10.0	11.9
Rice, paddy	17.5	15.9	19.1	32.1	28.1	38.4	17.6	16.1	19.2
Other cereals.....	8.6	7.3	9.0	12.3	13.9	18.0	10.7	10.7	13.3
Starches	67.8	68.0	74.5	108.5	114.9	122.2	96.9	95.3	97.1
Pulses	6.5	6.1	6.1	6.3	5.7	6.5	6.5	6.0	6.2
		Average 1948-52	Average 1958-60		Average 1948-52	Average 1958-60		Average 1948-52	Average 1958-60
<i>Cattle Products</i>	..... 100 kg/head of cattle								
		2.5	2.6		12.3	13.9		5.7	6.5

¹ Meat and milk in terms of milk equivalent, taking 1 unit of meat as equal to 10 units of milk.

average yields are still high. The table shows also that the disparities in yield have tended to widen.

The reasons for the low productivity of labor in the less developed countries are usually clear enough. Food production is often dispersed among a multitude of farms most of which are very small where the output may barely provide a minimum subsistence for the family, any excess being only sufficient for extremely modest cash requirements. But even on small holdings farmers can try to compensate for their disadvantages by striving for a high output per hectare. For instance in Japan where over 60% of the holdings are under 1 hectare, yields are as high as anywhere else in the world. The laborious technique of cultivating rice and other crops in Japan depends on the industry of the Japanese peasant. But there are other important factors. The rainfall is adequate and the irrigation system almost perfectly controlled. Farmers have generally avoided wasting land on draught animals and, more recently, have obtained mechanical equipment suited to small holdings. Large urban markets, supplies of cheap industrial goods, and security of tenure have all provided economic incentives to increased production. The thrift of the Japanese peasant, the high general level of education, and a well-developed co-operative system may all have provided a favorable background against which the Japanese achievement became possible.

It is known, however, that in most countries where farms are very small, the productivity of land is low. This is particularly true where farm practices are backward and credit facilities to acquire essential farm requisites are mainly lacking, as in most of the less developed countries. In many cases the problem is further aggravated by inadequate supplies and distribution of irrigation water. In some areas rainfall is of such great intensity and soil conservation measures are so inadequate that soil is often washed away. Furthermore, in many areas, and particularly in the Far East, little has been done over the years to restore the fertility of the cultivated soil. Illiteracy is widespread and most farmers know little about improved methods and techniques of production. Organizations for technical services to farmers are inadequate or nonexistent. Even where such organizations are established farmers have often been unwilling to adopt the improved practices partly because of attachment to traditional ways. They may be reluctant to adopt new methods where this involves

TABLE II. - PER CAPUT NET PRODUCT: TOTAL, AGRICULTURAL AND NONAGRICULTURAL; PERCENT CONTRIBUTION OF AGRICULTURE TO DOMESTIC PRODUCT AND PERCENTAGE OF AGRICULTURAL POPULATION IN VARIOUS COUNTRIES (1952-54)

Countries	Per caput net product at factor cost			Percentage of per caput agricultural to nonagricultural income	Percent contribution of agriculture to domestic production	Percentage of agricultural population
	Total	Agricultural	Nonagricultural			
	..... U.S. dollars					
Canada	1 310	983	1 372	72	12	16
U.S.A.	1 870	668	2 065	32	5	14
Australia	950	1 306	882	148	22	(16)
New Zealand	1 000	1 091	974	112	24	(22)
Belgium	800	492	846	58	8	13
Denmark	750	656	780	84	21	(24)
France	740	455	840	54	16	(26)
Germany, Fed. Rep. of ..	510	364	534	68	10	(14)
Sweden.....	1 160	706	1 296	54	14	23
United Kingdom	780	557	797	70	5	(7)
Argentina	460	350	496	71	19	25
Brazil	230	110	435	25	30	(63)
Ecuador	150	97	237	41	40	(62)
Paraguay	140	128	156	82	51	56
Congo (Leopold- ville)	70	27	165	16	27	(69)
South Africa.....	300	145	376	39	16	33
India.....	60	41	104	39	48	70
Japan	180	106	243	44	27	46
Pakistan	70	54	120	45	59	76
Philippines.....	150	91	295	31	43	(71)
Thailand	80	58	122	48	48	66
Turkey	190	109	380	29	40	70
U.A.R.	120	67	211	32	35	63

SOURCE: FAO, *The state of food and agriculture 1959*, Rome, Italy.

Note: Figures in parentheses refer to percentage of total male workers engaged in agriculture.

higher cost, more investment, and more contact with the marketing system; especially so in a situation in which land tenure is insecure, and the basic services of marketing, transport, and storage are bad

or unreliable. Many of the changes the farmer may be asked to make will increase the risk that his already inadequate income will dwindle or disappear completely.

Where the majority of farms are small and agriculture is the predominant economic activity, inevitably a large part of the population is dependent on agriculture. As Table 11 shows, in the less developed countries well over one half of the population is dependent on agriculture. In these countries a farm family barely produces the food that it needs for itself and there is at best only one nonfarm family per farm family to which to sell its additional produce. Furthermore, the production is confined to few commodities. Consequently the diets, consisting mainly of staple foods, lack variety. In contrast, in many of the developed countries the population dependent on agriculture is small, often less than 20%. Besides, the level of productivity in the developed countries is so high that one farm family produces much more than the quantity of food it needs. Furthermore, there are 10 to 20 nonfarm families on the average to buy its produce. Sales of home-grown foods enable the farm family to purchase types of foods not produced on the farm. Thus even in rural areas, much greater variety in food supplies is available.

The low level of productivity of labor in agriculture is a main cause of the low general level of incomes in less developed countries as illustrated by Table 12.

Although 70% of the world's people live in less developed areas their contribution to world income is little over 20%. In fact,

TABLE 12. - DISTRIBUTION OF THE WORLD'S POPULATION AND OF NATIONAL INCOMES, BY REGIONS (1957-59)

Regions	Percentage of population	Percentage of income
Far East (incl. China, Mainland)	52.9	12.3
Near East	4.4	1.9
Africa	7.1	2.5
Latin America	6.9	4.8
Europe (incl. U.S.S.R.)	21.6	39.5
North America	6.6	37.8
Oceania	0.5	1.7
World	100.0	100.0

per caput annual income early in the last decade was less than \$100 in most countries in the Far East and Africa; \$100-200 in most countries of the Near East, and \$100-250 in most countries of Latin America. Against this, per caput income was between \$750-1000 in western European countries, around \$1000 in Oceania, and \$1500-2000 in North America (see also Table 11).

These disparities have not been reduced in the course of the last decade but rather the gap has widened. Income in the less developed countries of the world grew at 3% per annum in the last decade. Because of the growth of population the increase in income per person was only \$1 per annum. In contrast the average income in the developed countries during the same period rose by about \$30 per head per year. This widening gap is also due to increasing disparities between the export prices of manufactured products and related services and those of primary products. The less developed countries in general are earning less and less per unit exported primary domestic product and are paying more and more per unit imported industrial product. Furthermore, in their efforts to accelerate economic development many less developed countries require more foreign currency earnings. This in turn leads to more concentration on export cash crops most of which are nonfood products; contributing to lower per caput food production and consequently, owing also to the need to limit imports, to lower per caput food supplies.

Low as the per caput income is in the less developed countries, even lower is the per caput farm income (Table 11). In the more developed countries also, disparities between income from farming and income from other activities are still to be found, though to a much lesser extent. As a consequence, rural-urban disparities in per caput food supplies are wider in the less developed than in the developed regions.

In the more developed countries food consumption has reached levels where further rises in disposable income lead to only relatively small increases in expenditure on food. The effect on farm sales of food products is still less, since part of any increased expenditures on food reflects more elaborate methods of processing and distribution. Thus the growth of demand for farm products is hardly greater than the growth of population which, although fairly rapid in North America and Oceania, is very slow as compared to the

less developed areas. Agricultural production, however, tended to increase rapidly in the developed countries, for technical progress has been substantial and its adoption in farm practice was encouraged by agricultural support policies. These circumstances have led recently to surplus food production accumulating in some of these countries.

In contrast, in the less developed countries it is more often the demand for food that runs ahead of the supply. Population growth has been fast and any increase in the low levels of income was largely spent on food and other agricultural products. Because production has fallen behind demand, domestic food prices have tended to rise and many less developed countries have had to import more food or to restrict exports of foodstuffs.

With the low level of productivity in less developed areas and with the low incomes, savings are low and offer small possibilities of investment to improve productivity or for new exploitations. Low income, low food consumption, and low productivity thus go together in a "circle of poverty" which is still common to nearly all the less developed countries.

3. LEVELS, PATTERNS, AND TRENDS OF FOOD CONSUMPTION

Major food groups

Appendix 4 gives the data on per caput food supplies of major food groups by regions and subregions for prewar, postwar, and recent periods. The salient features are summarized in the following paragraphs.

CEREALS

Among the regions, consumption of cereals is highest in the Near East, exceeding 160 kg per caput per year, followed by the Far East with 146 kg, and is lowest in North America and Oceania with about 70 kg and 90 kg, respectively. Consumption levels in Africa and Europe are close to the world average of 134 kg. The level in eastern Europe (including the U.S.S.R.) is higher than in the rest of Europe; in fact it is among the highest in the world.

The pattern of consumption of cereals is different from region to region and within regions. Thus, in the Far East rice is usually the preferred cereal, to the extent that the word is sometimes used as synonymous with food. Exceptions are to be found in north China and parts of India and Japan where wheat, maize, and millets are more important, while in parts of Indonesia maize is the common cereal. The Near Eastern countries depend heavily on wheat and to a lesser extent on millets, maize, and barley. North African countries, like the other Mediterranean countries, rely heavily on wheat and barley as their staple foods. In the savannah areas of Africa, millets are most important, followed by maize. Substantial quantities of rice are consumed in certain coastal zones. In east Africa the pattern is diverse, though maize is the principal crop. In Latin

America maize is the staple food except in the plains to the south where wheat is more important. The tropical coasts and plains are the rice-growing areas.

In the postwar period, per caput consumption of cereals compared with the prewar level had declined everywhere except in Latin America where it was some 10% above the prewar level. During the period from prewar to postwar years the Far East and the Near East regions, which had previously been net exporters of cereals, became net importers. Following this period of shortages, per caput consumption in the Far East and Latin America has been rising during the last decade, and in the Near East it was maintained at the high postwar level. This was due amongst other factors to the increasing imports on concessional terms from the larger exporting countries where considerable stocks of wheat and coarse grains have been accumulating. In the developed regions on the other hand the declining trend has continued over the last decade.

STARCHY ROOTS

Per caput consumption is highest in west and central Africa, nearly four times the world average of 84 kg per year, mainly due to the high consumption of cassava and yams. However, the data for Africa should be interpreted with more care since estimates of production of cassava may in many cases refer to potential production rather than to the quantities actually harvested for consumption. Next to west and central Africa is the consumption level of eastern Europe (including the U.S.S.R.) with 179 kg per caput per year, mainly potatoes, followed by the major islands of southeastern Asia with 136 kg, mostly cassava and yams. Consumption is lowest in the Near East, being only about 20% of the world average.

During the postwar years per caput consumption for the world as a whole increased by some 10% because of increases in Europe, Oceania, Latin America, and the Far East; in the other regions consumption decreased. During the last decade, per caput consumption for the world as a whole increased by a further 10%. There was a sharp increase in consumption in the Far East, where the need for calories is greatest, and a modest increase in the Near East, as also

in Oceania and possibly the U.S.S.R., whereas in other regions consumption levels tended to decline. The decline was sharpest in Europe (excluding U.S.S.R.) and North America, where the level fell below the prewar average.

SUGAR

Latin America is the only less developed region in which the consumption of sugar is above the world average of 18 kg per caput per year; in fact, the consumption is nearly twice this figure, and some 15% higher than in Europe. Per caput consumption is highest in Oceania and North America, 3-4 times the world average, and lowest in the Far East, where the level is about half the world average.

From prewar to postwar periods, only Latin America recorded a substantial increase of about 20%, while for the world as a whole the per caput consumption remained unchanged. During the 1950s, world per caput consumption of sugar rose by 2-3% per year. The rise in consumption during the last decade was partly due to the fact that sugar prices have developed more favorably than those of any other food crop. Trends in per caput consumption differed widely between the various regions. In North America and Oceania, consumption remained relatively stable at a high level. In the other regions, per caput consumption went up steadily, the greatest increases being recorded in eastern Europe and the northern countries of Africa.

In all the less developed regions consumption is now higher than in prewar.

PULSES AND NUTS

Consumption of pulses and nuts in the less developed regions amounts to 18 kg per caput per year. This is about 3 times as high as the level in Europe, 2½ times as high as that in North America and 4½ times that in Oceania.

Pulses are important in the diets in the Far Eastern countries, especially in southern Asia in the form of gram and in eastern Asia in the form of soybean and soybean products, while in the semitrop-

ical areas of southeastern Asia coconuts are more important. Pulses are a common food in most Latin American countries. Because of the low intake of animal protein, the consumption of pulses is a desirable feature of the diet in these areas due to their high protein content which supplements that from cereals.

In prewar years the consumption level was highest in the Far East, but it declined in postwar years and continued to decrease during the last decade, though to a lesser extent. Also in the Near East and Latin America consumption levels declined between prewar and postwar, but they increased rapidly during the last decade and in fact have now reached the level of the Far East. In contrast, in Africa the consumption level increased between prewar and postwar but has remained stable since then. In the developed countries, consumption levels have varied little. For the world as a whole, per caput supplies have remained almost unchanged during the last decade and are slightly below the prewar level.

VEGETABLES AND FRUIT

Of all foods, the data for vegetables and fruit are most difficult to estimate. The available information indicates that the consumption level is lowest in the Far East, about $\frac{3}{5}$ of the world average of some 90 kg per caput per year. In this region fruits are usually considered luxuries, except in tropical and semitropical areas where they are often eaten directly from the bush. Fresh green and yellow vegetables which are so valuable as a source of important vitamins and minerals are consumed in very small quantities. Preserved vegetables are more common and can provide a good source of vitamins and minerals. In Africa, the consumption is highest in the northern countries where it approximates the world average. In all other regions the consumption is well above the world average, the maximum being in North America. Among the less developed regions the Near East has the highest consumption, about the same as in Oceania and higher than in Europe.

From prewar to postwar periods, there was an upward trend in per caput consumption in all the regions except the Far East where it declined some 15%; and for the world as a whole it remained

practically unchanged. During the last decade there was an upward trend in Europe and in the less developed regions, though in the Far East the level still remains nearly 10% below the prewar average. On the other hand, Oceania and North America registered a decline during the same period, with the result that consumption is back to the prewar level in Oceania and a little below prewar in North America. For the world as a whole there has been an increase of about 10% above the prewar level.

MILK AND MILK PRODUCTS (EXCLUDING BUTTER)¹

The average consumption throughout the world is equivalent to 82 kg of liquid milk per caput per year; but the differences in consumption are very wide. This is especially important in relation to the adequacy of diets of expectant and lactating mothers and of children. Consumption in the Far East is only a quarter of the world average (in fact it is substantially lower than this because milk going into ghee (butterfat) is included in this group in India and Pakistan); in Africa the figure is considerably higher, but consumption is low in west and central Africa. Consumption in Europe is over twice the world average and in North America nearly 4 times the world average (15 times the consumption in the Far East).

Generally speaking, consumption levels in developed and less developed regions have been moving in opposite directions and the disparities have been getting wider.

MEAT, FISH, AND EGGS

The differences in consumption in this group between developed and less developed regions are nearly as striking as those for milk

¹ There is no correct way of converting quantities of milk products which have been made from 'incomplete' (i.e., partly skimmed milk) into whole milk equivalent. For practical purposes pragmatic conversion factors have been used. This seems to be justified by the fact that conversion of milk and milk products to fat and protein equivalents in most countries shows about the same quantities of both components as whole milk.

and milk products. The world average is about 33 kg per caput per year; the contribution of fish and eggs to this total being about 15% and 12%, respectively. Certainly this proportion is much more variable for fish, consumption being determined largely by ready access to supplies. Consumption of meat, fish, and eggs is less than half the world average in the Far East, 3½ times the world average in North America. In Latin America the consumption is well above the world average, but this is almost entirely due to the remarkably high level in the River Plate countries.

Except in North America, meat consumption fell from the prewar to the postwar period; generally the drop was compensated by a rise in fish and eggs. Recently, world meat consumption has regained its prewar level (but consumption is still short of this level in Latin America). Most low-calorie countries have shared in a modest way in the increase in meat since the postwar period. Since the war, fish consumption has continued to rise in the less developed regions, but eggs have only risen in Europe and Latin America.

FATS AND OILS

Per caput consumption in the more developed regions is 16-21 kg per year. This is 2 to 7 times the levels in the less developed regions.

Trends between prewar and postwar were generally in the opposite direction in the two groups of regions with supplies declining in the more developed regions. During the last decade consumption levels have increased in all the regions except in the Far East where the recent level has fallen back below the prewar average. For the world, consumption has remained unchanged since prewar.

Summing up, it is clear that whereas the per caput consumption of foods rich in carbohydrates has been nearly as high in the less developed regions as in the developed regions, consumption of animal products and other protective foods including fats and oils in the less developed areas is far below that in the developed regions.

During the last decade, in the less developed areas consumption of carbohydrate foods and also to some extent of animal products

(and other protective foods), has increased although the latter is still slightly below the low prewar level. In the developed regions, on the other hand, the consumption of carbohydrate foods has declined but that of animal products has increased substantially.

Calories and proteins

The disparities in the per caput food supplies are best brought out in terms of the nutritive value of the diets. This has two broad aspects, quantitative and qualitative. The former is measured by the calorie content of the diet, but to assess the latter no single and simple measure is available, since the balance between many nutrients needs to be taken into account. However, two indicators of the nutritional quality of the diet have been widely accepted, namely its protein content, and in particular the animal protein content, and the percentage of total calories derived from cereals, starchy roots, and sugar.

Table 13 shows the average levels of calorie and protein supplies for the prewar, the postwar, and the recent periods. The table shows that the less developed regions consume between 2,000 to 2,500 Calories per caput per day. The food consumed by the more developed regions, on the other hand, provides more than 3,000 Calories per caput per day. The contrast between the two groups of regions is seen to be even more striking in respect of the nutritional quality of the diets. Thus, the less developed regions consume 9 g of animal protein per caput per day, which is only one fifth the consumption per head in the more developed regions. Again, the percentage of calories derived from cereals, starchy roots, and sugar is seen to be close to 80 in the less developed regions against less than 60 in the developed regions. The disparity in the supply of fats is also large, levels being a little over 30 g per caput per day in the less developed regions and over 100 g in the developed regions.

It appears that the current level of calorie supplies has reached, and even exceeded, the prewar level in all developing regions except the Far East where it is still somewhat lower than the prewar level. Also in Europe, the current level is higher than the prewar level,

TABLE 13. - AVERAGE DAILY PER CAPUT SUPPLIES OF CALORIES, TOTAL PROTEINS, AND ANIMAL PROTEINS AT THE RETAIL LEVEL, BY REGIONS

Regions	Period	Calories		Total protein	Animal protein
		Number	% derived from cereals, starchy roots, and sugar		
.....Grams.....					
Far East (incl. China, Mainland)	Prewar	2 090	78	61	7
	Postwar	1 890	79	54	6
	Recent	2 060	81	56	8
Near East ...	Prewar	2 295	78	72	12
	Postwar	2 220	78	69	12
	Recent	2 470	71	76	14
Africa	Prewar	...	...	...	...
	Postwar	...	...	...	...
	Recent	2 360	74	61	11
Latin America	Prewar	2 160	63	64	28
	Postwar	2 315	66	62	22
	Recent	2 510	63	67	24
Europe (incl. U.S.S.R.)	Prewar	2 870	67	85	28
	Postwar	2 760	68	82	29
	Recent	3 040	63	88	36
North America	Prewar	3 260	48	86	51
	Postwar	3 170	43	91	61
	Recent	3 110	40	93	66
Oceania	Prewar	3 290	50	103	67
	Postwar	3 250	50	98	66
	Recent	3 250	48	94	62
Low-calorie countries ¹ ...	Prewar	2 110	77	62	10
	Postwar	1 960	78	56	8
	Recent	2 150	78	58	9
High-calorie countries ...	Prewar	2 950	62	85	34
	Postwar	2 860	62	85	37
	Recent	3 050	57	90	44
World ¹	Prewar	2 380	71	69	18
	Postwar	2 240	71	64	18
	Recent	2 420	70	68	20

¹ Includes estimates for Africa for prewar and postwar.

but there has been a declining trend in North America and Oceania. For the world as a whole calorie supplies would appear to have just reached the prewar level. Total protein supplies for the world as a whole per caput per day have gone up since the early postwar period but have still not reached the prewar level. The gap remains particularly large in the Far East. Animal protein supplies for the world as a whole have exceeded the early postwar as well as the prewar level. This however is due to considerable increase in consumption in Europe and North America. On the other hand, the animal protein supplies for the underdeveloped regions have barely reached or are still below the prewar level, thus further widening the already large gap between the developed and the less developed regions. Similar trends are revealed by the percentage of calories derived from cereals, starchy roots, and sugar.

4. HUNGER AND MALNUTRITION

Undernutrition means inadequacy in the quantity of the diet, that is, in calorie intake which, continued over a long period, results in either loss of normal body weight or reduction in physical activity, or both. This definition is strictly appropriate to adults, not to children. For children, the consequences of low calorie intake are unsatisfactory growth and physical development and a reduction of the high degree of activity characteristic of healthy children.

Malnutrition means inadequacy of the nutritional quality of the diet which if made good enables a person to lead a healthy active life. More precisely, it denotes inadequacy of a particular or several essential nutrients. Serious shortages of nutrients may result in clinical signs of specific deficiency diseases; minor degrees of deficiency can contribute to poor general health.

Undernutrition and malnutrition are naturally not mutually exclusive: people who are undernourished are likely to be malnourished and this, particularly if serious or prolonged, will lower resistance to disease.

Undernutrition

EVIDENCE OF UNDERNUTRITION

Table 14 compares region by region the existing levels of calorie supplies with the corresponding requirements, shown to the nearest 50. It shows that the calorie supplies for the Near East, Africa, and Latin America are about equal to their requirements, those for the Far East fall short of the requirements by about 10%, while those for Europe, North America, and Oceania are not only sufficient to meet their average needs but in fact exceed them by about

20%. These gaps between the supply and requirement levels need, however, to be interpreted with care, since within regions the calorie intake as well as the requirement varies considerably. For example, the apparent self-sufficiency of calorie supplies in the Near East is due to the somewhat higher level of supplies in Turkey, the United Arab Republic, Syria, Lebanon, and Israel which account for about one half the population in the region. The other countries in the region, which include Iran, Iraq, Saudi Arabia, and Jordan, have Calorie supplies only of between 2,100 and 2,200 per caput per day. The same observation applies to the Far East where, for example, Japan and China (Taiwan) are relatively much better fed than other countries in the region. Within-country variation between different socio-economic classes of the population is even larger in the less developed countries. The table brings out the large variation in calorie supply between regions against the relatively small variation in calorie requirements. Thus, while admittedly the calorie needs of the people in the less developed regions are smaller than those of the people in Europe and North America, as wide a difference as 850 Calories between the consumption levels of the two can hardly be justified on grounds of differences in age distribution, stature, and climate.

TABLE 14. - LEVELS OF CALORIE SUPPLIES AND CALORIE REQUIREMENTS BY REGIONS, 1957-59 (PER CAPUT PER DAY AT RETAIL LEVEL)

Regions	Calorie supplies ¹	Calorie requirements ¹	Calorie supplies as percentage of calorie requirements ²
Far East (incl. China, Main.) .	2 050	2 300	90
Near East	2 450	2 400	103
Africa	2 350	2 350	101
Latin America	2 500	2 400	104
Europe (incl. U.S.S.R.)	3 050	2 600	117
North America	3 100	2 600	120
Oceania	3 250	2 600	125
Low-calorie countries	2 150	2 300	93
High-calorie countries	3 000	2 600	116
World	2 400	2 400	100

¹ Rounded to the nearest 50.

² Calculated on unrounded figures.

In particular, the foregoing observation holds for the Far East, where a gap of 10% is to be found between the average calorie supply and the requirement. The significance of this gap cannot be overstressed. Considered in terms of total supplies the gap is seen to be large enough to feed the entire population of the Near East. The gap may either persist all through the year or be more severely felt in the period preceding the harvests. Again, it may be shared by the majority of the population or fall heavily on the poorer sections. In actual fact, the privileged and well-to-do everywhere will eat all they need and perhaps more. But what the poor can afford will generally not meet their full needs. Data from household surveys conducted in India showed that in practically every part of the country there are a large number of families who for want of income live on quantitatively inadequate diets and who do not get sufficient quantities even of staple food grains (Table 15). The data for India are illustrative of the conditions in other less developed countries.

By contrast, in the developed countries there is on the average no shortage of calories even in the poorest classes. Relevant data from a nation-wide survey conducted in the United States illustrate this statement. Table 15 shows that calorie supply is not influenced by rising income on anything like the scale noticed in India. Further, the level of calorie supply even for the lowest income groups in the United States is higher than the average requirement.

TABLE 15. - PER CAPUT INCOME AND FOOD CONSUMPTION

United States, 1955		India (Maharashtra State), 1958	
Yearly household disposable income in U.S.\$	Food consumption Calories/caput/day ¹	Yearly per caput expenditure in U.S.\$	Food consumption Calories/caput/day ¹
under 3 000	3 200	under 33	1 500
3 000-5 999	3 150	33-59	2 300
6 000 and over	3 250	60 and over	2 900

¹ Rounded to the nearest 50.

INCIDENCE OF UNDERNUTRITION

What has already been stated suggests that a large number of people in the low-calorie countries go undernourished at least part of their lives. This information, however, is not sufficient to estimate the proportion of people who are undernourished. To determine this proportion requires a comprehensive knowledge of the distribution of calorie intake in relation to the requirements of individuals. Such data are, however, scarce. What are available are the calorie intake distributions of households on "reference-man" basis¹ such as are given in Table 16 for prepartition India and for Burma.

TABLE 16. - DISTRIBUTION OF HOUSEHOLDS SURVEYED IN PREPARTITION INDIA (1935-48)¹ AND BURMA (1939-41) BY CALORIE SUPPLIES PER DAY PER REFERENCE MAN

Calories per day per reference man	Percentage frequency of households	
	India	Burma
under 1 300	4.9	.3
1 300 - 1 700	10.7	5.2
1 700 - 2 100	23.2	20.3
2 100 - 2 500	21.8	29.4
2 500 - 2 900	20.7	23.9
2 900 - 3 300	12.0	10.4
3 300 - 3 700	4.2	5.7
3 700 - 4 100	1.3	3.3
4 100 - 4 500	.7	1.0
4 500 and over	.5	.5
	100.0	100.0

¹ Refers to average consumption in small groups of households (see text, p. 41).

A method has been developed for estimating the proportion of undernourished households based on such distributions, using the available knowledge of the variation in energy expenditure among young, healthy, active adults, and is illustrated below with reference to the data for Burma.²

¹ The term "reference man" is a basic concept of the FAO calorie-requirement scale. The calorie requirement of the reference man for any country is that of a healthy, adult male of 20-30 years of age of moderate activity with an assumed desired weight, adjusted for the average environmental temperature.

² For details and sources of data see Sukhatme, P. V., "The world's hunger and future needs in food supplies," *The Journal of the Royal Statistical Society, Series A (general)*, Vol. 124, 463-525, 1961.

The distribution for Burma refers to dietary surveys conducted during 1939-41 in representative areas of the different districts of the country. In each selected area 20-30 households representing the population preponderant in the area were studied. The data were collected by local trained volunteers who were known to the households visited. The records of the quantity and kind of foodstuffs consumed were obtained by two daily visits at the time of preparation for cooking the principal meal. The foodstuffs were weighed before preparation. Sex and age of all members of the household consuming food were noted, and in calculating the reference-man equivalent of the members of the households, notice was also taken of any absence from meals or the presence of any guests. The table shows that in two thirds of the surveyed households in Burma the calorie intake per reference man falls short of the corresponding requirement, which according to the FAO scale is approximately 2,700. This does not mean, however, that two out of every three households are underfed, any more than one out of every four households found to fall short of the corresponding requirement in the United States (Table 18) can be considered undernourished. Clearly, some people will need less than the stipulated requirement, while others may need more. This is so because the adjustment of individual intake to reference-man equivalent is based on age and sex only and disregards variations in physical activity and other residual factors.

Available evidence given in FAO's report on calorie requirements indicates that the standard deviation of energy expenditure can be placed at approximately 400 Calories per reference man.³ The value of the standard deviation for households with a size equivalent to four reference men as is the case in Burma can be placed at approximately 200. If Burma's population were adequately nourished one would expect only a very small fraction of the households to have Calorie intake on a reference-man equivalent basis below 2,700 less three times the value of the standard deviation, that is, below 2,100. In

³ This figure is in broad conformity with the findings of Harries, J. M., Hobson, E. A. and Hollingsworth, D. F., "Individual variations in energy expenditure and intake," *Proceedings of the Nutrition Society*, Vol. 21, 157-169, 1962.

actual fact, the proportion of households with intake below 2,100 Calories is approximately 25%; assuming that the sample is representative, a conservative estimate of the proportion of undernourished in Burma during the period of the survey would be roughly a quarter.⁴

The data for prepartition India tell much the same story. These were collected over a 14-year period from 1935 to 1948, were fairly evenly spread out throughout the different seasons and covered 843 groups totalling 12,500 households, mainly drawn from the low-income stratum, estimated to cover about two fifths of India's population. The standard deviation appropriate for estimating the incidence of undernutrition from this distribution is approximately 100 Calories. It would therefore appear that most households would need to take more than 2,400 Calories per reference man in order to meet their needs. In actual fact, as Table 16 indicates, 55% of the groups of households surveyed during 1935-48 took less than 2,400 Calories. This is equivalent to approximately one fifth of all households in India. There would undoubtedly be some households with inadequate calorie supplies in the middle income group of the country, but no estimate of the proportion of such households can be made. Generalizing from the above, it would appear that the proportion of undernourished in India during 1935-48 was about one fourth.

A similar analysis of a survey conducted in Ceylon (1948-49) indicates that the proportion of undernourished was a little over one third.

It may be argued that all these data refer to earlier years and that the consumption levels have since probably improved. This however does not appear to be the case. Table 17 shows the average daily intake of foodstuffs per reference man as revealed by dietary surveys conducted by the Indian Council of Medical Research dur-

⁴ It is recognized that food is not equitably distributed in proportion to the needs of individual members, especially in poor households. Earners, for example, might take an adequate share of the food, leaving children to feed on much less than what they need. On the other hand, the same may also hold, although to a somewhat smaller extent, for households with more than 2,100 Calories per reference man. In generalizing the conclusion regarding the proportion of undernourished households to undernourished populations, it is assumed that these two groups broadly counterbalance each other.

ing 1935-48 and those carried out during 1955-58. Although the households surveyed during 1955-58 were not the same as those surveyed in the earlier period, the two groups are stated to be broadly comparable and, further, each included a large number of households selected from different parts of the country. The table shows that there has been no appreciable quantitative change in the diet of the people in India during the last 15 years. The estimate of between one third (Ceylon) to one fourth (India and Burma) regarding the proportion of undernourished households would thus seem to hold good even today.

TABLE 17. - AVERAGE INTAKE OF FOODSTUFFS PER REFERENCE MAN AS REVEALED BY FOOD CONSUMPTION SURVEYS IN INDIA

Commodities	1935-48 ¹	1955-58 ²
	..... <i>Ounces per day</i>	
Cereals	16.6	16.6
Pulses	2.3	2.4
Leafy vegetables	0.9	0.7
Other vegetables	4.1	3.2
Ghee and oils	0.9	0.5
Milk	3.3	2.8
Meat, fish and eggs	0.9	0.5
Fruit (and nuts)	0.6	0.2
Sugar and jaggery	0.7	0.7

¹ Data refer to prepartition India.

² Data refer to India only.

The limited statistics from other underdeveloped countries in the Far East lead to much the same conclusion as for India, Pakistan, Ceylon and Burma which comprise one third of the population of the Far East. Thus the conclusion is probably valid, with small differences, for the whole region, except Japan and China, Taiwan, where the calorie supply is relatively higher.

However, the factor which is likely to make the largest difference to the estimate of the proportion of the world's people who are underfed is the estimate for Mainland China. The food balance sheet for Mainland China for 1957-59 prepared by FAO shows that

the Calorie consumption level for this country is around 2,100 as against the consumption level of around 2,000 for India and Pakistan. On the other hand, the requirement for Mainland China is also likely to be somewhat higher as compared to that of India and Pakistan, in view of the more intensive use of labor in that country and lower environmental temperatures. Even granting that conditions in Mainland China have improved substantially in the course of the last 10 years, the recent famine in the country (suggesting a lack of reserves from the exceptionally good crops reported for the previous years) indicates that consumption in Mainland China has not yet reached a level where the existence of undernutrition on an appreciable scale even in normal times can be ruled out. Granted that the proportion of undernourished in Mainland China is somewhat smaller than in the subregion comprising India, Pakistan, Burma, and Ceylon, it is nevertheless likely to be appreciable and, possibly, amounts to 20%. It would therefore seem that about one fifth of the population in the Far East and possibly more is undernourished. We have already seen that though the over-all average calorie supply in other underdeveloped regions is about equal to the respective over-all requirements, there are a number of countries in these regions for which the average calorie supply falls considerably short of the corresponding requirement, indicating the existence of undernutrition. The proportion of undernourished, for the world as a whole, would thus seem to be between 10% and 15%. In other words, as a very conservative estimate, between 300-500 million people in the world are undernourished today.

It is interesting to use the foregoing approach to analyze the situation in the developed countries. Table 18 presents two calorie distributions on reference-man basis, one for rural households of the north-central region of the United States based on the food consumption survey conducted in 1952, and the other from a nationwide survey conducted in 1955. In a well-developed country one would expect most households to have sufficient calorie supplies. The calorie requirement at the retail level for the reference man in the United States is approximately 3,500 and the corresponding standard deviation per household on the basis of its average size of 2.5 reference men can be placed at approximately 300 Calories per refer-

ence man. One would therefore expect most households to have Calorie supplies exceeding 2,600 per reference man. The data shown in Table 18 accord with these expectations. In a well-fed country however one would expect that not only would there be no under-nutrition but that the average intake would equal the average requirement, and further, that the variance of intake would also be equal to the variance of requirement.

TABLE 18. - DISTRIBUTION OF HOUSEHOLDS BY CALORIE SUPPLIES PER REFERENCE MAN PER DAY, UNITED STATES

Calories per reference man per day	Percentage frequency					
	North-central region U.S.A., 1952		U.S.A., 1955			
	Rural farm	Rural nonfarm	Rural farm	Rural nonfarm	Urban	Total
Under 2 000	2	3	} 5	10	14	12
2 000-2 500	3	6				
2 500-3 000	12	14				
3 000-3 500	19	22	9	10	14	12
3 500-4 000	22	19	11	17	17	16
4 000-5 000	27	25	28	29	27	28
5 000-6 000	} 15	11	} 20	17	15	16
6 000 and over							27	17	13	16

The data for the United States show that on the average the calorie supply purchased per reference man exceeds the requirement at the retail level by 500 and, further, as indicated in Table 18, that the number of households exceeding the requirement plus 3 times the standard deviation per household on a reference-man basis approximates to 30% for the north-central region and indeed approaches 50% for the nation as a whole. This could indicate that a large proportion of people in the States is probably overeating. It is of course possible that intake may have been overestimated, due, among other factors, to the underestimation of wastage. Alternatively, requirement could have been underestimated. Possibly all three situations exist.

Malnutrition

EVIDENCE OF MALNUTRITION

Malnutrition reflects the inadequacy in the nutritional quality of the diet. Diets of poor nutritional quality are common in most of the less developed areas, as indicated by the high percentage of calories derived from foods rich in carbohydrates and the small consumption of animal protein. This is due to excessive dependence on cereals and starchy foods and low consumption of animal foods. In addition, consumption of other protective foods such as fresh green and yellow vegetables and fruit is inadequate. These factors, together with wrong methods of food preparation and religious taboos and traditional prejudices are responsible for the deficiency of good quality protein and of essential minerals and vitamins. Diets of poor nutritional quality and/or insufficient quantity are largely responsible for listlessness, general impairment of health, poor physical development, and low resistance to infections and diseases. They are directly responsible for the widespread occurrence of specific deficiency diseases. They also contribute to the high mortality among infants and young children and the low expectation of life in the less developed areas.

The protein-calorie deficiency diseases (kwashiorkor and marasmus) result from the provision to weaned infants of diets which lack sufficient protein of good quality and which often do not provide enough energy for the efficient utilization of this limited amount of protein. They are the commonest of the nutritional deficiency diseases in the world today. A nutritional survey in Uganda, where plantains are particularly important in the diet, has revealed an incidence of kwashiorkor ranging from 6 to 11% in different groups of young children examined. Surveys in southern Nigeria, where yams and cassava are the staple foods, have indicated an incidence of kwashiorkor among young children of about 5%, significantly higher than the incidence of 2% found in the northern region of Nigeria, where millets are the staple foods. An extraordinarily high incidence of kwashiorkor characterizes the Feshi district of the southern Congo (Leopoldville), where cassava provides more than 80%

of the total calorie intake. The incidence of these protein-calorie deficiency diseases is also high in Latin America and the Far East. In general it coincides with the consumption of diets in which maize and cassava are the staple foods, and is related to the lack of milk and other good quality protein foods in children's diets especially in the postweaning period. The reported incidence refers to cases with well-defined clinical signs. Less serious cases of protein-calorie malnutrition are much more common. It has been claimed that most Africans have suffered from the disease at some time in their childhood often with permanent aftereffects. An increasing use of pulses, as in India and Pakistan, and of milk and other animal products, as in Japan and China, Taiwan, is helping to reduce the incidence of protein malnutrition.

Vitamin A deficiency is mainly due to the insufficient intake of foods like green and yellow vegetables, milk, eggs, butter, fishliver oils, and carotene-containing vegetable oils such as red palm oil. It is still widespread in many countries of the Far East, Latin America, and Africa. The importance of vitamin A deficiency is that total and incurable blindness often results, particularly among children. It also causes night blindness and skin disorders. Vitamin A deficiency is a public health problem in Indonesia, Mainland China, Burma, and elsewhere in the Far East, in parts of Latin America and in the semiarid zones of Africa. Throughout the humid coastal zones of west Africa supplies of carotene (pro-vitamin A) are ample because of the widespread use of red palm oil.

Nutritional anaemia which may result from dietary deficiencies of iron, folic acid, or other nutrients accentuated by intakes of protein poor in quantity or quality, is common in areas where starchy roots are the staple foods and green leafy vegetables are eaten in only small amounts. The condition is often aggravated by chronic parasitic infestation which occurs among a high percentage of the population. Nutritional anaemia affects mostly pregnant and lactating women.

Owing to a low intake of milk and milk products the diets consumed in many parts of the world provide much less calcium than those eaten in the more developed countries. In certain developing areas where low levels of dietary calcium are associated with lack of exposure to sunlight, due either to climatic or cultural reasons, the

incidence of rickets in children or bony deformities in their mothers may be high. This has been found in parts of India and Burma, in the Near East, and in north Africa.

Among the common signs of malnutrition observed in developing countries are sore lips and sore tongues, due to lack of vitamin B₂ (riboflavin). These result from the use of starchy staple foods which contain only traces of the vitamin and a low consumption of dairy produce (milk and eggs) and fresh leafy vegetables.

Endemic goiter is found in areas where the soil and drinking water are low in iodine, and is particularly prevalent among the inhabitants of remote granite mountains, but may also be found in certain low-lying areas. In these circumstances the provision and use of iodized salt is the best means of eradicating the disease.

Considerable progress has been made during the past decade in reducing the incidence of the deficiency diseases through the adoption by governments of measures planned to orientate food production, processing and utilization to the consumption of nutritionally satisfactory diets, the adoption of planned development of health improvement measures, the spread of nutrition and home economics education, and programs for better nutrition, especially for vulnerable groups. For example, beriberi which is due to the lack of thiamine virtually disappeared from areas in Indonesia, China (Taiwan), and India through the use of undermilled or parboiled rice. It is reported that undermilling of rice and the practice of not washing it before cooking has also been introduced in Mainland China. Government insistence upon the use of parboiled and undermilled rice has prevented the appearance of beriberi in Nigeria where rice production is expanding rapidly. On the other hand, the increasing use of machine milling and consumption of highly polished rice in some parts of the Far East has spread the disease. It is reported that beriberi is now common in Thailand, Burma, and the Republic of Viet-Nam, and also in south Mainland China, East Pakistan, and some parts of India. In parts of Japan, however, the thiamine deficiency which had resulted from the return to the prewar habit of consuming highly polished rice has been overcome by legislation for enrichment of rice with thiamine.

Indirect evidence of malnutrition is provided by vital statistics and records of growth rates of children. High infant mortality rates

and poor growth rates in the less developed areas are indication of nutritional deficiency. Whereas the death rate for children under one year of age is less than 40 per thousand in industrial countries, it is about 100 per thousand in many Asian and Latin American countries and over 200 per thousand in some countries, particularly in Africa. Again, while the death rate of children between one and four years is some 1 per thousand in the United States and other developed countries, it exceeds 20 per thousand in many less developed countries.

Statistical data show that during the last 50-100 years a tremendous shift has taken place in the dietary habits of many of the well-developed countries towards animal products compared with that of cereals. By contrast, the intake of animal products including milk in many less developed countries, particularly in the Far East, even today is much below the level in the highly developed countries some 50 or 100 years ago. These differences in diet are significant in the light of the improvements in health which have taken place in these countries during the last 50 years or so. For example, expectation of life in the United Kingdom has increased from 40 in 1850 and 54 in 1910 to 70 in 1956, while the corresponding improvement, say in India, though impressive, still does not bring expectation of life there to more than 40 years. Even if the greater part of the improvement is considered due to general advances in medicine and sanitary control, there is a common agreement that the improvements in the composition of the diet in most developed countries over the last few decades have contributed materially to the decrease in mortality rates among children, increase of longevity, and greater resistance to diseases. Further evidence is provided by the striking improvement in the stature and body weight of the people of Japan since the war and the simultaneous improvement in the quality of their diets through larger intake of protective foods.

INCIDENCE OF MALNUTRITION

It will be clear already that there exists a large mass of evidence which shows that there is serious and widespread malnutrition in the less developed countries. Sufficient data obtained from clinical surveys are not available from which to estimate the incidence of specific

deficiency diseases. Even if available, such data may not reveal sub-optimum states of nutrition. The incidence of malnutrition can therefore only be measured indirectly. In the absence of satisfactory information on individual nutrient intakes and requirements, the most that can be done is to estimate the incidence of malnutrition by reference to the nutritional quality of diets in the developed countries using an appropriate indicator for this purpose. Clearly a single indicator cannot be expected to reflect fully the many difficult factors which result in malnutrition; but indicators are often used to advantage in even more complicated subjects. For instance, a high national income per caput is reasonably taken to imply a high level of living but does not necessarily reflect an adequate level of living in every respect.

The indicator of quality of diet chosen in the second world food survey was the percentage of calories derived from cereals, starchy roots, and sugar and was also recommended by the United Nations and its Specialized Agencies as an indicator of the food consumption and nutrition component of the level of living. It is a simple indicator and will be used here. Clearly the choice of this indicator affects the estimate of the proportion of malnourished. It may understate malnutrition where starchy roots are preponderant and overstate it where cereals make a larger contribution to the calorie supply. Also some foods like white fish and poultry make a greater contribution to the animal protein supply than their contribution to the calories would suggest. So that in countries where a major contribution to animal protein supply is made by such fish, as in Japan, this indicator may well overstate malnutrition. Again, fresh fruit and vegetables which supply vitamins and minerals make a negligible contribution of calories, even when consumed in satisfactory amounts.

The proportion that is considered to be malnourished also depends on the standards chosen. Whatever reasonable standard is set, certain individuals who are on the wrong side of this standard will nevertheless succeed in providing themselves with an adequate diet by a careful selection of their foods. Even when the observed value of the indicator is high, stringent public health measures and nutrition education may be sufficient to avoid some of the worst consequences of malnutrition. But as the indicator rises, a stage is clearly reached when the knowledge, control, and education required to avoid all the

consequences of malnutrition are so great that the only practical policy is to raise the general quality of the diet. On the other hand even in a country where the value of the indicator is low (like the United Kingdom) government measures are often considered necessary to avoid shortages of some specific nutrients. But the indicator is useful nevertheless because as it falls, the probability of malnutrition falls, and as it rises, the difficulty in avoiding malnutrition rises.

In the second world food survey whenever the proportion of calories from cereals, starchy roots, and sugar exceeded two thirds, this was taken as evidence of malnutrition, although no attempt was made to estimate the percentage of malnourished. To do this, the value of the indicator for the individual members of the population must be known. In the United Kingdom, a well-fed country, the average value of the indicator is 50% and the standard deviation is a little over 10%, so that in at least 90% of the households that indicator falls below 80%.

Table 19 shows a distribution of the indicator for all types of households in Maharashtra State (India). It will be seen that some 60% of the households derive more than 80% of their calories from cereals, starchy roots, and sugar. In other words, if this is representative of conditions in India as a whole, some 60% of the households live on diets substantially inferior in quality to those in the United King-

TABLE 19. - DISTRIBUTION OF HOUSEHOLDS BY THE PERCENTAGE OF CALORIES DERIVED FROM CEREALS, STARCHY ROOTS, AND SUGAR IN MAHARASHTRA STATE (INDIA) (1958)

Percentage of calories derived from cereals, starchy roots, and sugar	Percentage frequency
< 50	5.8
50 -	2.2
55 -	1.7
60 -	4.1
65 -	6.5
70 -	10.3
75 -	11.6
80 -	18.0
85 -	19.6
90 -	15.9
95 - 100	4.3
	100.0

dom and may be considered to be malnourished, if the situation in the United Kingdom and similar countries with a moderate average value for the indicator is taken as the standard of comparison.⁵ Data concerning the exact form of the distribution of the indicator throughout the world are very scarce; but distributions were fitted using the limited knowledge available concerning them and the average values for the various countries (see also Appendix 4). The conclusion was reached that the data on malnutrition for India were fairly typical of other less developed countries. So the incidence of malnutrition in the less developed regions is estimated at 60%.

To sum up, as a very conservative estimate some 20% of the people in the underdeveloped areas are undernourished and 60% are malnourished. Experience shows that the majority of the undernourished are also malnourished. It is believed therefore that relative to the nutritional levels enjoyed by the people in the well-to-do countries and relative to the actual calorie requirements of the countries based on the FAO international scale, some 60% of the people in the underdeveloped areas comprising some two thirds of the world's population suffer from undernutrition or malnutrition or both. Since there are undoubtedly some people in the developed countries who are also ill-fed it is concluded that up to a half of the peoples of the world are hungry or malnourished.--

⁵ For details and source of data, see Sukhatme, P. V., "The food and nutrition situation in India, Part I," *Indian Journal of Agricultural Economics*, Vol. XVII, No. 2, 1-28, 1962.

5. NUTRITIONAL TARGETS

Throughout the underdeveloped countries hunger and malnutrition are urgent problems and demand an immediate increase in the supply of food. The nutritional targets which form the central theme of this survey are therefore of the immediate type which people in the developing countries have a right to aspire to, overnight as it were, and have for their objective the elimination of undernutrition and a reasonable improvement in the nutritional quality of the diet. Such targets, hereafter called short-term targets, must (in the words of the Hot Springs Conference) be "based upon the practical possibilities of improving the food supplies of the population." They have been drawn up to assist the developing countries in preparing plans in response to the United Nations "Development Decade" which calls upon the countries of the world to co-operate in achieving a rate of growth of at least 5% per annum in the gross national product. This rate of increase is necessary in order to cover the increase in the population and at the same time to provide for a reasonable increase in the level of living. In this context the short-term nutritional targets become possible by the year 1975. But by their very nature, targets set out what ought to be achieved, not necessarily what is likely to be achieved during a period of economic growth, and need to be implemented deliberately by appropriate planning and policy measures.

The short-term targets are only a first step in what must be a continuous effort to achieve improvement in health and physique through better nutrition. Nutritional goals are dynamic.¹ They will probably change as people change their way of life; they will certainly

¹ Wright, N. C., "The current food supply situation and present trends" in Russel, E. J. and Wright, N. C., ed., *Hunger: can it be averted?* London, 1961, British Association for the Advancement of Science.

change as the science of nutrition makes progress; and they will actually recede the more nearly they are realized, for increased stature and body weight lead to increased requirements for food. In this context long-term targets have been formulated, not with the intention of providing any final answer to the problems of hunger and malnutrition but to give an idea of the scope for improvement in the diet as the problems of poverty and scarcity become less acute. We consider the implications of trying to realize these objectives by the turn of the century.

Quantitative formulation of nutritional targets

The guiding principles in formulating nutritional targets are clearly (1) to ensure quantitative adequacy of diets, and (2) to improve the nutritional quality of diets.

1. The objective of eliminating undernutrition requires that the calorie target should be equal to the corresponding average calorie requirement at the physiological level plus whatever allowance is needed to account for wastage and losses between the physiological level and the retail level (i.e., the level at which food supplies are usually measured). Further, the calorie supply should be so distributed that everyone in the population eats enough to meet his energy needs. In practice however the calorie supply will be unequally distributed, with some people taking more calories than they need. The calorie targets at the retail level need therefore to be so set up that they are equal to the average requirement at the physiological level increased by an appropriate amount to allow for wastage between the retail and physiological levels, and also to cover inequalities in distribution between social strata and within families.

The losses between the retail level (as brought into the kitchen) and the physiological level include losses of foods through spoilage, losses in cooking, wastage on plates, and food fed to domestic animals. However, losses through spoilage in the underdeveloped countries occur mostly during storage in homes in rural areas, owing to poor storage facilities. They are admittedly larger than in the developed countries. But these losses occur all through the year be-

fore the food is brought into the kitchen. They should strictly be taken into account in estimating the available food supplies at the retail level and therefore do not enter into the difference between the retail level and the physiological level. On the other hand, losses in the preparation of foods and wastage on plates are much smaller than in the developed countries. The quantity fed to domestic animals in developing countries is difficult to estimate. Altogether, it would appear that the losses between the retail and physiological levels in the developing countries are lower than in the prosperous countries and for the purposes of this survey have been placed at 5-10%. As the proportion of the rich to poor is exceedingly small in most developing countries, the over-all allowance of 10-12% over and above the calorie requirement at the physiological level leaves enough room for extra consumption arising from inequalities in distribution between social strata and within families. Accordingly, the *short-term targets* for the developing regions are set at the current requirement at the physiological level increased by 10-12%.

The dynamic nature of nutritional targets already referred to demands some extra allowance for improved stature and health. The *long-term calorie targets* for developing regions are set higher by 50-100 Calories to allow for an increase in height and body weight of adults. The corresponding increases for children are allowed for in the short-term targets.²

In the developed regions, as shown in sections 3 and 4, there is almost always an excess of calorie intake over requirements. This can only be explained either by increasing stature, underestimation of physical activity, or underestimation of wastage of food between the retail and physiological levels. There is not adequate evidence to conclude that people in the developed countries are overeating to anything like the extent indicated by the gap. Part of the obesity observed might well be due to lower activity than needed for a healthy active life. It follows that a good part of the gap must be explained by either underestimation of calorie requirements or

² The physiological energy requirements up to the age of 15 years suggested by the Second FAO Committee on Calorie Requirements are the same (except for an allowance of environmental temperature) for children in developing and developed countries.

of wastage between the retail and physiological levels. The existence of obesity suggests the desirability of reducing the current consumption levels. This is however hardly practicable in the short run, and even in the long run the effects of increased income on consumption and wastage may counterbalance the effect of any inducement to reduce the calorie intake, however desirable nutritionally. Accordingly, no change is made in the current consumption levels for the developed regions.

2. The objective of improving nutritional quality of diet requires that the intake of protective foods should be increased to a level approaching that in the well-fed countries, insofar as this is feasible and advisable. This objective cannot be achieved merely by specifying targets for the total amount of proteins in the diet. Proteins refer to only one aspect of the nutritional quality of diets and the quality of proteins from different sources varies. However, most diets rich in good quality proteins like those of animal origin also include a greater variety of foods and are therefore likely to contain substantial amounts of other essential nutrients. It has accordingly been a custom to use protein derived from animal sources as a measure of the quality of the diet, provided that the total protein is adequate.

To achieve optimal utilization of protein for growth and maintenance of health, it is essential that the diet provide adequate energy from nonprotein sources (fats and carbohydrates). While fulfilling its primary function of providing for growth and maintenance, dietary protein contributes 4 Calories for each gram so utilized. If the diet does not supply sufficient energy from nonprotein sources, protein is diverted from its primary functions of providing for growth and maintenance of body tissues to supplying energy for other vital functions. Provided adequate energy is available from fats and carbohydrates, the total amount of protein required for growth and maintenance depends inversely upon its quality (biological value). In general the proteins derived from animal sources have a higher biological value than those derived from vegetable sources. Thus the greater the percentage of the over-all dietary protein which is derived from animal sources the smaller will be the requirement and the fewer will be the calories derived from its utilization, always

provided the supply of non-protein calories is adequate. Provided that a reasonable proportion of total protein is derived from animal foodstuffs, a diet is likely to supply sufficient protein if 10-12% of the calories are derived from this nutrient.

In well-fed countries like the United Kingdom and France, about half the dietary protein is of animal origin. To aim at so high a proportion as one half or even a third for the developing countries is clearly not practicable, for animal proteins are far more costly than vegetable proteins; and even if it were possible to produce them most people would not be able to afford them until their purchasing power had gone up proportionately. But such high proportions may be unnecessary. Protein malnutrition is mainly important in infants and children. Protein deficiency in adults and adolescents (except pregnant and nursing mothers, the ill and infirm) can be remedied by adequate amounts of mixtures of vegetable foods; for although individual vegetable products are known to be deficient in one or more of the essential amino acids, a mixture is usually not.

Taking the above considerations into account, the *short-term targets* for the developing regions provide for a modest increase of 5-6 grams of animal protein to a total of 15 grams per person per day, which amounts to 22% of the total proteins. If distributed according to physiological needs within populations and families, this would go a long way to meet the most urgent needs of the vulnerable groups. A larger increase would have been desirable, but so small has been the trend of increase that the attainment of a larger target in the course of a decade or so is clearly outside the range of practical feasibility. Neither would a larger target be within the purchasing capacity of the people, even if Member Governments were to succeed in increasing the gross national product at a rate approaching 5% per annum in response to the call of the United Nations Development Decade.

The *long-term target* for the developing regions has been increased by a further 6 to a total of 21 grams per person per day which is equivalent to 28% of the total protein. This is intended to cover more adequately the needs of the vulnerable groups and to satisfy in some measure the demand in other sections of the community.

In the developed countries the intake of animal and total protein

TABLE 20. - SHORT-TERM AND LONG-TERM TARGETS FOR CALORIES, TOTAL PROTEINS, AND ANIMAL PROTEINS, BY REGIONS (PER CAPUT PER DAY)

Regions	SHORT-TERM TARGET					LONG-TERM TARGET				
	Calories	Total protein	Animal protein	Percentage of animal protein of total protein	Percentage of total calories derived from protein	Calories	Total protein	Animal protein	Percentage of animal protein of total protein	Percentage of total calories derived from protein
		..... Grams .....					..... Grams.....			
Far East	2 300	68	12.5	18	12	2 400	74	20	27	12
Near East	2 450	77	20	26	12	2 500	79	25	32	12
Africa	2 400	69	18	26	12	2 500	75	25	33	12
Latin America (excl. River Plate countries)	2 550	71	25	35	11	2 550	71	25	35	11
Low-calorie countries	2 350	69	15	22	12	2 450	74	21	28	12
World	2 550	75	23	31	12	2 600	79	28	35	12

is often unnecessarily high, but in the face of consumer preferences the targets do not suggest any change from the present consumption levels.

The different targets for calories and animal and total proteins, region by region, are given in Table 20, both for the short-term target and the long-term target. Appendix 5 gives targets by subregions.

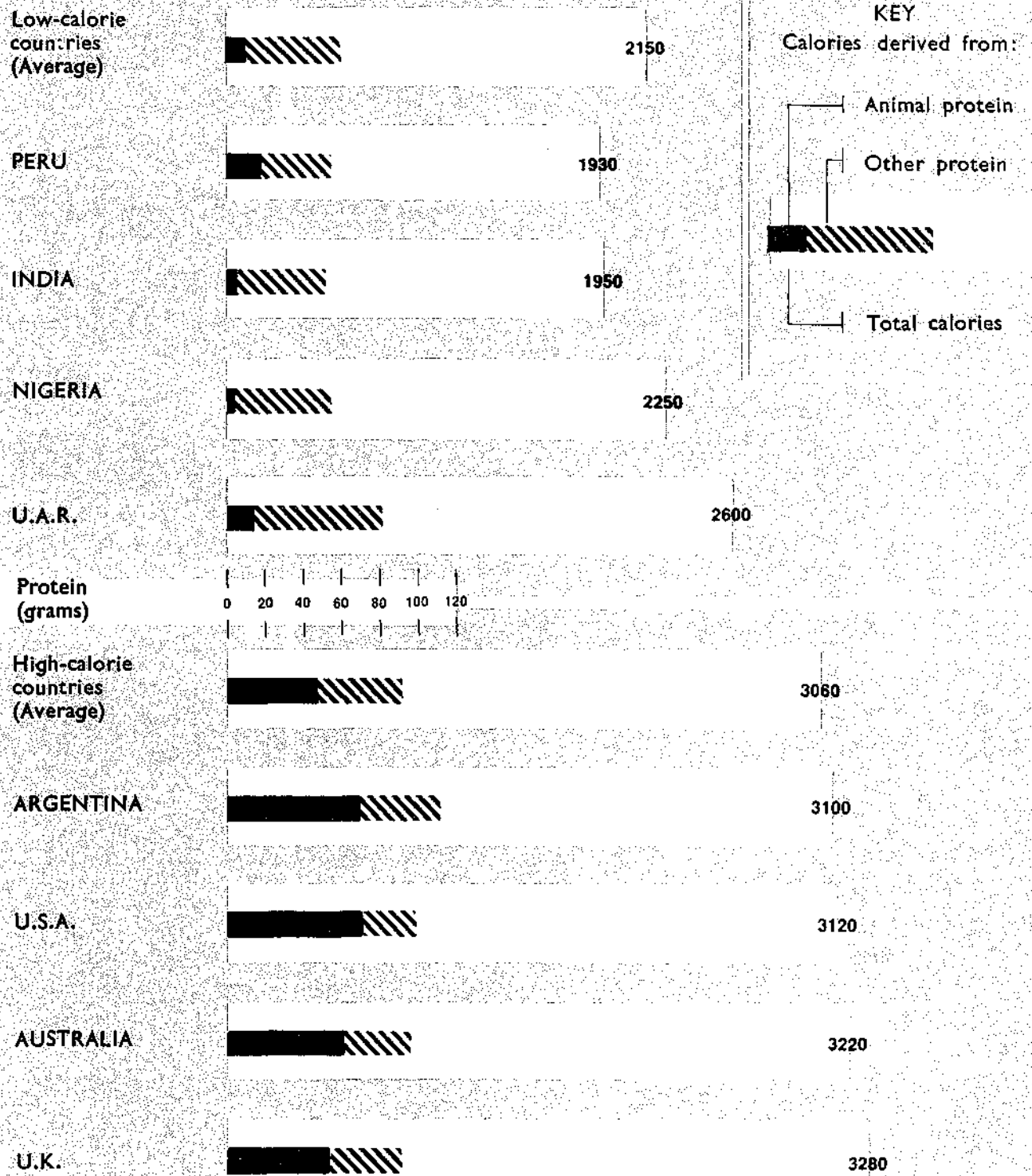
Limitation of targets

It should be re-emphasized that to improve nutrition in any given area, more is needed than an increase in the average level of calories, proteins, or other nutrients to the level implied in the targets. Satisfactory distribution of food within countries and families so that each may eat according to his needs is of utmost importance. Targets to be realistic ought therefore to be defined in relation to existing dietary patterns and preferences in the socio-economic groups within each country. In order to get the best results out of the supplies made available under the targets, it is necessary to direct them towards those members of the population who need them most, both through schools, clinics, hospitals, etc., and by means of associated measures of nutrition education. Such measures are best developed by the countries themselves, in the light of first-hand knowledge of the patterns of consumption and resources available in the countries. The objective of the third world food survey is only to give an idea of the order of change in food supplies needed to raise the peoples' level of nutrition. This objective is served by specifying targets for regions and subregions. It does not mean that a uniform degree of nutritional adequacy in all countries within a subregion is suggested. Indeed, in using subregional targets, differences between and within countries will be concealed.

Chart 1. - CONTRASTS IN NUTRITIONAL STATUS

Groups and selected countries

(Calories per caput per day)



1. Canada - 2. United States - 3. Mexico - 4. Cuba - 5. Jamaica - 6. Haiti - 7. Dominican Republic - 8. Puerto Rico - 9. Guatemala - 10. El Salvador - 11. Honduras - 12. Nicaragua - 13. Costa Rica - 14. Panama - 15. Colombia - 16. Venezuela - 17. Guianas - 18. Ecuador - 19. Peru - 20. Brazil - 21. Chile - 22. Bolivia - 23. Paraguay - 24. Uruguay - 25. Argentina - 26. Hawaii - 27. Ireland - 28. United Kingdom - 29. Denmark - 30. Norway - 31. Sweden - 32. Finland - 33. Netherlands - 34. Belgium - 35. France - 36. Spain - 37. Portugal - 38. Italy - 39. Sicily - 40. Sardinia - 41. Germany, Fed. Rep. - 42. Switzerland - 43. Austria - 44. Yugoslavia - 45. Germany, Eastern - 46. Poland - 47. Czechoslovakia - 48. Hungary - 49. Romania - 50. Bulgaria - 51. Albania - 52. Greece - 53. U.S.S.R. - 54. Turkey - 55. Syria - 56. Lebanon - 57. Israel - 58. Jordan - 59. Saudi Arabia - 60. Yemen - 61. Iraq - 62. Iran - 63. Afghanistan - 64. Pakistan - 65. India - 66. Ceylon - 67. Nepal - 68. China, Mainland - 69. Burma - 70. Thailand - 71. Laos - 72. Viet-Nam - 73. Cambodia - 74. Fed. of Malaya - 75. Singapore - 76. China, Taiwan - 77. Philippines - 78. Indonesia - 79. Australia - 80. New Zealand - 81. Korea - 82. Japan - 83. Morocco - 84. Algeria - 85. Tunisia - 86. Libya - 87. United Arab Rep. - 88. Mauritania - 89. Gambia - 90. Senegal - 91. Mali - 92. Upper Volta - 93. Niger - 94. Chad - 95. Sudan - 96. Ethiopia - 97. Somalia - 98. Guinea - 99. Sierra Leone - 100. Liberia - 101. Ivory Coast - 102. Ghana - 103. Togo - 104. Dahomey - 105. Nigeria - 106. Cameroon - 107. Central African Rep. - 108. Gabon - 109. Congo (Brazzaville) - 110. Congo (Leopoldville) - 111. Uganda - 112. Kenya - 113. Ruanda-Urundi - 114. Tanganyika - 115. Angola - 116. N. Rhodesia - 117. S. Rhodesia - 118. Nyasaland - 119. Mozambique - 120. Madagascar - 121. S.W. Africa - 122. Bechuanaland - Basutoland - Swaziland - 123. South Africa.

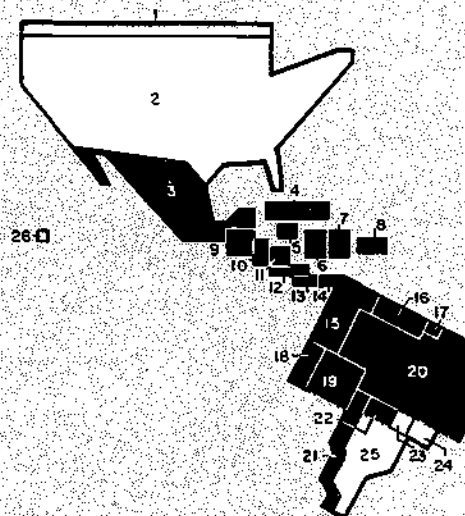
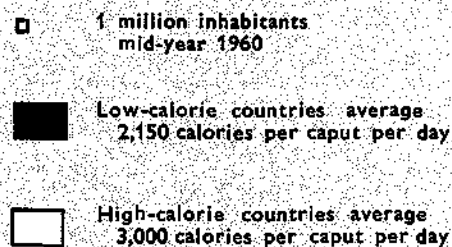


Chart 2. - NUTRITIONAL STATUS BY GROUPS
 (Countries and territories shown in proportion to population)

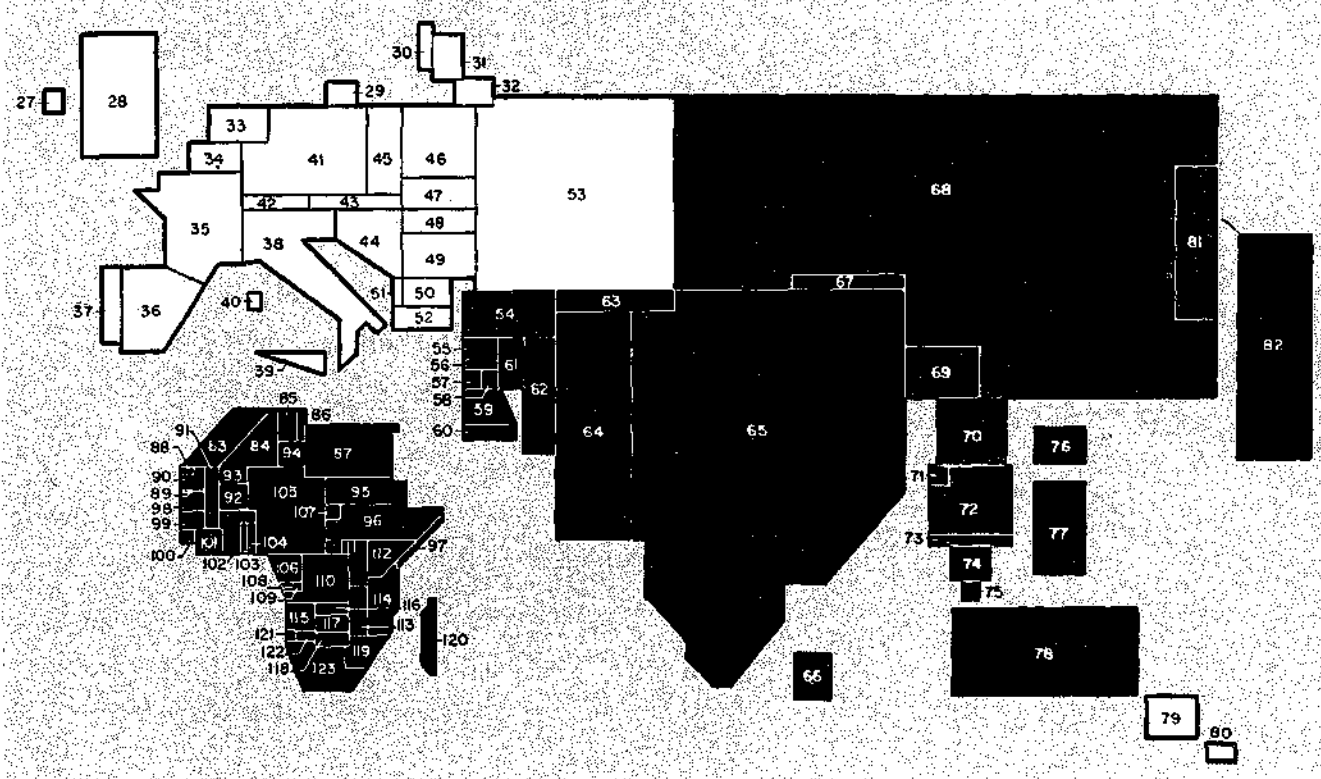
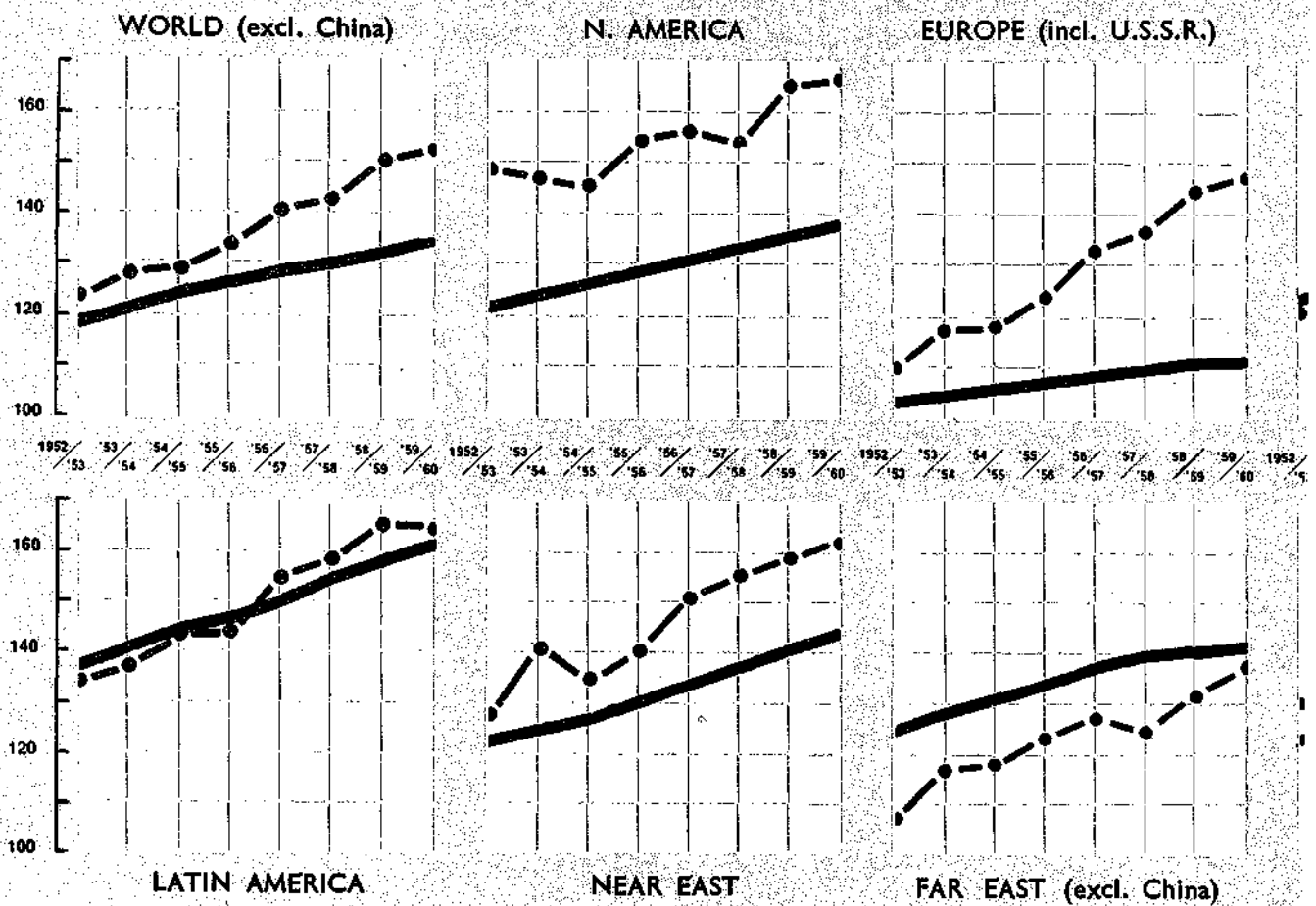


Chart 3. - THE RACE BETWEEN FOOD AND POPULATION

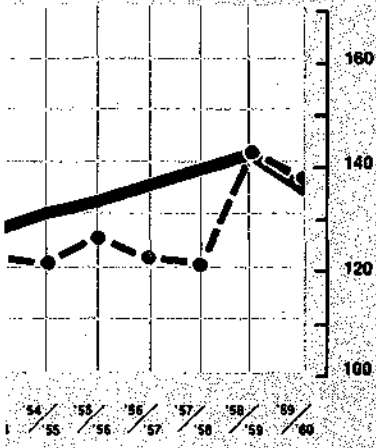
● — ● — ● — ● — Food production ——— Population



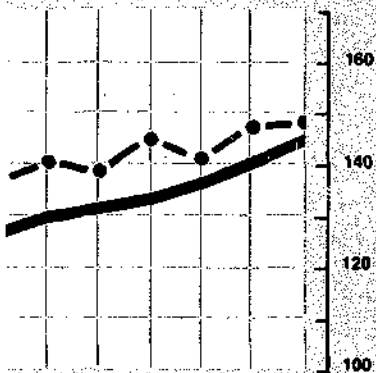
NOTE: The data in Charts 3, 4, 5 and 6 does not always agree exactly with the figures given in the text and in the appendixes. This is due to the fact that, at the time of the

Indices, prewar = 100

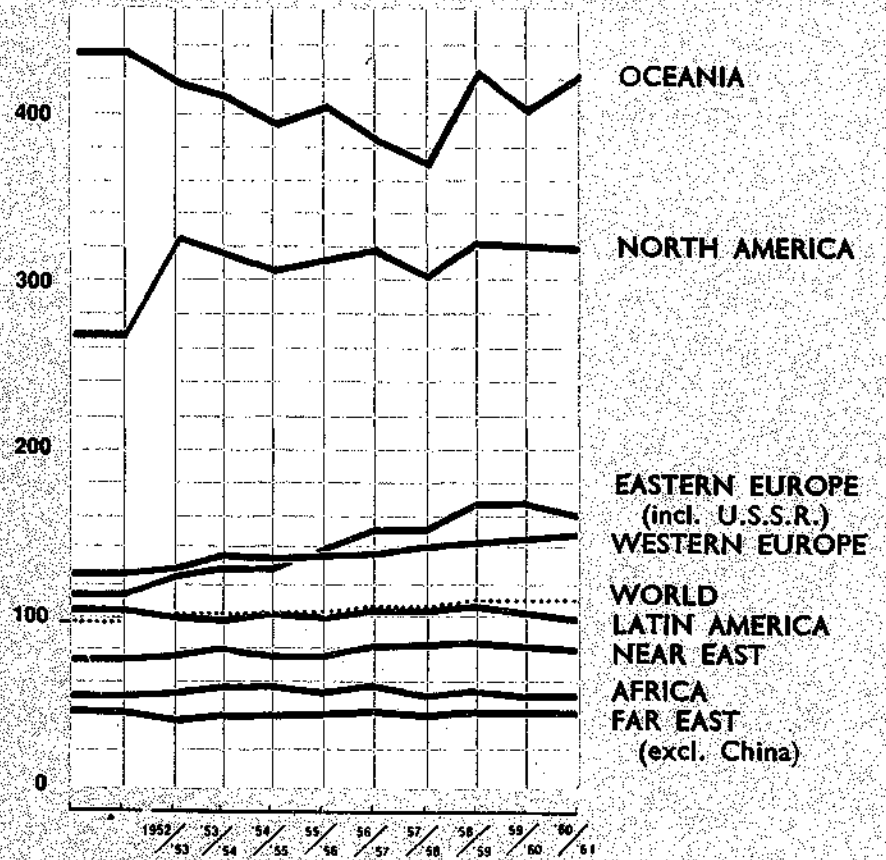
OCEANIA



AFRICA



Trends of food production per head
(World average, prewar = 100)



final revision of the text, more recent figures based on a different geographic distribution had become available.

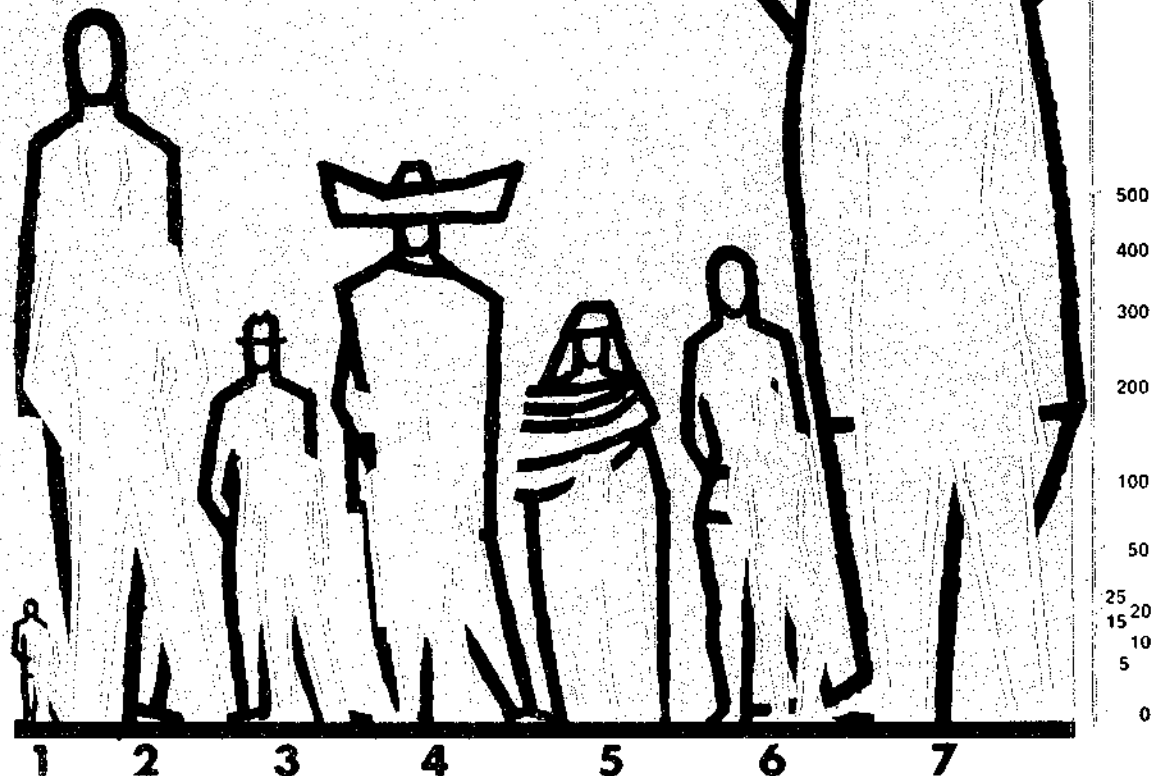
Chart 4. - EXPECTED POPULATION GROWTH

Regional populations
1960
(World total: 2,910 million)



Estimated regional
populations 2000 A.D.
(Estimated world total:
6,280 million)

1. OCEANIA
2. EUROPE (incl. U.S.S.R.)
3. NORTH AMERICA
4. LATIN AMERICA
5. NEAR EAST
6. AFRICA
7. FAR EAST



**Chart 5. - ESTIMATED RECENT AND REQUIRED (2000 A.D.)
LEVELS OF PER CAPUT FOOD SUPPLIES**

(Recent world average = 100)

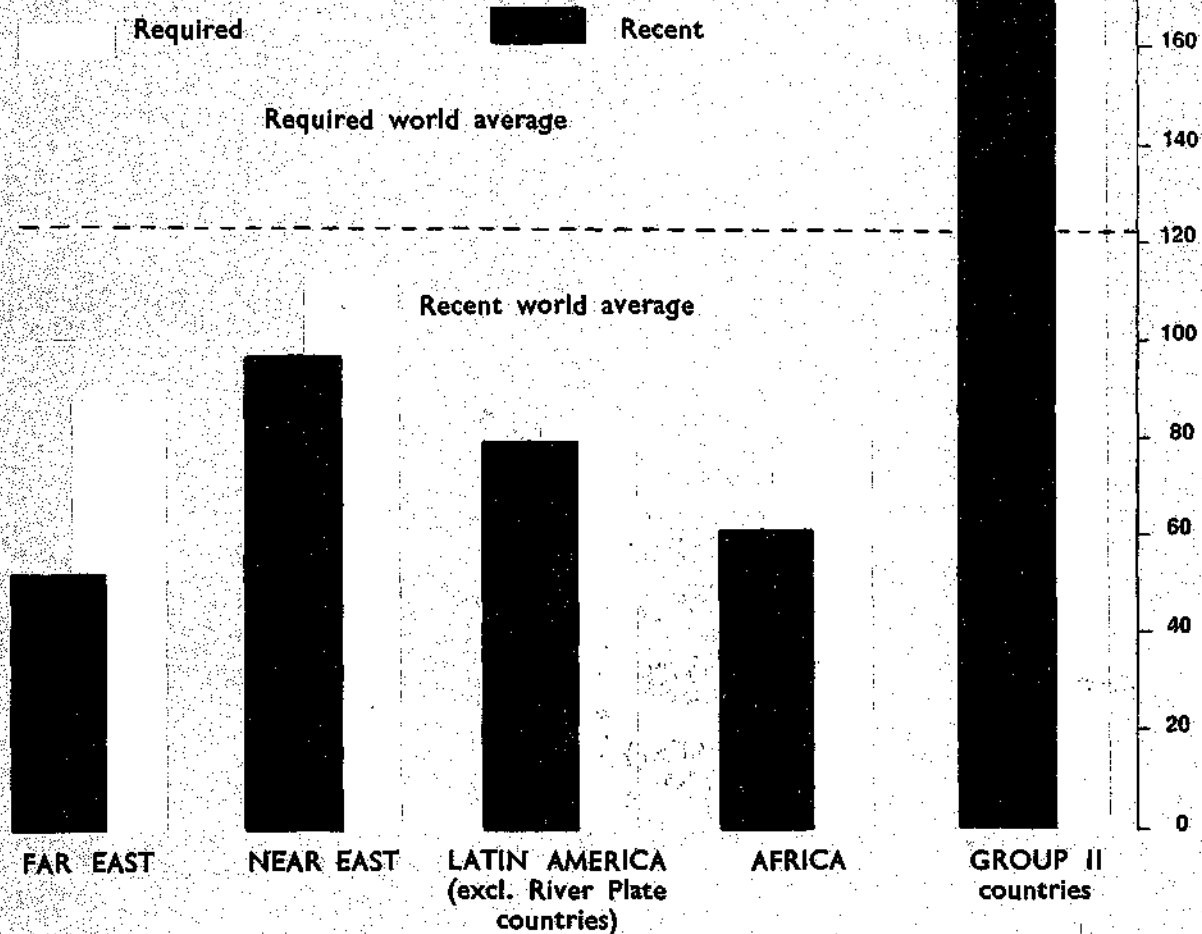
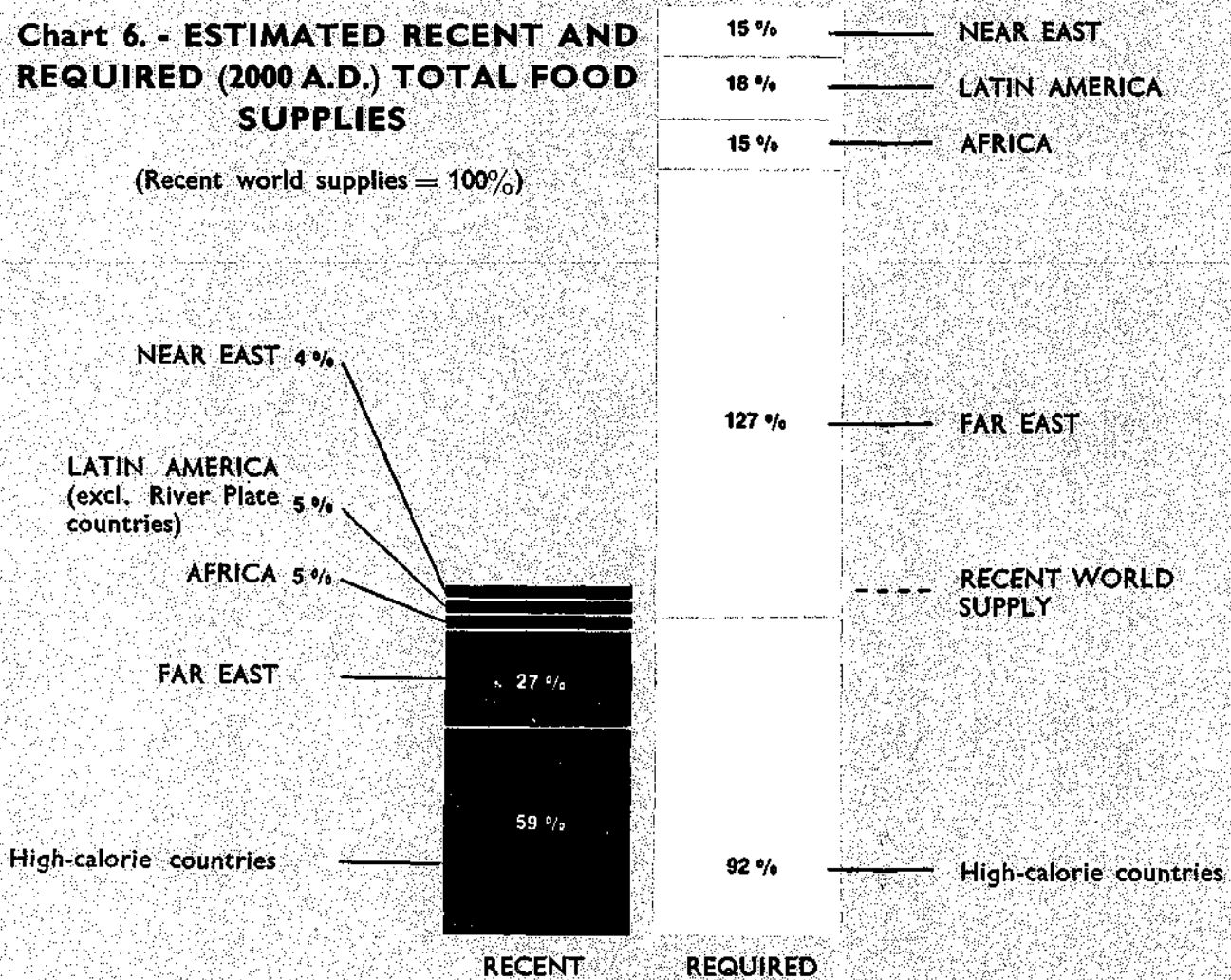


Chart 6. - ESTIMATED RECENT AND REQUIRED (2000 A.D.) TOTAL FOOD SUPPLIES

(Recent world supplies = 100%)



6. FOOD SUPPLY TARGETS

How they are set up

The next step is to compute targets in terms of the major food groups which reflect the proposed nutritional goals and in addition provide for adequate amounts of nutrients other than proteins, that is vitamins and minerals. Two types of considerations were taken into account in establishing them. It was considered that no radical changes should be introduced into the existing dietary pattern of the people and that where they are called for, as in the case of diets in subregions of Africa and Latin America, they would be introduced gradually as one passes from the short-term target to the long-term. The second consideration, which is rather more relevant for the short-term target (but will probably always be relevant to some extent), is economic and production feasibility, and ensures that the computed targets are feasible of achievement and as far as the short-term goals are concerned are within reach of the people in the course of the next decade or so. The long-term production possibilities can only be speculated upon, but every possible care has been taken in formulating the long-term supply targets.

The targets are expressed at the retail level. The sum of the calories derived from cereals, starchy roots, and sugar has been substantially reduced to allow for the inclusion of satisfactory amounts of pulses, animal products, fats, and oils in the diets. The specific points for each food group taken into account in establishing the food supply targets within the over-all considerations given above are set out below.

CEREALS

In most of the developing regions and subregions this food group makes a greater contribution than any other food group, not only to the energy value of the diets but also to their protein content.

In some subregions, notably central Africa, starchy roots contribute as much to the calorie supply as cereals, but even here cereals provide more protein than any other single food group. The biological value of many cereal proteins is high, particularly those of rice and certain millets, and they provide a more concentrated form of energy than root crops. Therefore, in formulating the targets, cereals have been used to replace a part of the starchy roots in areas where consumption of the latter is excessively high. In other developing regions targets for cereals are reduced to allow for the additional consumption of foodstuffs from animal sources needed to meet the animal protein targets. In general, the targets approximate to, or are set below the current levels.

STARCHY ROOTS

In some areas these staple foods can be produced very easily and provide the cheapest source of calories. Consequently the calorie target for such subregions could be met most economically by increases in supplies of roots like cassava and plantains alone. This however is not nutritionally desirable because the calorie concentration in such foods is low and the physical bulk of these diets is very great, an undesirable nutritional characteristic which is of great importance in the case of small children and expectant mothers. Moreover, the protein content is low and of poor quality. The food consumption targets for subregions in which the energy value of the diets consumed is largely derived from starchy roots have been so determined that a proportion of the energy presently derived from roots is replaced by more concentrated sources of calories such as cereals, fats, and oils.

SUGAR

In certain developing subregions it would appear that sugar consumption is somewhat too high, and the money spent on it might be better used for the purchase of more nutritious food. Even though sugars may be a reasonably cheap source of energy in these areas,

and the yield per acre higher than for cereals, most of them are purely carbohydrates. Therefore, for such subregions the target has been set below the present consumption. On the other hand, in other developing subregions the present levels of sugar consumption would appear low, sometimes contributing less than 50 Calories to the total, due among other things to the relatively high cost of sugar compared with other carbohydrates. Nevertheless, recent estimates of income elasticity of demand for sugar are high in these areas, suggesting the likelihood of considerably increased consumption with increasing per caput income. The increase over present consumption suggested in the targets has been placed for nutritional reasons below the level expected on economic grounds.

PULSES AND NUTS

This food group is nutritionally important as a source of energy as well as protein, some minerals, and B-complex vitamins. In regions where the present consumption of proteins is low and the potential production of foods from animal sources is poor, the target for pulses and nuts has been set at a relatively high figure.

FRUIT AND VEGETABLES

A considerable increase in the production and consumption of fresh fruit and green leafy vegetables is necessary in many of the developing areas of the world in order to provide many of the minerals and vitamins essential for good nutrition. In particular, adequate provision of this food group in the diet is important for the prevention of specific deficiency diseases such as scurvy, beriberi, and keratomalacia, and for satisfactory growth and maintenance of health. On the other hand, the production of many fruits and vegetables in semiarid, arid, and cold climates is not easy and contributes greatly to the cost of the diet. In line with the first world food survey, the principle followed in establishing targets for this food group was that it should contribute not less than 5% of the calories to the total energy value except in some subregions of the Far East and Africa

where the current level is abnormally low and any increase to bring the current level of supply to 5% of the calorie needs is not considered feasible in the short-term target. Adequate provision, however, is made in the long-term targets.

PRODUCTS OF ANIMAL ORIGIN (MEAT, FISH, EGGS, MILK AND MILK PRODUCTS, EXCLUDING BUTTER)

Criteria for setting up the animal protein targets have been described in the previous section. Of the different animal products, eggs and meat are usually the most costly sources of proteins and also of calories. Considerations of palatability and the desirability of ensuring a steady supply of animal proteins with the associated minerals and vitamins throughout the year made it necessary, however, to ensure that a certain minimum amount of animal proteins from these sources was included in the diet by establishing targets higher than the existing levels but consistent with what is agriculturally feasible and what the consumer can afford by 1975. Where it is available, fish is usually the cheapest source of animal protein. The target for animal protein could therefore be most economically met by increases in fish supplies. On nutritional grounds there is no objection to fish as a sole source of animal protein. An upper limit was set for the fish supply targets to take account of production feasibility and consumer preferences. Milk and milk products are not always cheap sources of animal protein, but are valuable sources of calcium. Milk is the most convenient food for meeting most of the nutritional requirements of infants, children, expectant and nursing mothers, the old, and the sick. The suggested target increases largely reflect the needs of these vulnerable groups.

FATS AND OILS

Fats and oils obtained from foodstuffs of animal and vegetable origin are a concentrated source of energy, and certain of them supply large amounts of fat-soluble vitamins and essential fatty acids.

Provided a diet supplies enough energy and sufficient of these essential food factors, nutritionists have not yet determined a minimum requirement for fat *per se*. On the other hand, diets which contain large amounts of fat (up to 40% calories from fat) may be harmful to health. But this consideration does not apply to the low-calorie countries where the inclusion of reasonable quantities of fat, particularly of unhydrogenated vegetable oils (good sources of essential fatty acids) in a diet which would otherwise rely on starches as the main source of energy, increases the calorie value of the diet while reducing its over-all bulk. This is an important factor in child feeding, particularly in developing countries. On a subregional basis such dietary improvements cannot be reflected fully in the figures. Still, in most subregions the target for fats and oils calls for a substantial increase in the short-term targets. The long-term targets provide for approximately double the present consumption in the low-calorie countries. Larger increases would have been nutritionally desirable but are hardly feasible when production and economic considerations are taken into account. These increases in visible fats have been accompanied by corresponding increases in the invisible fats, especially those contained in milk and meat.

Food supply targets in comparison with present consumption levels

Tables 21 to 26 show region by region the data on per caput food supplies available and needed under the short-term and long-term goals. The tables also show the resulting total values for calories, total proteins, animal proteins, and other indicators of the nutritional quality of diet, together with price-weighted index numbers of per caput food supplies¹ required to attain the respective targets. Appendix 6 shows the details by subregions.

A comparison of the food supplies available and needed to attain the short-term target shows that the Far East with a population of over 1,500 millions in 1958 has a current deficit in the protective

¹ See note 1 to Table 8.

food groups of some 15 million tons in pulses, 45 million tons in fruit and vegetables, 40 million tons in animal products, 4 million tons in fats and oils. Over-all food supplies today provide only some three fourths of what is essential for a healthy, active life. The deficit is particularly large in animal products which provide only about

TABLE 21. - PER CAPUT FOOD SUPPLIES AVAILABLE AND NEEDED UNDER THE SHORT-TERM AND LONG-TERM TARGETS TOGETHER WITH THE CALORIE AND PROTEIN LEVELS, FAR EAST

Item	Available	Short-term target	Needed/available %	Long-term target	Needed/available %
	..... g/day .....			.. g/day ..	
Cereals.....	400	395	99	361	90
Starchy roots.....	166	160	96	144	87
Sugar.....	24	35	146	35	146
Pulses and nuts.....	50	75	150	80	160
Vegetables and fruit.....	144	225	156	315	219
Meat.....	24	36	150	66	275
Eggs.....	3	6	200	8	267
Fish.....	12	21	175	30	250
Milk.....	54	98	181	140	259
Fats and oils.....	9	16	178	24	267
TOTAL CALORIES.....	2 060	2 310		2 400	
% calories derived from cereals, starchy roots, sugar	81	73		64	
TOTAL PROTEINS (g/day)....	56	68		74	
ANIMAL PROTEINS (g/day) ..	7.5	12.5		20	
Over-all index of per caput food supply.....		131		170	
Over-all index of per caput animal food supply.....		163		267	

60% of what is nutritionally desirable under the short-term target. The deficits for the different subregions range from 15 to 30% in over-all food supplies and from 20 to 45% in animal products. The inadequacy of the current food supply is even more striking when compared with the long-term target. The protective foods, including

fats and oils, are much less than a half of what is desirable as a long-term goal and the diet as a whole falls short of it by some 40%.

These deficits mean that the available food supplies per person must be increased by nearly one third and animal products by two

TABLE 22. - PER CAPUT FOOD SUPPLIES AVAILABLE AND NEEDED UNDER THE SHORT-TERM AND LONG-TERM TARGETS, TOGETHER WITH THE CALORIE AND PROTEIN LEVELS, NEAR EAST

Item	Available	Short-term target	Needed/available %	Long-term target	Needed/available %
	..... g/day .....			.. g/day ..	
Cereals.....	446	401	90	374	84
Starchy roots	44	44	100	44	100
Sugar	37	44	119	50	135
Pulses and nuts	47	47	100	47	100
Vegetables and fruit	397	397	100	397	100
Meat	35	53	151	68	194
Eggs	5	10	200	25	500
Fish	6	7.5	125	15	250
Milk	214	307	143	307	143
Fats and oils	20	25	125	30	150
TOTAL CALORIES	2 470	2 470		2 500	
% calories derived from cereals, starchy roots, sugar	72	66		62	
TOTAL PROTEINS (g/day)	76	77		79	
ANIMAL PROTEINS (g/day)....	14	20		25	
Over-all index of per caput food supply		117		130	
Over-all index of per caput animal food supply		148		180	

thirds, in order to attain the short-term goal. The increases needed to attain the long-term target are much higher.

The index number of total food supply in Africa falls short of that needed under the short-term target by some 20% and that of animal products by some 40%. Compared to the long-term target

the total food supply is two thirds and that of animal products considerably less than one half.

For the Near East, deficits are smaller, being 15% in total foods and some 30% in animal foods under the short-term target. The

TABLE 23. - PER CAPUT FOOD SUPPLIES AVAILABLE AND NEEDED UNDER THE SHORT-TERM AND LONG-TERM TARGETS, TOGETHER WITH THE CALORIE AND PROTEIN LEVELS, AFRICA

Item	Available	Short-term target	Needed/available %	Long-term target	Needed/available %
	..... g/day .....			.. g/day ..	
Cereals.....	330	365	111	340	103
Starchy roots.....	473	240	51	224	47
Sugar	29	31	107	31	107
Pulses and nuts	37	44	119	44	119
Vegetables and fruit	215	232	108	317	147
Meat	40	60	150	74	185
Eggs	4	10	250	15	375
Fish	8	20	250	35	438
Milk	96	145	151	203	211
Fats and oils	19	20	105	25	132
TOTAL CALORIES	2 360	2 400		2 500	
% calories derived from cereals, starchy roots, sugar	74	68		62	
TOTAL PROTEINS (g/day)	61	69		75	
ANIMAL PROTEINS (g/day) ..	11	18		25	
Over-all index of per caput food supply		123		151	
Over-all index of per caput animal food supply		171		239	

corresponding deficits under the long-term target are nearly 25% and 45%.

The food deficits are the least in the case of Latin America (excluding the River Plate countries), where per caput supplies approach more nearly those in the prosperous countries. Therefore, only one

target has been set for this region. Total food supplies fall short of this target by a little over 10% and those of animal foods by a little over 20%.

For the low-calorie countries together the food supply per caput is only some 80% of what is urgently required, and 65% of what is

TABLE 24. - PER CAPUT FOOD SUPPLIES AVAILABLE AND NEEDED, TOGETHER WITH THE CALORIE AND PROTEIN LEVELS, LATIN AMERICA, EXCL. RIVER PLATE COUNTRIES

Item	Available	Target	Needed/ available %
	..... g/day		
Cereals	282	315	112
Starchy roots	225	169	75
Sugar	89	74	83
Pulses and nuts	53	53	100
Vegetables and fruit	355	355	100
Meat	72	85	118
Eggs	11	16	145
Fish	8	16	200
Milk	201	250	124
Fats and oils	22	25	114
TOTAL CALORIES	2 430	2 550	
% calories derived from cereals, starchy roots, sugar	65	62	
TOTAL PROTEINS (g/day).....	63	71	
ANIMAL PROTEINS (g/day) ...	19	25	
Over-all index of per caput food supply		114	
Over-all index of per caput animal food supply		128	

needed under the long-term target. Per caput supplies of animal foodstuffs are 65% and 45% respectively under the two types of goals.

The net result for the world is that per caput food supplies are of the order of 90% of what is required under the short-term target

and 80% under the long-term target. The corresponding figures for animal foods are of the order of 85% and 70%.

The results of the survey imply that for the world as a whole there is an immediate deficit of some 60 million tons in animal products,

TABLE 25. - PER CAPUT FOOD SUPPLIES AVAILABLE AND NEEDED UNDER THE SHORT-TERM AND LONG-TERM TARGETS TOGETHER WITH THE CALORIE AND PROTEIN LEVELS, LOW-CALORIE COUNTRIES

Item	Available	Short-term target	Needed/available %	Long-term target	Needed/available %
	..... g/day .....			.. g/day ..	
Cereals.....	386	386	100	356	92
Starchy roots.....	194	162	84	148	76
Sugar	31	39	126	39	126
Pulses and nuts	48	68	142	72	150
Vegetables and fruit	184	248	135	324	176
Meat	30	44	147	69	230
Eggs	4	8	200	10	250
Fish	12	20	167	28	233
Milk	80	129	161	166	208
Fats and oils.....	12	18	150	24	200
TOTAL CALORIES	2 150	2 350		2 430	
% calories derived from cereals, starchy roots, sugar	78	71		64	
TOTAL PROTEINS (g/day)	58	69		74	
ANIMAL PROTEINS (g/day)	9.5	15		21	
Over-all index of per caput food supply		127		157	
Over-all index of per caput animal food supply		157		233	

50 million tons in fruit and vegetables, and 5.5 million tons in fats and oils. The long-term target indicates the need for increasing current production by twice these deficits to meet the needs of the present world population, while requiring some 20 million tons less of cereal for human consumption.

TABLE 26. - PER CAPUT FOOD SUPPLIES AVAILABLE AND NEEDED UNDER THE SHORT-TERM AND LONG-TERM TARGETS TOGETHER WITH THE CALORIE AND PROTEIN LEVELS, WORLD

Item	Available	Short-term target	Needed/available %	Long-term target	Needed/available %
	..... g/day .....			.. g/day ..	
Cereals.....	367	367	100	347	95
Starchy roots.....	230	207	90	197	86
Sugar.....	49	53	108	53	108
Pulses and nuts.....	38	52	137	55	145
Vegetables and fruit.....	238	282	118	336	141
Meat.....	66	76	115	94	142
Eggs.....	11	15	136	16	145
Fish.....	14	19	136	25	179
Milk.....	225	261	116	287	128
Fats and oils.....	22	27	123	31	141
TOTAL CALORIES.....	2 420	2 560		2 620	
% calories derived from cereals, starchy roots, sugar	70	66		62	
TOTAL PROTEINS (g/day)....	68	75		79	
ANIMAL PROTEINS (g/day) ..	20	23		28	
Over-all index of per caput food supply.....		111		123	
Over-all index of per caput animal food supply.....		116		138	

7. THE SIZE OF FUTURE FOOD NEEDS

The discussion in the previous section is confined to the dietary changes needed to achieve better levels of nutrition. It does not deal with the increases required to meet the needs of the growing population. The United Nations has prepared population projections up to the year 2000 based on various assumptions - low, medium, and high. Revised regional figures for 1975 and 2000 based on the medium assumption are shown in Table 27. Subregional figures are given in Appendix 7. These figures imply that increases in population alone without any improvement in the existing level of diet would call for an over-all increase in food supplies in the low-calorie countries of 41% by 1975 and 150% by the year 2000. The increases are much lower in the high-calorie countries. For the world as a whole food supplies would have to be increased by 36% by 1975 and 123% by 2000. Estimates of the index number of total food supplies covering the requirements for better levels of nutrition and for increasing population are shown in Table 28. The size of the problem involved in achieving the short-term targets (by 1975) and the long-term targets (by the year 2000) is discussed below. Appendix 8 gives details by regions and subregions.

Low-calorie countries

FAR EAST

Interpreted in terms of future needs, the short-term target implies that for every 100 million increase in population, the region would have to provide a total of some 15 million tons of additional cereals, 3 million tons of additional pulses, 8 million tons of additional fruit

and vegetables, and 6 million tons of additional animal products. According to the medium projection the population in the Far East is expected to grow from a little over 1500 millions in 1958 to some 2150 millions in 1975. It follows that if the short-term target is to be achieved by 1975 the total food supplies in the region would have to be increased by some 40% in cereals, 110% in pulses, 120% in fruit and vegetables, 155% in milk, and 150% in fats and oils (Appendix 8). Expressed in terms of the over-all index of animal food

TABLE 27. - PROJECTED GROWTH OF POPULATION AND INDEX NUMBERS OF POPULATION, BY REGIONS (1958 = 100) (medium assumption)

Regions	1975		2000	
	Population in millions	Index numbers	Population in millions	Index numbers
Far East	2 150	140	3 753	245
Near East	182	143	326	257
Africa	273	133	458	223
Latin America (excl. River Plate countries)	272	155	552	315
Latin America, River Plate countries	32	128	43	172
Europe	757	121	954	153
North America	250	130	325	169
Oceania	22	146	30	200
Low-calorie countries ..	2 877	141	5 089	250
High-calorie countries ..	1 061	124	1 352	158
World	3 938	136	6 441	223

and food supplies as a whole, the increases needed would be 128% and 83% respectively. These represent an annual compound rate of increase of 4.9% in animal foods and 3.6% in foods as a whole.

The trend of increase in over-all food supplies over the last 25 years has barely kept pace with the population growth (Table 8). There is, however, an indication that in some countries of the Far East the trend has exceeded population growth and reached a rate of 3% during the last decade. Encouraging as this development is, this rate would have to be stepped up and maintained at well over 3.5% for the region as a whole in order to achieve the short-term target by 1975. In actual fact the available evidence does not in-

dicating any increase in the per caput supply level between 1958 and 1962. If this is so, the actual rate needed to achieve the target by 1975 is more nearly 4.5% than 3.5% in total food supplies (this implies a rate of increase of 2.3% in per caput food supplies, the rate of population increase being 2%). Any attempt, however, to push up the rate of increase in per caput food supplies has to be accompanied by a corresponding effort to increase the purchasing power of the people so that they may absorb the additional food supplies available. It follows that if the aim is to attain the short-term targets by 1975 economic development plans should provide an increase in per caput income which, with the known income elasticity for food as a whole,

TABLE 28. - OVER-ALL INDEX NUMBER OF NEEDS IN TOTAL AND ANIMAL FOOD SUPPLIES UNDER THE SHORT-TERM AND LONG-TERM TARGETS, BY REGIONS (1957-59 = 100)

Regions	Short-term target 1975		Long-term target 2000	
	Total foods	Animal foods	Total foods	Animal foods
Far East	183	228	417	654
Near East	167	212	334	463
Africa	164	227	337	533
Latin America (excl. River Plate countries)	176	198	359	403
Low-calorie countries ..	179	221	393	583
World	151	158	274	308

would support a rate of increase in per caput food supplies of 2.3%. The income elasticity of food as a whole being of the order of .8, this rate of increase in per caput income is estimated at some 3% per annum. At a rate of population growth of approximately 2% per annum (and indications are that population growth is likely to be faster), the aim should therefore be to increase the aggregate national income by approximately 5% per annum, which in fact is the target for the decade 1960-70 in the plans for activating economic development through the joint efforts of the United Nations, FAO, and other specialized agencies.

The long-term target calls for larger increases in food supplies. Assuming that their realization is contemplated by the year 2000 and

that the population were about 2.5 times its present size, total food supplies should be more than quadrupled, and the supplies of animal foodstuffs should be $6\frac{1}{2}$ times their present amount.

OTHER DEVELOPING REGIONS

The implications of the targets have been discussed above in detail for the Far East, the largest of the developing regions. No detailed discussion for the other developing regions is made as the data presented in Tables 27 and 28 tell much the same story:

LOW-CALORIE COUNTRIES AS A WHOLE

Putting the results for the low-calorie countries together, we find that the total supplies in cereals would have to be increased by some 40% by 1975 and 130% by the year 2000; the corresponding figures are 100% and 275% for pulses and 120% and 485% for animal products. The respective increases in food as a whole needed by the low-calorie countries are 79% by 1975 and 293% by the year 2000.

The increase in total food supplies by 1975 calls for a per caput rate of increase of 2.0%, corresponding to some 3% in per caput income (the income elasticity for food as a whole being .7). If the population growth rate is 2% (and it may well be higher) this implies a rate of increase in aggregate national income approximating 5% which again is compatible with the philosophy of the United Nations "Development Decade."

The world

For the world as a whole, total food supplies in 1975 would have to increase by some 35% in cereals, 85% in pulses, and 60% in animal products, and in 2000 by some 110% in cereals, 225% in pulses, and 210% in animal products. The over-all change in the world's total food supplies needed to achieve the short-term target by 1975 and the long-term target by the year 2000 are 51% and 174% re-

spectively. In actual fact, the necessary increase in food supplies may well be greater because of inequality of distribution between countries. So the broad conclusion is that should the world population grow according to the United Nations medium projection its total food supply would have to be increased by well over a half by 1975 and threefold by the turn of the century, in order to provide a satisfactory level of nutrition.

8. THE POSSIBILITIES OF PRODUCING THE REQUIRED FOOD

What are the possibilities of producing the needed foods? This topic is the theme of another Basic Study prepared by FAO for the Freedom from Hunger Campaign and will therefore be touched upon only briefly here.¹

Production possibilities were kept in mind when setting up the short-term targets, but one is left wondering whether the large increases can in fact be achieved over a decade or so. These doubts may be even stronger in the case of the more distant objective. But there should be little room for doubt on one score: the world could grow enough food to meet all these needs if we made rational use of nature's bounty. Doubts arise because the necessary effort to reach the targets may not be made. Other objectives may cloud the horizon: the financial resources required to develop the world's agriculture may not be made available; the incentive to expand production may be absent in many parts of the developing world and the underdeveloped countries may be unable to purchase the food supplies they require.

If present technical knowledge can be spread, potential food production is extremely large. The use of organic and inorganic fertilizers, control of pests and disease, better seed and appropriate methods of cultivation, together with the large possibilities of extending irrigation and double-cropping, provide the means of increasing crop and fodder yields. Better and scientific feeding, timely use of forage crops, control of animal disease, and an efficient breeding program can likewise increase yields of livestock. Without any expansion of the cultivated area the production of crops could well be doubled. For livestock products the prospects are even better, although yields as

¹ *Possibilities of expanding world food production*. FFHC Basic Study No. 10 FAO, Rome, 1963.

high as those in some developed countries are not likely to be obtained until the scarcity of feeding stuffs has been overcome.

Lack of adequate soil surveys makes it difficult to say how much land is capable of producing crops, but the Basic Study referred to above shows that the area is very much larger than the 10% of the world's surface which is cultivated at present. Finally, a substantial increase in the effective yields can be made by improved methods of storage. For all these reasons it seems that supplies at the retail level could well be increased fourfold, and the true upper limit is probably much higher.

The agricultural resources can also be supplemented by a very great increase in the production of fish. The targets set imply an expansion of about fourfold by 2000, which may call for exploitation of marine resources outside the conventional fishing areas. There is also great scope for increasing production and improving the access to supply by deliberate culture of fish in inland lakes and waterways.

The position is more critical when we consider the requirements region by region. The low-calorie countries need to increase their food fourfold by 2000. In Latin America and Africa this expansion could be met by both increases in yields and expansion in the cultivated area, although this may not be achieved easily in areas of Africa where the custom of permanent settlement has scarcely been established. Where the shortage of land is acute as in the densely populated countries of the Far East and in the Near East, the problem is mainly one of raising yields through intensive agriculture. These countries must make the most of the "advantages of backwardness" quickly; otherwise the production may have little hope of keeping pace with the population.

In the high-calorie countries of the world, production seems more than likely to keep pace with the population growth. Even without any increase in incentive, a rise in the productivity of land of the order of 1½-2% is not merely possible but probable; and in addition in some areas (eastern Europe and the U.S.S.R.) a large acreage is available for new cultivation.

Clearly it is possible for countries with food surpluses to export food supplies to the low-calorie countries; but it is hardly conceivable that it can become a permanent means of redressing the imbalance between the regions, unless a final answer can be found to problems

associated with the balance of payments. For example, in the case of the Near East where it is a little difficult to see how the extra food is going to be produced, the exports of oil may be sufficient to pay for food. But in general the importation of food by developing countries should take second place to increased national food production, and justifiably so. Surpluses, particularly of milk products and cereals, occurring in the rest of the world can make a contribution to the needs of the underdeveloped countries but only if very deliberate steps are taken to use them to increase their production potential. The World Food Program launched jointly by the United Nations and FAO on an experimental scale is a welcome indication of our awareness of this task.

APPENDIXES

The appendixes give detailed data by regions and subregions. The regions used in Appendixes 1 to 3 are defined in the FAO *Production yearbook* and *Trade yearbook*. The coverage of the regions and subregions used in Appendixes 4 to 8 (and, for reasons of consistency, of the subregions in Appendix 1) depends on the availability of data on food supplies and is given below:

FAR EAST

South Asia:	Ceylon, India, Pakistan
Southeastern Asia, mainland:	Burma, Fed. of Malaya, South Viet-Nam, Thailand
Eastern Asia:	China (Taiwan), Japan, South Korea
Southeastern Asia, major islands: China, Mainland	Indonesia, Philippines

NEAR EAST:	Cyprus, U.A.R., Iran, Iraq, Israel, Jordan, Lebanon, Libya, Sudan, Syria, Turkey
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AFRICA

North Africa:	Algeria, Morocco, Tunisia
West and central Africa:	Congo (Leopoldville), Cameroon, former French Equatorial Africa, former French West Africa, Ghana, Guinea, Liberia, Nigeria, Togo
East and southern Africa:	Angola, Ethiopia, Kenya, Mada-

gascar, Mauritius, Fed. of Rhodesia and Nyasaland, Tanganyika, South Africa

LATIN AMERICA

Mexico and Central America: Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Mexico, Panama

Northern and western countries of South America: Bolivia, Chile, Colombia, Ecuador, Peru, Venezuela

Brazil

River Plate countries: Argentina, Paraguay, Uruguay

EUROPE

Western Europe: Austria, Belgium, Denmark, Finland, France, Fed. Rep. of Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Yugoslavia

Eastern Europe: Bulgaria, Czechoslovakia, E. Germany, Hungary, Poland, Romania

NORTH AMERICA: Canada, United States

OCEANIA: Australia, New Zealand

LOW-CALORIE COUNTRIES: Far East, Near East, Africa, Latin America (excl. River Plate countries)

HIGH-CALORIE COUNTRIES: River Plate countries, Europe,
 North America, Oceania

Appendix 1 presents midyear estimates of the total population for 1938, 1950, and 1960 by subregions and regions. Wherever feasible, official estimates are shown; the unofficial estimates are mainly based on data furnished by the Statistical Office of the United Nations.

Figures given for 1938 have been revised in the light of recent information. In some cases unofficial interpolated values replace the official estimates that have not yet been revised to agree with the latest censuses.

The accuracy of the data is highly variable. In several areas, no comprehensive and reasonably reliable population count has been made recently and the estimates given for them are largely conjectural. In view of the fact that for several areas of the world the size of the population is unknown or uncertain, the regional and world totals must be regarded as approximate estimates only.

As far as possible the estimates relate to present boundaries and to the population present in the area, plus members of the armed forces stationed outside the area. Wherever sufficient information was available on prisoners of war, displaced persons, indigenous groups, or other groups ordinarily excluded from the official data of a country, the estimates have been adjusted to include them.

Appendixes 2 and 3 present index numbers of food production and per caput food production by regions for periods from prewar to 1961/62. Food production in these appendixes includes the following commodity groups: grains, starchy roots, sugar, pulses, oil crops, nuts, fruit, vegetables, wine, livestock, and livestock products. To avoid double counting, allowances are made for commodities used for livestock feeding; these include products fed as such, and semi-processed feeds such as oilcakes and bran. In addition, to the extent that adequate estimates are possible, allowances are also made for imported feeds, seed, and production waste. The index numbers were constructed by applying regional weights, based on 1952-56 farm price relationships, to the production figures.

The data on per caput food supplies presented by subregions in Appendix 4 are based on national food balance sheets, partly prepared on a regular basis by governments in collaboration with FAO

(and, in the case of European countries, with the Organization for Economic Cooperation and Development), and partly prepared as *ad hoc* estimates by FAO for the purposes of its world food surveys. The food balance sheet is a statistical method which starts from the data of production, trade, and movement in stocks for each foodstuff; makes appropriate deductions for the amounts used for feed, seed, manufacture, and waste; and so arrives at the estimated quantity of food supplied at the retail level and its nutritive value for a given period, usually a year. Food balance sheet data are subject to the following principal limitations: the range and accuracy of national statistics vary widely from country to country; for a number of commodities, official statistics of production and trade are frequently inadequate, so that rough estimates have to be made. Except in a few countries, practically no data are available on farm and commercial stocks whose yearly changes may appreciably affect the supplies of food. Quantities utilized for feed, seed, waste and for industry are frequently roughly determined in the absence of statistics on the utilization of individual commodities. For these reasons, the results obtained for different countries are not fully comparable.

Data on population, index numbers of food production and on food supplies by countries are regularly published by FAO in its *Production yearbook*.

Appendix 1

POPULATION 1938-60 (MIDYEAR ESTIMATES) AND INDEX NUMBERS OF POPULATION (1938 = 100), BY SUBREGIONS AND REGIONS

Subregions and regions	1938	1950		1960	
	<i>Population in 1 000</i>	<i>Population in 1 000</i>	<i>Index numbers</i>	<i>Population in 1 000</i>	<i>Index numbers</i>
FAR EAST					
South Asia	380 135	441 011	116	533 743	140
Southeastern Asia, mainland	42 261	52 208	124	67 191	159
Eastern Asia.....	91 360	111 032	122	128 472	141
Southeastern Asia, major islands	84 223	96 472	115	120 392	143
China, Mainland	481 000	546 815	114	702 500	146
Total region	1 115 530	1 293 360	116	1 602 500	144
NEAR EAST					
Total region	90 750	104 280	115	132 370	146
AFRICA					
North Africa	17 617	21 276	121	26 814	152
West and central Africa	63 671	72 607	114	89 812	141
East and southern Africa	46 621	57 158	123	71 145	153
Total region	146 200	174 130	119	215 260	147
LATIN AMERICA					
Mexico and Central America	34 557	45 388	131	60 023	173
Northern and western countries of South America	29 018	37 133	128	47 424	163
Brazil	39 480	51 944	132	70 767	179
River Plate countries ..	16 894	20 923	124	25 319	150
Total region	125 075	161 726	129	211 026	169
EUROPE					
Western Europe	274 648	298 461	109	322 406	117
Eastern Europe (excl. U.S.S.R.)	92 909	87 315	94	95 795	103
U.S.S.R.	191 000	181 000	95	214 400	112
Total region	564 950	572 341	101	638 571	113

POPULATION 1938-60 (MIDYEAR ESTIMATES) AND INDEX NUMBERS OF POPULATION (1938 = 100), BY SUBREGIONS AND REGIONS (*Concluded*)

Subregions and regions	1938	1950		1960	
	<i>Population in 1 000</i>	<i>Population in 1 000</i>	<i>Index numbers</i>	<i>Population in 1 000</i>	<i>Index numbers</i>
NORTH AMERICA	141 470	166 041	117	198 563	140
OCEANIA	10 603	12 426	117	15 692	148
LOW-CALORIE COUNTRIES	1 460 661	1 712 573	117	2 135 837	146
HIGH-CALORIE COUNTRIES	733 917	771 731	105	878 145	120
WORLD	2 194 578	2 484 304	113	3 013 982	137

INDEX NUMBERS OF FOOD PRODUCTION

(PREWAR = 100)

Regions	Prewar	Average 1948/9- 1952/3	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62
FAR EAST												
Excl. China, Mainland	100	106	112	121	122	126	131	129	135	142	146	147
Incl. China, Mainland	100	98	105	111	113	117	123	127	137	140	140	140
NEAR EAST	100	117	131	142	137	142	152	160	164	167	168	164
AFRICA	100	125	131	137	142	140	148	143	149	149	155	151
LATIN AMERICA	100	126	134	137	144	145	155	159	167	167	168	171
EUROPE (incl. U.S.S.R.)	100	105	111	119	119	125	132	137	145	149	154	154
NORTH AMERICA	100	139	149	148	146	153	157	152	163	165	167	165
OCEANIA	100	114	121	122	121	127	123	121	142	140	147	147
LESS DEVELOPED REGIONS												
Excl. China, Mainland	100	115	122	129	131	134	141	142	148	152	155	155
Incl. China, Mainland	100	107	114	120	123	126	133	136	145	147	148	148
DEVELOPED REGIONS ..	100	117	125	129	128	134	140	141	151	154	158	158
WORLD excl. China, Mainland	100	116	124	129	130	134	141	141	150	153	157	157
Incl. China, Mainland	100	112	120	125	126	131	137	139	149	151	154	154

INDEX NUMBERS OF PER CAPUT FOOD PRODUCTION
(PREWAR = 100)

Regions	Prewar	Average 1948/9- 1952/3	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62
FAR EAST												
Excl. China, Mainland	100	88	90	95	94	96	97	94	97	99	100	98
Incl. China, Mainland	100	83	85	88	88	90	92	92	98	97	95	93
NEAR EAST	100	98	105	112	105	106	111	114	115	114	112	107
AFRICA	100	101	102	104	105	101	105	100	102	100	101	96
LATIN AMERICA	100	94	95	95	98	96	100	100	103	100	98	98
EUROPE (incl. U.S.S.R.)	100	101	106	112	111	115	120	123	129	131	134	133
NORTH AMERICA	100	116	121	117	114	117	118	112	118	117	117	114
OCEANIA	100	94	96	94	91	93	89	85	98	94	97	94
LESS DEVELOPED REGIONS												
Excl. China, Mainland	100	93	96	100	99	99	102	101	103	103	103	101
Incl. China, Mainland	100	88	91	94	94	94	97	97	102	101	99	97
DEVELOPED REGIONS ..	100	110	114	116	115	119	122	121	128	129	130	129
WORLD excl. China, Mainland	100	100	103	106	105	107	110	108	113	113	114	111
 Incl. China, Mainland	100	97	100	102	101	103	106	105	110	110	109	107

Appendix 4

PER CAPUT FOOD SUPPLIES AND NUTRITIVE VA

Subregions and regions	Period	Cereals ¹	Starchy roots ²	Sugar ³	Pulses and nuts ⁴	Vegetables and fruit ⁵	Meat ⁶	Eggs ⁷
..... Kilograms per year								
FAR EAST (incl. China, Mainland)	Prewar	155	30	7	22	57	8	1
	Postwar	139	33	6	19	48	7	1
	Recent	146	61	9	18	53	9	1
South Asia	Prewar	139	8	13	22	51	3	-
	Postwar	121	7	12	21	30	2	-
	Recent	139	10	16	21	31	2	-
Southeastern Asia, mainland	Recent	149	17	7	24	53	10	2
Eastern Asia	Prewar	154	51	13	16	85	4	2
	Postwar	155	63	4	7	77	3	1
	Recent	156	60	12	15	94	6	4
Southeastern Asia, major islands	Prewar	129	111	7	9	63	7	1
	Postwar	122	100	4	10	50	6	1
	Recent	119	136	10	25	49	7	1
China, Mainland	Prewar	172	30	1	25	57	13	2
	Postwar	153	36	1	22	57	11	1
	Recent	153	89	3	15	61	14	1
NEAR EAST	Prewar	176	4	8	13	98	11	2
	Postwar	165	10	9	10	112	11	2
	Recent	163	16	14	17	145	13	2
AFRICA	Recent	121	173	11	14	78	15	1
North Africa	Recent	148	18	25	6	86	19	4
West and central Africa	Recent	93	320	4	14	94	6	1
East and southern Africa	Recent	149	36	15	15	58	25	2

UES, BY SUBREGIONS AND REGIONS (RETAIL LEVEL)

Fish *	Milk *	Fats and oils **	Calories	Calories derived from cereals, starchy roots, and sugar	Calorie requirement	Calories derived from cereals, starchy roots, and sugar as percentage of total calories	Total calorie intake as percentage of calorie requirement	Total protein	Animal protein
			<i>Number per day</i>			<i>Percent</i>		<i>Grams per day</i>	
3	24	4	2 090	1 625	2 300	78	91	61	7
3	18	5	1 890	1 490	2 300	79	82	54	6
5	20	3	2 060	1 660	2 300	81	90	56	8
1	64	3	1 950	1 485	2 300	76	85	52	8
1	47	3	1 720	1 310	2 300	76	75	46	6
1	50	4	1 970	1 530	2 300	78	86	50	7
15	9	3	2 030	1 579	2 260	78	90	49	13
10	3	1	2 030	1 725	2 350	85	86	54	8
12	4	1	1 900	1 700	2 350	90	81	49	9
19	14	3	2 180	1 750	2 370	80	92	65	15
5	2	6	2 020	1 675	2 270	83	89	46	6
4	3	6	1 900	1 540	2 270	81	84	42	5
6	5	4	2 070	1 680	2 270	81	91	45	7
4	-	6	2 230	1 712	2 300	77	97	72	7
3	-	7	2 030	1 590	2 300	78	88	63	6
3	2	3	2 100	1 743	2 300	83	91	61	7
1	89	4	2 295	1 800	2 400	78	96	72	12
2	84	4	2 220	1 723	2 400	78	92	69	12
2	78	7	2 470	1 768	2 400	72	103	76	14
3	35	7	2 360	1 740	2 340	74	101	61	11
1	70	5	2 260	1 694	2 340	75	97	66	16
4	10	9	2 360	1 757	2 300	74	103	50	5
6	57	4	2 380	1 734	2 360	73	101	69	17

Appendix 4

PER CAPUT FOOD SUPPLIES AND NUTRITIVE VALUE

Subregions and regions	Period	Cereals ¹	Starchy roots ²	Sugar ³	Pulses and nuts ⁴	Vegetables and fruit ⁵	Meat ⁶	Egg
		..... Kilograms per year						
LATIN AMERICA	Prewar	90	75	25	15	90	48	
	Postwar	101	84	30	14	100	35	
	Recent	104	82	33	18	128	37	
Mexico and Central America	Prewar	104	39	21	11	96	26	2
	Postwar	119	34	29	13	98	20	2
	Recent	114	32	32	19	110	23	
Mexico	Prewar	109	5	18	9	67	25	
	Postwar	129	7	30	12	60	20	
	Recent	124	8	33	21	79	24	
Central America	Prewar	93	43	23	11	195	34	3
	Postwar	135	11	27	11	116	18	
	Recent	119	11	30	14	129	16	
Caribbean	Prewar	93	151	33	16	157	29	4
	Postwar	84	115	29	17	168	21	3
	Recent	83	111	31	17	171	26	3
Northern and western countries of South America	Prewar	87	89	29	12	104	27	3
	Postwar	88	103	37	8	124	25	3
	Recent	84	97	36	10	151	28	3
Brazil	Prewar	78	91	25	23	88	50	3
	Postwar	86	112	25	24	82	27	2
	Recent	106	118	31	27	133	29	3
River Plate countries	Prewar	100	75	27	4	67	108	7
	Postwar	120	95	33	3	101	112	7
	Recent	112	80	32	3	116	105	7
EUROPE (incl. U.S.S.R.)	Prewar	151	132	18	9	99	34	6
	Postwar	142	155	19	8	105	29	5
	Recent	137	138	28	6	116	40	8

, BY SUBREGIONS AND REGIONS (RETAIL LEVEL) (Continued)

Fish *	Milk *	Fats and oils ¹⁰	Calories	Calories derived from cereals, starchy roots, and sugar	Calorie requirement	Calories derived from cereals, starchy roots, and sugar as percentage of total calories	Total calorie intake as percentage of calorie requirement	Total protein	Animal protein
			<i>Number per day</i>			<i>Percent</i>		<i>Grams per day</i>	
2	90	6	2 160	1 347	2 420	63	89	64	28
3	68	8	2 315	1 530	2 410	66	96	62	22
3	82	9	2 510	1 580	2 410	63	104	67	24
2	77	6	1 950	1 341	2 430	69	80	54	18
2	66	7	2 230	1 570	2 420	71	92	57	15
2	85	9	2 370	1 540	2 420	65	98	63	19
1	86	5	1 800	1 265	2 450	70	74	53	18
2	67	7	2 220	1 610	2 450	73	90	58	16
2	94	9	2 440	1 590	2 450	65	100	68	20
1	18	6	1 965	1 214	2 340	62	84	51	16
1	61	4	2 190	1 630	2 370	75	92	58	13
1	69	5	2 130	1 510	2 370	71	90	58	14
4	68	7	2 475	1 639	2 410	66	102	60	21
2	67	8	2 280	1 450	2 390	64	95	54	16
3	78	11	2 410	1 450	2 390	60	101	57	19
2	71	4	1 970	1 355	2 510	69	78	55	18
3	66	5	2 160	1 500	2 480	70	87	53	18
5	76	7	2 190	1 440	2 480	66	88	56	20
1	81	5	2 190	1 301	2 310	59	95	64	28
2	34	7	2 180	1 420	2 310	65	95	55	15
2	60	8	2 650	1 700	2 310	64	115	67	19
2	161	9	2 740	1 457	2 560	53	107	95	59
2	162	15	3 150	1 700	2 560	56	123	106	63
2	141	16	3 040	1 640	2 560	54	119	96	55
6	131	13	2 870	1 930	2 590	67	111	85	28
6	143	11	2 760	1 883	2 590	68	107	82	29
7	180	16	3 040	1 903	2 590	63	117	88	36

Appendix 4

PER CAPUT FOOD SUPPLIES AND NUTRITIVE V/

Subregions and regions	Period	Cereals ¹	Starchy roots ²	Sugar ³	Pulses and nuts ⁴	Vegetables and fruit ⁵	Meat ⁶	Eggs ⁷
..... Kilograms per year								
Western Europe	Prewar	130	107	23	9	112	44	8
	Postwar	124	118	23	8	125	33	7
	Recent	111	101	30	8	145	45	10
Eastern Europe and U.S.S.R.	Prewar	174	159	13	9	82	23	4
	Postwar	161	196	15	8	83	24	4
	Recent	166	179	26	3	82	35	7
NORTH AMERICA	Prewar	91	66	44	7	198	71	16
	Postwar	77	54	42	8	205	81	21
	Recent	67	49	41	7	188	91	20
OCEANIA	Prewar	98	49	52	2	139	118	12
	Postwar	96	50	52	5	157	109	12
	Recent	89	53	49	4	141	114	11
Low-calorie countries	Prewar	147	49	9	20	44	12	1
	Postwar	134	51	8	18	55	9	1
	Recent	141	71	11	18	67	11	1
High-calorie countries	Prewar	136	116	24	8	118	45	8
	Postwar	126	130	25	8	128	44	9
	Recent	119	114	32	6	133	55	11
WORLD	Prewar	144	70	14	17	79	23	3
	Postwar	132	76	14	15	78	20	4
	Recent	134	84	18	14	87	24	4

NOTE: Prewar and postwar totals for low-calorie countries and world include estimates for Africa.

¹ Cereals: In terms of flour and milled rice.

² Starchy roots: Includes sweet potatoes, cassava and other edible roots.

³ Sugar: Includes raw sugar; excludes syrups and honey.

⁴ Pulses and nuts: Includes cocoabeans.

⁵ Vegetables and fruit: In terms of fresh equivalent.

UES, BY SUBREGIONS AND REGIONS (RETAIL LEVEL) (Concluded)

Fish ⁸	Milk ⁹	Fats and oils ¹⁰	Calories	Calories derived from cereals, starchy roots, and sugar	Calorie requirement	Calories derived from cereals, starchy roots, and sugar as percentage of total calories	Total calorie intake as percentage of calorie requirement	Total protein	Animal protein
.....			..... Number per day .....			..... Percent .....		..... Grams per day ..	
8	155	17	2 880	1 713	2 570	60	112	85	36
8	164	16	2 750	1 676	2 580	61	107	82	33
8	188	20	2 910	1 594	2 580	55	113	83	39
4	105	8	2 850	2 162	2 600	76	110	84	20
4	120	6	2 780	2 111	2 600	76	108	82	24
6	172	12	3 180	2 242	2 600	71	122	94	33
5	247	21	3 260	1 566	2 590	48	125	86	51
5	293	20	3 170	1 366	2 590	43	122	91	61
5	304	21	3 110	1 255	2 590	40	120	93	66
5	176	16	3 290	1 647	2 610	50	126	103	67
5	210	15	3 250	1 638	2 610	50	124	98	66
4	209	16	3 250	1 548	2 610	48	125	94	62
3	36	4	2 110	1 626	2 320	77	91	62	10
3	29	5	1 960	1 525	2 320	78	84	56	8
4	29	4	2 150	1 668	2 320	78	93	58	9
5	157	14	2 950	1 833	2 580	62	115	85	34
6	177	13	2 860	1 762	2 580	62	111	85	37
7	208	18	3 050	1 741	2 580	57	116	90	44
3	75	8	2 380	1 692	2 400	71	99	69	18
4	75	8	2 240	1 598	2 400	71	93	64	18
5	82	8	2 420	1 685	2 400	70	101	68	20

⁸ Meat: Includes offal, poultry and game expressed in terms of carcass weight, excluding slaughter fats.

⁷ Eggs: Fresh egg equivalent.

⁹ Fish: Estimated edible weight.

⁹ Milk: Excludes butter except for south Asia (India and Pakistan); includes milk products as fresh milk equivalent.

¹⁰ Fats and oils: Pure fat content.

Appendix 5

SHORT-TERM TARGETS FOR CALORIES, TOTAL PROTEINS, AND ANIMAL PROTEINS, BY SUBREGIONS AND REGIONS (PER CAPUT PER DAY)

Regions	Total calories (number)	Total proteins	Animal proteins	Animal proteins as percentage of total proteins	Percentage of total calories derived from proteins
FAR EAST		..... Grams			
South Asia	2 300	63	12.5	20	11
Southeastern Asia, mainland	2 300	57	15	26	10
Eastern Asia	2 350	72	20	28	12
Southeastern Asia, major islands	2 300	55	12	22	10
China, Mainland	2 350	72	11	15	12
REGION	2 300	68	12.5	18	12
NEAR EAST					
REGION	2 450	77	20	26	12
AFRICA					
North Africa	2 350	72	22	31	12
West and central Africa ..	2 400	63	13	21	10
East and southern Africa	2 450	73	21	29	12
REGION	2 400	69	18	26	12
LATIN AMERICA (excl. River Plate countries)					
Mexico and Central America	2 450	69	23	33	11
Northern and western countries of South America	2 500	72	25	35	12
Brazil	2 650	71	25	35	11
REGION	2 550	71	25	35	11
LOW-CALORIE COUNTRIES	2 350	69	15	22	12
WORLD	2 550	75	23	31	12

Appendix 6

PER CAPUT FOOD SUPPLIES NEEDED UNDER THE SHORT-TERM TARGET TOGETHER WITH

Subregions and regions	Cereals	Starchy roots	Sugar	Pulses and nuts	Vegetables and fruit	Meat	Eggs
<i>Kilograms per year</i>							
FAR EAST							
South Asia Target ...	139	16	20	31	58	3	1
% needed/available	99	167	127	149	184	160	300
Southeastern Asia, mainland Target ...	149	16	8	40	93	11	3
% needed/available	100	100	117	172	178	115	150
Eastern Asia Target ...	151	60	18	18	104	8	5
% needed/available	97	100	150	122	110	124	150
Southeastern Asia, major islands Target ...	131	110	12	31	91	9	3
% needed/available	110	81	114	128	185	139	200
China, Mainland Target ...	150	87	7	24	94	23	3
% needed/available	98	98	225	155	155	159	350
REGION Target ...	144	58	13	27	82	13	2
% needed/available	99	96	146	150	156	150	200
NEAR EAST							
REGION Target ...	146	16	16	17	145	19	4
% needed/available	90	100	119	100	100	151	200
AFRICA							
North Africa Target ...	141	18	25	10	86	27	7
% needed/available	95	100	100	159	100	140	167
West and central Africa Target ...	120	160	4	19	94	15	2
% needed/available	130	50	120	131	100	247	300
East and southern Africa Target ...	146	27	15	15	73	27	4
% needed/available	98	75	100	100	127	110	200
REGION Target ...	133	88	11	16	85	22	4
% needed/available	111	51	107	119	108	150	250

CALORIE AND PROTEIN LEVELS, BY SUBREGIONS AND REGIONS (RETAIL LEVEL) ¹

Fish	Milk	Fats and oils	Calories	Percentage of calories derived from cereals, starchy roots, and sugar	Total proteins	Animal proteins	Over-all index of per caput food supply	Over-all index of per caput animal food supply
.....			<i>Number per day</i>		<i>.. Grams per day ..</i>			
4 300	88 174	7 182	2 310	69	63	12.5	138	183
18 120	12 148	5 175	2 300	69	57	15	121	122
23 124	28 195	4 171	2 340	76	72	20	117	135
12 178	11 231	5 150	2 310	74	55	12	130	162
5 175	5 325	5 163	2 330	75	72	11	132	169
8 175	36 181	6 178	2 310	73	68	12.5	131	163
3 125	112 143	9 125	2 470	66	77	20	117	148
2 250	89 129	5 100	2 330	70	72	22	117	142
9 250	24 258	9 100.	2 390	68	63	13	124	253
7 133	73 128	5 125	2 440	68	73	21	114	124
7 250	53 151	7 105	2 400	68	69	18	123	171

Appendix 6

PER CAPUT FOOD SUPPLIES NEEDED UNDER THE SHORT-TERM TARGET TOGETHER WITH C/

Subregions and regions	Cereals	Starchy roots	Sugar	Pulses and nuts	Vegetables and fruit	Meat	Eggs
<i>Kilograms per year</i>							
LATIN AMERICA (excl. River Plate countries)							
Mexico and Central America	120	32	23	19	110	27	8
Target	106	100	72	100	100	119	150
% needed/available							
Northern and western countries of South America	120	59	27	14	151	31	4
Target	143	61	76	141	100	112	150
% needed/available							
Brazil	106	90	29	24	133	34	5
Target	100	76	94	88	100	118	156
% needed/available							
REGION	115	62	27	19	130	31	6
Target	112	75	83	100	100	118	145
% needed/available							
LOW-CALORIE COUNTRIES	141	59	14	25	91	16	3
Target	100	34	126	142	135	147	200
% needed/available							
WORLD	134	76	19	19	103	28	5
Target	100	90	108	137	118	115	136
% needed/available							

* % needed/available is calculated on unrounded figures.

DIET AND PROTEIN LEVELS, BY SUBREGIONS AND REGIONS (RETAIL LEVEL) (Concluded)

Fish	Milk	Fats and oils	Calories	Percentage of calorie derived from cereals, starchy roots, and sugar	Total proteins	Animal proteins	Over-all index of per caput food supply	Over-all index of per caput animal food supply
.....			<i>Number per day</i>		<i>.. Grams per day ..</i>			
4 200	97 114	9 108	2 430	63	69	23	113	127
9 192	89 117	8 122	2 500	65	72	25	116	124
5 200	88 145	9 118	2 660	60	71	25	112	132
6 200	91 124	9 114	2 550	62	71	25	114	128
7 167	47 161	7 150	2 350	71	69	15	127	157
7 136	95 116	10 123	2 560	66	75	23	111	116

Appendix 7

POPULATION (1975 AND 2000) AND INDEX NUMBERS OF POPULATION (1958 = 100),
BY SUBREGIONS AND REGIONS (MEDIUM ASSUMPTION)

Subregions and regions	1958	1975		2000	
	Population in millions	Population in millions	Index numbers	Population in millions	Index
FAR EAST					
South Asia	510	716	140	1 271	249
Southeastern Asia, mainland..	64	92	143	162	254
Eastern Asia	125	161	129	231	185
Southeastern Asia, major islands	114	164	144	290	254
China, Mainland	670	949	142	1 685	251
REGION	1 531	2 150	140	3 753	245
NEAR EAST					
REGION	127	182	143	326	257
AFRICA					
North Africa	25	38	149	73	287
West and central Africa	85	111	131	178	210
East and southern Africa ..	68	91	134	153	225
REGION	205	273	133	458	223
LATIN AMERICA (excl. River Plate countries)					
Mexico and Central America	57	89	157	181	319
Northern and western coun- tries of South America	45	68	151	135	301
Brazil	66	104	159	219	334
REGION	175	272	155	552	315
RIVER PLATE COUNTRIES	25	32	128	43	172
EUROPE					
REGION	624	757	121	954	153
NORTH AMERICA					
REGION	192	250	130	325	169
OCEANIA					
REGION	15	22	147	30	200
LOW-CALORIE COUNTRIES	2 038	2 877	141	5 089	250
HIGH-CALORIE COUNTRIES ..	856	1 061	124	1 352	158
WORLD.....	2 894	3 938	136	6 441	223

INDEX NUMBERS OF NEEDS IN TOTAL FOOD SUPPLIES BY 1975 UNDER THE SHORT-TERM TARGET, BY SUBREGIONS AND REGIONS

Subregions and regions	Cereals	Starchy roots	Sugar	Pulses and nuts	Vegetables and fruit	Meat	Eggs	Fish	Milk	Fats and oils	Total food	Animal food
FAR EAST												
South Asia	139	234	178	209	258	224	420	420	244	255	193	256
Southeastern Asia, mainland	143	143	167	246	255	164	215	172	212	250	173	174
Eastern Asia	125	129	194	157	142	160	194	160	252	221	151	174
Southeastern Asia, major islands	158	117	164	184	266	200	288	256	333	216	187	233
China, Mainland	139	139	320	220	220	226	497	249	462	231	187	240
REGION	139	134	204	210	218	210	280	245	253	249	183	228
NEAR EAST												
REGION	129	143	170	143	143	216	286	179	204	179	167	212
AFRICA												
North Africa	142	149	149	237	149	209	249	373	192	149	174	212
West and central Africa	170	66	157	172	131	324	393	328	338	131	162	331
East and southern Africa	131	101	134	134	170	147	268	178	172	168	153	166
REGION	148	68	142	158	144	200	333	333	201	140	164	227

INDEX NUMBERS OF NEEDS IN TOTAL FOOD SUPPLIES BY 1975 UNDER THE SHORT-TERM TARGET, BY SUBREGIONS AND REGIONS

Subregions and regions	Cereals	Starchy roots	Sugar	Pulses and nuts	Vegetables and fruit	Meat	Eggs	Fish	Milk	Fats and oils	Total food	Animal food
LATIN AMERICA (excl. River Plate countries)												
Mexico and Central America	166	157	113	157	157	187	236	314	179	170	177	199
Northern and western countries of South America	216	92	115	213	151	169	227	290	177	184	175	187
Brazil	159	121	149	140	159	188	248	318	231	188	178	210
REGION	174	116	129	155	155	183	225	310	192	177	177	198
LOW-CALORIE COUNTRIES	141	118	178	200	190	207	282	235	227	212	179	221
WORLD	136	122	147	186	160	156	185	185	158	167	151	158

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