FOOD PLANNING IN INDIA

BY

BALJIT SINGH

M.A., LL.B., PH.D., D.LITT.

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PREFACE

In a discussion of the Indian food problem there is often a digression to Malthus and instead of emphasizing the real issue of raising the tempo of production and securing an equitable parity of incomes for the different classes and groups of workers we are led .to think of our birth-rate and of even achieving the impracticable and undesirable goal of curtailing the magnitude of our population. Demographic changes are interpreted as proof of the validity of the Malthusian doctrine in the East and population is regarded as merely an Economists' problem. That ignores the over-all political importance of the issue of population and would seem to force on India a policy which even the great Powers, possessing all the weapons of modern warfare (including, in the instance of America, the Atomic Bomb), do not hesitate to condemn as dangerous to their pwn defence and to the maintenance of international peace. Any action in this respect should be the subject of an international agreement based on a recognition of equality and freedom for all races and nations, guaranteeing equal opportunities to peoples of the different countries for colonization in empty or sparsely-populated lands.

Situated as we are, we have not got enough food for the proper maintenance of all in India. Life is cheap and longevity is among the lowest in the world at an average expectation of some 27 years, with only 60 per cent of the children born ever reaching the age of five. Famines and epidemics are recurrent while deficiency diseases and infirmities are as common in India as they are conspicuous by their absence in the West. The present study reveals that taking into full consideration the dynamics of our population, it need not and ought not to be so, for India's economic potentialities are great. The cause of her tragedy has been the total and callous neglect to develop her resources and in spite of being hoary with age as the seat of a great civilization and culture she is still in an infant stage of economic development. Obliged thus to maintain a modern population with mediaeval and even ancient means and resources she finds any adjustment difficult. At the same time, her present economic backwardness leaves a vast vista of development, while such scope is obviously limited in the case of the Western Powers, as their

agriculture and industries are now in a very advanced stage of development. It is not only conceivable but almost a certainty that India will emerge as a leading Power, gaining ascendancy year after year among the nations of the world with a much larger and healthier population—provided that racial, communal, or social exploitation of her man power and resources is not allowed to stand in the way of her great future.

An attempt has been made here to estimate the future population of India, and assess its food requirements on the basis of a balanced diet. Targets of production have then been fixed for the different items and scrutinized at each stage as to their practicality. For a time imports will be necessary but that will be only during the transition period, after which the country can be self-sufficient at a standard of food consumption which will provide enough of the various necessary nutritional elements for all with ease. For the present there is little room for self-complacency and the maximum of effort is required to save millions from starvation and death. These emergency measures including procurement, rationing, subsidized distribution, tapping of sub-soil and low-level water, cultivation of quick-maturing cash crops, etc. will have to be dovetailed into a Food Plan for the country. Agricultural Planning to be practical must not rest with fixing Provincial or State targets of production. It must be worked to the minutest detail for each holding and village, where panchayats or multi-purpose societies will have to be organized as authorities responsible for the execution of the Plan. Without some form of compulsion and regimentation, Planning will have little practical value. In fact, little improvement in agriculture is practicable under peasant farming without some system of co-operation or combination. Collectivization may be a distant objective, but if present practice is not altered and peasants are left with their petty holdings and are to be free to non-co-operate either with their neighbours or authorities in the cultivation of land, things will not change materially for all our efforts in other directions. Scientific farming implies large-scale operations and organization of entire villages into single farming units, with improved implements and machinery. Isolated experiments here and there will not do and the country will have to choose between some form of socialism and aggressive capitalism. Planned production without equitable distribution of

incomes, purchasing power and capacity to consume has little chance of success. This will necessitate the adoption of the mechanism of price control on the widest possible scale, not only to secure fair prices for articles of food, but also to secure to the cultivators the products of industry at a fair exchange ratio and to safeguard to workers in different trades and callings including agriculture, uniform amenities of life and comfort, which should be at a reasonable par with those enjoyed by others. Such a stabilization of price parity between farm and industrial products, or between labour and capital, may not be reached easily; but an utter failure in this respect will be the most insidious and at the same time one of the most potent factors tending to jam economic progress.

Without any food people die; with little they multiply fast. It is only on the basis of a modicum of amenities, opportunities and leisure that proper social attitudes towards marriage and family can be cultivated, which may result in raising the average age of marriage, reducing the frequency of births and limiting the size of the family. Birth rate will then fall with an adequate food supply, improvement of public health measures and social reforms; but the reduction in the waste of human life will be still greater. Simultaneously the incidence of diseases, epidemics and mortality will be reduced to the minimum possible, raising the present survival rate as also the standard of health, physique, longevity and efficiency on the one hand, and of social values, and family life on the other.

A NOTE

Since the book was written before the division of India took place or was even in the domain of practical politics, separate analysis of the food position in Pakistan and India was not thought of. The reader will get an idea of the changed situation if attention is focussed on the following figures:

	Percentages of the former Provinces of India included in	
	India	*Pakistan*
1. Population	77.7	22.3
2. Area	73.1	26.9
3. Rice Acreage	72.5	27.5
4. Wheat Acreage	70.0	30.0
5. Sugarcane	85.5	14.5
6. Oil-seeds	88.3	11.7
7. All food-grains including pulses	80.0	20.0
8. Irrigated Area	70.0	30.0
9. Irrigated Wheat acreage ..	52.0	48.0
10. Government Canals irrigated area	48.0	52.0

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CHAPTER I

THE CONSUMPTION UNITS

One-fifth of the Human Race

In considering India's food position account has to be taken at the outset of the great number of people that inhabit this vast sub-continent. The following statistics present the problem in right perspective and when studied in relation to the world population as a whole, remind us that planning food for forty crores of Indians means providing an elementary security to one-fifth of the whole human race:

TABLE I[1]

Population and Area of the World

Country	Population (000 omitted)	Area Km^2 (000)	Percentage in world population	Percentage in world area
Africa ..	158, 000[2]	30,000	7-28	22.59
Union of South Africa	9,590	1,224	0-44	0.92
America ..	273, 400[2]	40,610	12-60	30.58
North America ..	143, 178[2]	19,662	6-60	14.80
Canada ..	11,507	9.569	0.53	7.20
United States ..	131,669	7,839	6.07	5.90
South America ..	88,500[2]	17968	4.08	13.53
China ..	450,000[2]	11,103	20.74	8.36
India ..	388,998	4,096	17.93	3.08
Burma ..	16824	605	0.77	0.46
Japan ..	73,114	382	3.37	0.29
U. S. S. R. ..	170,467	21,175	7.86	15.94
Europe (Excl. U.S.S.R.) ..	402,000[2]	5,385	18.52	4.05
Germany ..	79,375	086	3.66	0.44
France ..	41,183	551	1.90	0.41
Spain ..	25,878	505	1.19	0.38
Italy ..	43,864	310	2.02	0.23
United Kingdom ..	46,046	244	2.12	0.18
Oceania ..	10.800[2]	8,550	0.50	6.44
Australia ..	6,630	7,704	0.30	5.80
World Total ..	2,170,000	132,800	..	..

Feeding Indians is to feed almost one-fifth of the world population! The problem is really gigantic; for in numbers the

[1] This table has been compiled from Table 2 of the *Statistical Year-Book of the League of Nations* 1942-4, and the population figures are those of the latest census.

[2] Figures refer to estimates given for 31 December, 1939.

Indians are exceeded, if at all, only by the Chinese. They are as many as all the Europeans taken together, excluding of course the Russians, or thrice the number of people in the U.S.A. India is one of the most densely populated regions of the globe, with a density of 95 persons per square kilometre in contrast to 15-9 for the world taken as a whole. The U.S.A. and the British Empire have only 15 persons per square kilometre, Japan has 69-1, China 42 -2, France 9 -0, Soviet Russia 8-1 and Italy 13 -9. *India presents the problem of* 18 *per cent of the world's people confined to* 3 *per cent of its area.*

A Growing Organism

This magnitude of population is responsible for the staggering food demand in the country, while the rate at which population has been increasing renders all calculations of India's food requirements at a given time inaccurate, except for a very brief period—the demand is sure to be *substantially* increased within say five years hence. A food policy, therefore, which does not take full account of this factor has obviously little chance of success. The rate of increase of the Indian population is revealed in TABLES II AND HI opposite.

In the course of a single decade, viz. 1931-41, the population has increased by more than five crores—an addition which by itself outstrips the entire population of any European country except Germany or Russia. If we take a long period the population has increased from 15 crores in the middle of the nineteenth century to nearly 40 crores at present, that is by about 25 crores. From 1891 to 1941 alone, the increase has been 11 crores, while the total population of U.S.A. is only 13 -16 crores. The total population of the Union of South Africa equals just two years' increase in the Indian population, while such smaller European countries as Denmark, Finland, Ireland, Norway, Scotland, and Switzerland do not have even as many people as are added to the Indian population in the course of a single year. *The food problem in India should therefore be viewed in the light of the growing numbers of its people,* a factor which lends the character of a living *young* organism to her food demand. The requirements have to be reckoned not as a fixed quantity but in terms of a certain quantity at a given time plus a cumulative percentage addition for the subsequent accretion.

TABLE II

Increase in Population during Fifty Years

(Figures in thousands)

Province or State	Population in 1891	Actual Increase from					
		1891.1901	1901.11	1911.21	1921.31	1931.41	1891 to 1941
India ..	279,446	4,426	19,140	2,681	32,426	50,879	109,552
Provinces ..	212,971	7,634	10.999	1,957	23,197	39,051	82,838
Madras ..	33,733	2,526	2,870	997	4,079	5,137	15,609
Bombay ..	15,985	—666	817	.124	1,980	2,858	4,864
Bengal ..	39,097	3,052	3,342	1,213	3,412	10,191	21,209
U. P. ..	46,501	811	—506	—1,431	3,034	6,612	8,519
Punjab ..	18,653	1,290	—364	1,106	2,895	4,838	9,766
Bihar ..	28,201	50	1,096	—324	3,345	3,974	8,139
C. P. and Berar	12,946	—1,103	1,916	—17	1,581	1,490	3,867
Assam ..	5,364	362	853	880	1,163	1,582	4,840
N..W.F.P. ..	1857	184	155	54	174	613	1,180
Orissa ..	6,710	417	455	—231	674	703	2,019
Sind ..	2,875	336	302	—234	608	648	1,660
Ajmer. Merwara	482	.56	23	[illegible]	60	77	101
Delhi ..	373	33	8	75	148	282	545
States and Agencies	66,476	— 3,208	8,141	723	9,229	11,828	26,714

TABLE III

Province or State	Percentage of Increase in Population				
	1931.41	1921.31	1911.21	1901.11	1901.41
India ..	15.0	10.6	0.9	6.7	37.0
Provinces ..	15.2	9.9	0.8	5.0	34.1
Madras ..	11.6	10.4	2.5	7.9	36.1
Bombay ..	15.9	12.4	—0.8	6.3	36.1
Bengal ..	20.3	7.3	2.8	8.0	43.1
U. P. ..	13.7	6.9	—3.1	—1.1	16.3
Punjab ..	20.6	13.9	5.6	—1.8	42.5
Bihar ..	12.3	11.5	.1.1	2.9	28.6
C. P. and Berar ..	9.7	11.5	—0.1	16.2	42.0
Assam ..	18.3	15.6	13.4	14.9	78.2
N..W.F.P. ..	25.2	7.7	2.5	7.6	48.8
Orissa ..	8.8	9.2	—3.0	6.4	22.5
Sind ..	16.7	18.6	—6.7	9.4	41.2
Ajmer.Merwara ..	15.1	13.5	—0.5	5.4	36.9
Andamans and Nicobars	14.6	8.8	2.4	7.3	37.0
Baluchistan ..	8.2	10.2	1.5	8.5	31.3
Coorg ..	3.3	—0.3	—6.4	—3.1	—6.6
Delhi ..	44.3	30.3	18.0	2.0	126.2
Panth Piploda ..	15.9	3.2	—1.7	26.5	48.6
States and Agencies ..	14.5	12.8	1.0	12.9	47.3

Cumulative Rate of Increase

The Census of 1941 reveals that the Indian population is multiplying at an increasing rate. It increased by 15 per cent during 1931-41, as against 10-6 per cent only during 1921-31 and 0'9 per cent during 1911-21. Leaving aside a few minor exceptions this tendency is almost uniform in the different parts of the country, although it is not gathering momentum at the same rate. The Census Commissioner points out that the rates of increase are noticeably larger in the north than in the south and in fact the country has in the Punjab and Eastern Bengal two swarming areas. The relatively new irrigation system of the former, and the renovation of soil caused by river floods coupled with a practically unfailing water-supply in the latter, make these regions particularly suitable for a flow of the human tide. Assuming *a given standard of living,* the population capacity of a region increases with an improvement in the exploration and utilization of its economic resources. India, being mainly an agricultural country, widens its frontiers in this respect with every right step towards irrigation progress and development of scientific farming. Industrial advancement too has a similar effect. Swarming inevitably follows all these openings of the physical and economic frontiers and so long as the exploitation of new opportunities is not planned to aim at the much-needed improvement in the standard of living, the great masses continue to live a life of extreme poverty, squalor, ignorance and misery.

Dynamics of Population

This factor of an ever-increasing population makes India, unlike most of the countries of Europe, though she is old as a home of civilization, young and new and dynamic for the future. The improvement in her irrigation system and the relatively recent industrialization are creating a new India, since they simultaneously offer fresh opportunities for an improvement in the standard of living of the masses and an additional filling capacity at the old standard. The future generation will perhaps utilize them both ways and as agricultural and industrial improvement takes place in the country an increase in the rate of population growth is inevitable. Looking into and ahead of the decade 1941-51 one could have, purely on considerations of economic factors.

counted on an increase in population at a higher rate than in the previous decade of 1931-41, had it not been for the famine of 1943, the failure of winter rains in 1946, and the World War. When the post-War development schemes are carried out bringing about greater security and employment, the growth in population increase in the next two or three decades may actually be higher than the average annual increase of 50 lakhs in the past decade.

Demographic Studies

But in making estimates of the size and distribution of population at future dates more important than adversity or prosperity are the data of sex and age distribution, the gross reproduction and the net reproduction rates. In the tables published for the Census of 1941 there is a deplorable absence of age figures. The Population Data Committee has found that satisfactory projection of population is possible by the use of age tables from sample steps, in the absence of age figures based on complete enumeration and sorting.

Going back to the figures of the previous decades the following age-grouping for women is revealed:

TABLE IV

Ages	Numbers per 10,000 women			
	1931	1921	1911	1901
5-9	1,280	1,496	1,383	1,382
10-14	1,124	1,081	997	1,082
15-19	938	815	826	835
20-24	98,3	881	930	692
25-20	868	885	909	895
30-34	756	833	835	851
35-39	595	565	556	557
40-44	505	621	631	652
45-49	289	346	338	339

No figures are available as yet showing the differential fertility rates in India by age periods; but the reproductive span can safely be taken to be the period 15-49. The fertility is higher during the earlier part of this period than later. The number of women in the reproductive span was greater in 1931 than in

1921, particularly in the more fertile period of 15-24. The higher rate of increase in the population during 1931-41 than that in the previous decade was therefore an obvious outcome, which could have been foreseen, though not to the extent actually found. The large proportion of girls in 1931 in the age-group 10-14 was significant for the later part of the decade 1931-41 as it was to enter the reproductive period, and also for the decade 1941-51 since in the early forties that same age-group was still in the reproductive span. As the number of women in this group in 1931 was heavier than in any previous decade it indicated a higher fertility during the period 1935-45. In addition, the age-group 5-9 of 1931 entered the child-bearing period in the decade 1941-51. This however provides the weakest link suggesting a diminished fertility, for there are only 1,280 girls in this age-group in 1931 as compared to 1,496 in 1921, 1,383 in 1911 and 1,382 in 1901. It may therefore be said in general, without attempting a scientific accuracy in the absence of the age data for 1941, that the population during the current decade is not likely to increase at a higher rate than in the previous one. It may perhaps continue to increase at the same rate.

Gross and Net **Reproduction Rates**

Not only do we lack figures showing the differential fertility rates by age periods but we have also no reproduction ratios. In the Census of 1941, for the first time, questions have been introduced regarding the number of children born and surviving, and^the age of the mother at the birth of her first child. These have not yet been analysed except for a few states. For Mysore the Census enquiries reveal the following data:

Total fertility for 1,000 married women ..	5,133
Gross reproduction rate ..	2 -524
Net reproduction rate	1 -282

The above figures, although very significant, cannot be applied to the country as a whole. They, however, clearly indicate an increasing tendency in the Indian population, in contrast to a tendency towards stationary or diminishing population in most of the countries of the West. The gross and net reproduction rates of some of the other countries are given below:

TABLE V

Reproduction Rates

Country	Year	Gross	Net
Germany ..	1936	1.063	0.934
Denmark ..	1943	1.289	1-140
France ..	1938	1.040	0-910
Ireland ..	1940-2	1.422	1.192
Italy ..	1936-7	1.425	1.131
Norway ..	1939	0.932	0.856
United Kingdom ..	1940	0-850	0.753
	1944	-	0.990
Sweden ..	1941	0.925	0.843
Switzerland ..	1943	1.169	1.064
Australia ..	1943	1.256	1.163
Union of South Africa	1940	1.495	1.346
Canada ..	1940-2	1.416	1.274
U. S. A. ..	1942	1-270	1.189

Nowhere is the net reproduction rate so high as in India excepting in the case of the white population of the Union of South Africa. Nowhere is the divergence between the gross and net reproduction rates so great as in this country, pointing to the high mortality and the consequent scope for improvement. The gross reproduction rate may be found to be mostly between 2 and 3, while the net reproduction ratio may be found to be varying between 1 .2 and 1.5.

The mortality rate has been falling during the last decade with a marked decline in the infantile death-rate. As it continues to improve further the rate of increase of population will be still more accelerated. It has been worked out that the decline in infantile mortality during the period 1920-40 would have added approximately over 30 lakhs by the middle of 1941 and if child mortality continues to decrease at the same rate as in these two decades, the addition to the population by the middle of 1951 is likely to be about 70 lakhs and in 1961 about 1 -34 crores.[3] One can look forward to the same improvement of public health service in the years to come, perhaps even greater. Likewise the present maternal mortality is said to be in the neighbourhood of 20 per 1,000 as compared with the figure of 2 -9 for England and Wales. Gradually, with better maternity care and services,

[3] Census of India, 1941, Vol. I, p. 42.

there will be an inevitable reduction in the Indian rate, and that will add to the reproduction rate. Assuming a reduced infantile and maternal mortality ratio, the Indian population during the successive decades will inevitably tend towards a mounting fertility rate.

On a consideration of all these factors and in the absence of enough statistical data to make an accurate estimate of the future population it may be stated in general that the Indian population is increasing at present at the rate of nearly 1 -5 per cent per annum. The estimates of population at different dates are:

Enumerated Population	of	1941	38,89,98,000
Estimated	„	of 1946	41,81,73,000
„	„	of 1951	44,73,48,000

Obviously, with an increase in population the total demand for food in the country has been increasing even at the old levels of consumption, and at a higher rate than the increase in population with the establishment of better nutrition standards.

In any case, it is now growing each year at the rate of I '5 *per cent since the year* 1931 and will increase by about 57 per cent in 1951 over that of 1901.

Age-groups and Consumption Units

To ascertain the food demand in the country a reckoning of the number of people and the rate of their increase is not enough. The proportion of women and children of the various age-groups has a high determination value. TABLE vi opposite gives comparative figures by quinquennial age-groups of the population of U.S.A., England and Wales, Australia and India.

These figures disclose that in India the number of children up to the age of 4 in an average group of 100 persons is almost twice as much as in America, the United Kingdom, or Australia. Likewise the number of children between the ages of 5 to 14 is about 25 per cent of the total population in India as against 14 to 15 per cent in these countries. Since children require and consume less than adults, *the demand for food per* 100 *persons is inevitably to be much less in India than in Europe or America,* in whose population, the proportion of children up to the age of 14 is 23 to 25 per cent only, in contrast with some 40 per cent in

TABLE VI

Population by Quinquennial Age-groups

Age-groups	U. S. A.	England and Wales	Australia	India
	Average proportions in 100 persons of both sexes			
-1 } 1-4 }	8.3	7.3	8.5	15.3
5-9	7.7	7.0	7.4	13.0
10-14	8.2	7-5	8.2	11.6
15-19	8.9	8.3	8-8	9.1
20-24	8-6	5.8	8.5	9.4
25-29	8.2	7.6	8.5	8.6
30-34	7.8	8.2	7.9	7.7
35-39	7.3	8.0	7.1	6.2
40-44	6/7	7.1	6.6	5.3
45-49	6.4	6.6	6-3	4-1
50-54	5..8	6.3	6.0	3.3
55-59	4.8	5.8	5.0	2.3
60-64	3..8	5 0	3-8	1-9
65-	7.4	9.5	7-4	2.2

this country. Similarly the proportion of men with women of 15 years and upward affects the food requirements, for the intake of women is not equal to that of men. In India the proportion of women in the adult population is less than that of men and this is a factor which cannot be ignored in making an estimate of the food requirements of the country.

Figures for the proportion of sexes by age-groups are not available for the Census of 1941. The Census of 1931 revealed that the proportion of children of less than 15 years in the total population was 39 -9 per cent. Among the adults the percentage

TABLE VII

Estimates of Age-groups and Sex Ratio in the Population of India

Ages	Percentage to Total	Figures in crores		
		1941	1946	1951
0-14 years ..	39-9	15-52	16-68	17-84
Males 15 and above ..	33-5	13-03	14-00	14-97
Females do ..	26'6	10-35	11-12	11'89
Total ..	100.0	38-9	41-8	44-7

of women was 44 -6 per cent. The proportion of women per 1,000 men had declined from 940 in 1931 to 935 in 1941. Making a proportionate allowance it is therefore assumed that in the adult population of 1941 women accounted for only 44 -3 per cent.

Weights and ' Man Value'

In order to facilitate calculations of total food requirements the population is reduced to a common consumption unit by assigning proper weights for sex and age differences. Dr Radhakamal Mukerjee has adopted Lusk's coefficients of comparison of the food requirements of children with those of an average man or woman.[4] He has estimated 'the average and total man value' of India's population as follows:

TABLE VIII

Ages	'Man Value' per head	Population in crores		Total ' Man Value ' in crores	
		1931	1935	1931	1935
0-15 years ..	0-7	14-12	15-08	9-88	10-56
Males 15 and upwards	1-0	10-92	12-55	10-92	12-55
Females 15 and upwards	0-83	10-26	10-07	8-52	8-36
Total ..	0-835	35-30	37-70	29-32	31-46

These weights afford quite a workable basis for the calculation of India's food requirements. But since they are not based on any wide-spread enquiries of food consumption in the country it is better to look for other data as well.

Professor K. B. Madhava has recently[5] worked out on the Imsis of some samples taken from 25,000 budgets of working class families that in terms of expenditure on food on account of a male adult, the weights for females (adults), boys, and girls under 17 would be 0-75, 0-33, and 0-385 respectively. Since, however, his enquiries were confined to expenditure on food of Delhi's working class families with incomes between Rs. 60 and

[4] R. K. Mukerjee: *Food Planning for Four Hundred Millions,* p. 23.

[5] See Presidential Address delivered by him at the Statistics Conference of 33rd Indian Science Congress, 1946.

80 per month, his figures have no general applicability for all-India purposes.

Dr Aykroyd has suggested the following scale of coefficients on the basis of caloric requirements as sufficiently accurate for practical nutrition work in India.[6]

TABLE IX

Group	Coefficient	Calories required
Adult male (over 14)	1-0	2,600
Adult female (over 14)	0-8	2,100
Child 12 and 13 years	0-8	2,100
Child 10 and 11 do	0-7	1,800
Child 8 and 9 do	0-6	1,600
Child 6 and 7 do	0-5	1,300
Child 4 and 5 do	0-4	1,000

The above scale of coefficients seems to err in the case of women, whose requirements are taken to be equal to those of a child of 12 and 13 years. Actually, during pregnancy and lactation the needs of a woman exceed those of men ; and in India, as has already been noticed, women are more constantly in either of the two states than in Europe or America. The above scale, since it is arbitrary, had better be modified by adopting a coefficient of 0-85 for adult females.

In my opinion, the following scale of coefficients will be more practical and give results nearer the truth:

TABLE X

	Coefficient
Adult male (over 14 years)	1-0
Adult female (over 14 years)	0-85
Child 10-14 years	0-75
Child 5-9 ,,	0-5
Child 0-4 ,,	0-35

Applying these to the estimated[7] age and sex composition of the present population the 'Man Value' per 100 persons is shown in TABLE xi overleaf.

This means that the food demand per 100 *persons* in India is equal to that of 76 .7 *male adults;* or the demand per average

[6] Health Bulletin No. 23.

[7] See TABLES vi and vii.

TABLE **XI**

Man Value ' per 100 persons of all ages and sex

Group	Coefficient	Proportion	' Man Value '
Males over 14 years ..	1-0	33-5	33-5
Females over 14 years	0-85	26-6	22-6
Child 10-14 ..	0-75	11-6	8-7
Child 5-9 ..	0-50	13-0	6-5
Child 0-4 ..	0-35	15-3	5-4
Total	..	100-0	76-7

person of all age-groups and both sexes coincides with 0 -767 of the demand of an average man. /t *may, therefore, be stated that in India the total number of consumption units in terms of adult males comes to* 29-84 crores in 1941, 32-06 crores in 1946 and 34-28 crores in 1951. It was about 21-78 crores only in 1901 and 25-93 crores in 1931.

Marriages and the Food Demand

In India, not only are marriages more universal than in the West, but their ceremonial directly affects food consumption to a marked degree. All classes of people, high or low, rich or poor, celebrate marriages to the accompaniment of big feasts, spread over a number of days especially among the Hindus, which, largely owing to waste, add considerably to the total food consumption in the country. These requirements being of a conventional nature cannot be brushed aside as they take precedence even over the necessities. There are other rituals and festivals too going on all the year round, connected with events from the cradle to the grave or funeral pyre, but the incidence of these latter on the total food consumption in the country is not appreciably high. Putting it rather arbitrarily and making a very rough estimate, it may be said that on an average the additional food consumption per marriage amounts at least to that of one man for a whole year. Thus, if there are 100 marriages in a year in a particular area it means as if an additional amount of food is required for 100 persons, who exist nowhere, for a whole year. In a computation of the food demand of the country therefore each marriage should rank equal to an adult male consumption unit or be converted to 'Man Value' on the basis of a coefficient of 1-0.

Marriages are not registered in India and hence their number from year to year cannot be exactly ascertained. According to the Census of 1931 all women over 20 were returned as married except only about 148 per thousand. By the time they reach sixty, not even one per cent remain unmarried. U.S.A. recorded a marriage rate of 13 -1 per 1,000 inhabitants for 1942. In most of the European countries the rate varies between 8 and 10, though in France, Italy and Ireland it is as low as 4 to 6. Considering the fact that in the West the institution of marriage is much less universal, an average marriage rate of 15 per thousand persons per year may be assumed for India. // *implies about* 58 -4 *lakh marriages in* 1941, *adding to the 'Consumption Units' by the same number.*

Distribution of Demand

The distribution of the total 'Consumption Units' for 1941 is given in the following table for the major provinces and states.

TABLE XII

Distribution of Consumption Units

(Figures in lakhs)

Province or State	Population	Human Units Adult Man Value	Marriage Units Adult Man Value	Total Adult Man Value
Madras ..	493	378	6.4	384.4
Bombay ..	209	100	3.1	163.1
Bengal ..	603	463	9.0	472.0
U. P. ..	5o0	422	8-3	430.3
Punjab ..	284	218	4.3	222.3
Bihar ..	363	278	5.4	283.4
C. P. and Berar	168	129	2.5	131.5
Assam ..	102	78	1.5	79.5
N.-W. F. P. ..	30	23	0.5	23.5
Orissa ..	87	67	1.3	68.3
Sind ..	45	35	0.6	35.6
Provinces ..	2958	2269	44.4	2313.4
States ..	931	714	14.0	728.0
Total ..	3889	2983	58 .4	3041.4

The total units in terms of Man Value some to a little more than 30'4 crores in 1941, of which about 7.28 crores represent the requirements of the Indian states and the rest of British India.

CHAPTER II

NUTRITION LEVELS AND FOOD REQUIREMENTS

Workers and Dependants

In assessing the food requirements of a community the nature of work and the proportion of workers are both germane. People with a high ratio of dependants and idlers and a low proportion of workers engaged in manual labour will require comparatively less food than those living under reverse conditions.

There is no direct information on the subject in the Census of 1941. The classification into workers and dependants in the Census returns of 1931 is based on the definition of a worker as a wage receiver or a subsistence obtainer or a working dependant. Thus all those who were principal workers, and those who were helpers have been equally classified as workers. There is no reason to believe that the proportion of workers and dependants has undergone any appreciable change since then. For the purpose of calculation of food requirements the ratio of 1931 may be assumed to be still continuing.

Out of every 100 persons, 44 were returned as workers and 56 as dependants. The proportion of dependants had increased by 2 per 100 persons as compared with 1921 and it was pointed out that part of this was due to the increasing difficulty of getting employment and earning an independent livelihood—keeping youths/in'the middle class at any rate, dependent on their families, whereas 10 years previously they would have been earning. Employment has increased since then, particularly during the War years, but population too has increased and there has been a marked sophistication of the womenfolk of the middle class. All this has perhaps kept the ratio of dependants at the same high level of 56 of the 1931 Census.

Of the total population, 50 -5 per cent is between the ages of 15 and 50, while 39 '9 per cent are children up to the age of 15, and 9 '6 per cent are old people above the age of 50. In all, there were 21 '18 crore adults of which some 30 lakhs were old people. The number of actual workers was 15-39 crores. This suggests that not only a large proportion of women remains idle, having little or no work but some proportion of male adults as

well has little to do. *Rightly speaking this idleness, enforced or voluntary, should be interpreted to imply a lower ratio of food consumption than in a country with high employment level.* Hence, with a policy of full employment in the country provision will have to be made for an average higher per capita consumption.

Women Workers

There were in all 4 .88 crore women returned as actual workers in 1931. The number of women of 15 years and above was more than 10.2 crores. The comparison suggests a lower per capita food consumption for women than for men, among whom the adults were 10 .9 crores as compared to 10 .5 crore workers. But what is more important is that the per capita demand for food is not uniform in the various classes, not only because of the differences in their work and occupation, but also on account of the varying ratio of women workers. There are certain classes where women bear the burden of work equally or very near equally with men and in their case the average per capita food consumption should naturally be high. The more important among these are indicated in the following table:

TABLE XIII

Proportion of Women Workers

	No. of actual workers 000 omitted		No. of Women per thousand Men
	Men	Women	
1. All occupations ..	105,086	48,830	465
2. Agricultural labourers ..	17,111	14,370	1840
3. Workers in Tea Plantations	555	464	834
4. Workers in Textile Industry	2,531	1,571	620
5. Workers in Food Industries	706	771	1,091
6. Basket Makers, etc. ..	322	316	983
7. Dealers in Food-stuffs[1] ..	1,511	1,002	662
8. Traders in Fuel ..	129	163	1,260
9. Unspecified labourers .	3,753	3,123	832

The very high proportion of women workers among the labourers, particularly in agriculture, increases their per capita food consumption. It is here that both husband and wife alike toil all day long; and hence, the family needs a little more food

[1] Excluding dealers in wines, sweetmeats, etc.

than that of any other class, where the cloistered life the women lead reduces food consumption—in the liberal professions and the richer classes sophistication and seclusion of women from work must have cut deep into their food requirements. *It may, therefore, be concluded that the average consumption of food per capita is highest in the case of the labourers, particularly those who work on the land; and is reduced as the number of women workers in a class or group falls.* It is perhaps the least among those engaged in liberal arts and professions.

Nature of Work

In determining the food requirements the nature of work plays an important role. A person with a sedentary occupation needs and ordinarily consumes less food than another who is required to do heavy muscular work. In 1931, the workers were shown to be distributed as below:

TABLE XIV

Distribution of Workers

Means of subsistence	Percentage of workers
Agriculture, fishing, etc. ..	67.11
Industry and Mining ..	10.2
Transport and Trade ..	6.6
Public Administration and Liberal Arts ..	2.7
Domestic Service ..	7.1
Others ..	6.3

It was pointed out by the Census Commissioner that the 572 women per 10,000 workers, who had returned their occupation as domestic service, would have appeared in 1921 as workers mainly if not entirely agricultural. In fact, the correct percentage of those engaged in agriculture and allied occupations would be about 73. The occupational distribution has undergone little material change since 1931, for, in spite of the so-called War-time industrialization, the total number of workers engaged in organized industries at present in the country is only about 23 lakhs as against a little more than 13 lakhs in 1931. An increase of about 10 lakhs in the volume of factory employment, although amounting to 75 per cent, hardly affects the occupational distribution of more than 17 crore workers in the country.

Three-fourths of the Indian workers are agriculturists, and, hence, the average per capita food requirements are determined by the needs of a farmer. It is unlike Great Britain, where agriculture accounts only for 7 per cent of the workers, the bulk of whom, viz. 47 .2 per cent is to be found in industry and mining. The British food standards, therefore, have largely to meet the requirements of an industrial worker, who, though he has work—perhaps hard work—all the year round, does enjoy sufficient leisure and rest every day, work being limited by law to a few hours. The Indian farmer does not enjoy any such security or limitation of work. Nature is often the controller of his time and usually provides work by fits and starts. The cultivator has to remain idle periodically, sometimes for weeks together. But when work comes, there is a race against time and Nature is callous. Therefore, in spite of the enforced idleness which in certain parts is as high as 180 days or even more in a year, the food requirements of a farmer cannot be much less than those of a worker in a factory. On the whole the proportion of workers in sedentary occupations and trades is very small in the country; the bulk consists of manual workers who have no machines or labour-saving devices to relieve them of the heavier tasks or of monotony. Thus the average consumption of food per man should be relatively high in India owing to an overwhelming majority of the people being manual workers.

Calorie Requirements

Since one of the principal uses of food is to supply energy to the living body, it is usual to express food requirements or consumption in terms of heat units called calories, which measure the energy value in it. This energy is needed (i) to maintain the process of living, (ii) for the every-day activities of life, and (iii) for the performance of muscular work—no calorific energy from food being needed for mental work. The amount of energy used by different individuals is found to be proportional to the surface area of their bodies; and since men are bigger than women, the total number of calories needed by men is greater than that needed by women.

Energy and Metabolism

In the first instance food energy is required for maintaining basal metabolism, i.e. the functions of the body when lying *still*

and *warm* and to supplement the waste in specific dynamic action. The latter may be assumed to amount to 10 per cent of basal metabolism in a mixed diet. Scientists hold that merely for the process of keeping alive, men and women of the average bod) size require 70 and 60 calories per hour in Great Britain. Thus on an average some 1,700 calories per day are required for an individual simply to maintain the process of living. The basal metabolic requirements of calories will of course differ in individual cases according to their size. The following table illustrates this relationship:

TABLE XV

Body Surface and Basal Metabolic Requirement

	Height Cm.	Weight Kg.	Surface Area Sq.m..	Basal Metabolism plus specific dynamic action
Public School Youths ..	180	71	1-88	1870
Conventional ' mean ' man ..	171	60	1.77	1,770
Average Industrial worker ..	169	61	1.69	1,694

Investigations carried out in India indicate that the basal metabolic rate for an Indian is slightly less than the corresponding rate for people in Europe. The cause of this lower rate has nol been definitely ascertained and a number of hypotheses have been suggested. It may be due to climate, the very low proportion of protein consumption, or race. It *is also possible that chronic tender-feeding and universal malnutrition may be responsible for ttie lower metabolic rates in India;* for it is a known fact that during starvation or under-nutrition, the basal metabolic rate becomes very much reduced. Experiments have shown that prolonged starvation can reduce the basal metabolism by as much as 29 per cent.

Metabolism investigations in India have now been sufficienl to leave no doubt about the lower metabolic rate as compared to the Western standards. Krishnan and Vareed found that the basal metabolism of young college students in Madras was 12 per cent for men and 16 per cent for women *below* Western standards. Similarly, Mukerjee and Gupta found that in Bengal it was *below* the Western standards on an average by 13-3 per cent.

Rahman has recorded the average ba£al heat production per hour of a group of male students in Hyderabad as 60 calories, i.e. some 7 to 8 per cent below American standards. According to Mason and Benedict the average for women (students and teachers) in Madras works out at 44 calories per hour. It is perhaps not so low in Northern India, where the average basal metabolism has been found to be 6 -9 per cent below the English and American standards. The basal metabolism of peasants in the United Provinces as investigated at the Physiological Laboratory, Lucknow University, comes to about 1,200 calories per day. Dr Burridge arrives at a lower figure for the workman. The Indian workman according to him seldom weighs as much as 120 Ibs., usually he is nearer 100. This implies a basal metabolism, which is approximately obtained by multiplying the weight by 11 to 1,100 calories. The people of North India have generally a bigger body surface than the South Indians and so their calorie requirements are slightly greater.

Placing reliance on investigations carried on on basal metabolism in India one may state that the average needs of men for energy to maintain the process of living are 1,400 to 1,600 calories per day, i.e. about 12 per cent below the Western standards. The lower rate applies more to the people in South India and rice zones while the upper rate holds good for people in the North and wheat zones. *An all-India average would be in the vicinity of* 1,500 *calories per day per man for both basal metabolism and specific dynamic action.*

Energy and Daily Activity of Life

In addition to the calorie requirements for the process of keeping alive, extra energy is needed for each activity and movement. Experiments on European and American subjects have shown that the amounts of energy needed for different daily actions are as in TABLE xvi overleaf.

In Great Britain the energy expended on an average during the 8 hours of the day which are filled with miscellaneous domestic activities require about 360 calories for men and 215 calories for women, or an addition of about 21 and 15 per cent respectively to the energy requirements for the process of living. In India, although people are perhaps not as active as in Europe, they have at the same time little or none of those many amenities of life

TABLE XVI

Calories needed for every-day activity

Action	Calories per hour
Sitting at rest	15
Standing	20
Dressing or undressing	83
Walking slowly	115
Walking moderately fast	215
Walking down-stairs	290
Walkingup-stairs	1,000

which in the West make for a greater amount of rest and leisure' Domestic duties connected with the maintenance of a house and family are decidedly more numerous and heavier in India than in Europe or U.S.A., specially for the women. A calorie requirement of 300 per day for an average individual providing an addition of some 20 per cent to the needs of mere living, will be very much near the truth for practical purposes.

Energy and Work

In addition to the basic requirements of living and ordinary activity the amount of food an individual needs is determined

TABLE XVII

Calorie Requirements for Muscular Activity

Occupations	Calories per hour
1. Sedentary-	
Writing	20
Typing	30
Tailoring	45
2. Moderately active—	
Shoe-making	90
Carpentering	140
Light metal working	140
3. Active—	
Heavy carpentering	180
Light blacksmithing	275
Stone mason's work	300
4. Very active—	
Coal-mining	320
Heavy blacksmithing	350
Wood cutting	380

by the muscular activity of his work. Dr Burridge suggests that 500 calories per day would easily be enough for the actual physical work which an Indian factory worker does. This however seems to be an under-estimate. The approximate average values of calories used up by workers in the West in different occupations are given in TABLE XVH.

The Indian workman being lighter requires less, probably by 10 per cent, than his contemporary in Europe or America. An average Indian agriculturist may be taken as moderately active, using up about 110 calories per hour in his work of about 8 hours a day. The energy expenditure per day for labour thus requires an intake of about 880 calories.

To sum up, although energy expenditure differs for individuals according to their size, weight and work, the average total daily needs of cultivators in India may be calculated as follows:

24 hours of the process of living	1,500
8 hours of every-day activity	300
8 hours' labour	880
Total day's calorie need	2,680

The above estimate is a little higher than that given in *Diet Surveys in South Indian Villages.* That estimate is based on the assumption that the South Indian peasant spends 8 hours of 24 in sleep, 8 hours at work, and 8 hours 'sitting at rest'. The energy expenditure has been worked out at 432 calories for 8 hours' sleep at 54 calories per hour, 1,440 calories for 8 hours' work at 180 calories per hour, and 688 calories for' 8 -hours' 'sitting at rest' at 86 calories per hour, giving a total of 2,560 calories. That there is an under-estimate is obvious from the simple fact that peasants do not simply 'sit at rest', while they are not working or sleeping. If this estimate is corrected accordingly, the calorie needs worked out in it come very near the amount given above. Dr Aykroyd has estimated the calorie requirements for an 'average man' in India at 2,600 per day. He concedes however that those who perform heavy manual work probably require about 2,800-3,000 calories per day and if the agriculturist is to work very strenuously on his holding, he must have a correspondingly high calorie intake. In considering the requirements of the country as a whole, therefore, we have to take 2,680 calories as the irreducible minimum required by the average

Indian. The British Ministry of Food estimates the requirements of a carpenter at 3,180 calories, a blacksmith at 4,260 calories, and a wood-cutter at 5,100 calories, and making allowances for our warmer climate and the smaller size of our men, an average calorie need of 2,680 per day per man must by all computations be regarded as essential.

Net **Intake and Waste**

But 2,680 is only the amount of *"net* calories' per day, that is the actual intake assimilated. Since there is 'wastage' and 'leakage' of food in the kitchen or at the table during distribution or cooking, an addition of 100 to 150 calories to compensate for this loss is taken to be the minimum for calculating food requirements. *Adding some 5 per cent to the net calorie needs for loss in wastage* 2,800 *calories per day may be taken to represent the standard food requirements of an average man in India.* On this basis the total annual calorie requirements of the country for different years are as follows:

(In terms of billion calories)

Year	1941	1946	1951
Calorie Needs[2]	310.83	334.14	357.45

The country's food requirements are represented at a minimum by 310.83 *billion calories for* 1941, *of which* 236.2 *billion calories indicate the needs of British India alone, exclusive of the Indian States.* This demand has risen by 7 .5 per cent in the year 1946 and continues to grow at the rate of 1 .5 per cent each year.

In considering food requirements it is not only the quantity that matters but its quality is of equal importance, for it is quite conceivable that there may be no under-nutrition in a community and yet it may suffer from malnutrition of a very acute type. A diet should be adequate not only in terms of calories but should also be nutritionally satisfactory and should contain adequate quantities of proteins, fats, carbohydrates, vitamins and minerals.

Proteins are needed in nutrition for the growth and repair of the human body and are also used by the organism as a source of heat and other forms of energy. According to modern physiologists the protein intake for all adults should not fall below 1 gramme per kilogramme of body-weight. MeCarrison lays

[2] Figures are in billions, i.e. a million millions=one lakh crores.

down a standard of 100 grammes while Dr Aykroyd suggests the following scale, which may often with advantage be exceeded:

TABLE XVIII

Protein Requirements

Age and Sex	Coefficient	Grammes per day
Man 18 to 60	1.00	65
Woman 18 to 60	0.85	55
Boy 10 to 17	1.20	80
Girl 10 to 17	1.10	70
Child 6 to 9	0.90	60
Child 2 to 6	0.60 to 0.80	40-50

Growing children require, per unit of body weight, more proteins than adults and similarly the needs of women during pregnancy and lactation are greater than at other times. Proteins are derived both from plant and animal cells and are made up of a number of ammo-acid units, which are sometimes of as many as twenty different kinds. There are ten essential ammo-acids which must be supplied in the diet and the animal proteins usually contain these in adequate proportions for human needs. The vegetable proteins lack in one or the other of these ten essential amino-acids. Hence some animal proteins are essential particularly during growth, pregnancy and lactation. It has been suggested that their proportion should be at least one-fifth and higher if possible. If the diet contains only vegetable proteins, not only a variety of foods must be eaten and quite large amounts of them, tut even so its 'incompleteness' still remains.

Fat in adequate quantities must be included if the diet is to be 'complete'. There is no exact knowledge of the quantity of fat required by the body. M eCarrison's standard is 80 grammes while Dr Aykroyd's is 40 to 50 grammes per adult daily. Fat is the most concentrated of all energy foods and as such all common fats possess the same value. But animal fats, such as butter or ghee, contain other nutrients as well, e.g. vitamin A, which most vegetable fats and oils lack. Therefore the nutrition value of the animal fats is higher than that of most vegetable oils.

The chief source of energy in the body are the carbohydrates and in a diet which is mostly vegetarian as in India there is an excess rather than a deficiency of these.

There are about 19. or so major inorganic mineral substances, which must be supplied from food. Many of them are needed only in small amounts and are widely distributed in many foods. Their importance in practical dietetics with our present knowledge is small. The case of calcium, phosphorus and iron is, however, different as these may easily be lacking. A balanced diet should contain enough calcium and phosphorus and the two should be in adequate proportion to each other. Bones and teeth are largely composed of calcium phosphate and therefore both calcium and phosphorus are important.

Besides, calcium is necessary for the normal clotting of the blood, functioning of the muscles and for the proper growth of children—who need more of it than adults, as much as 10 grammes daily. The expectant and nursing mothers also require more calcium than other people, first to form the bones of the child and then to supply it in their milk. The requirements of adults may be put at 0 -6 gramme daily.

Similarly, phosphorus is important as a major constituent of bones and teeth and plays an essential part in the continuance of life. The body needs more than 1 -0 gramme daily; but since with the exception of milk and milk products all common foods are richer in phosphorus than calcium, a diet which is satisfactory in its calcium content will not be deficient in phosphorus. It is stated that adults require twice as much phosphorus as calcium, while children need 1 part of calcium for each 1 .5 parts of phosphorus; but these ratios are not vital and a good supply of vitamin D. compensates for a wrong proportion.

Blood formation in the body needs iron and so it is essential for health that the diet should contain sufficient iron. Anaemia is inevitable in case of iron deficiency in the food. A satisfactory diet should contain 20 ings, of iron.

In addition, the different vitamins in adequate quantities should be supplied by food. The body requires a daily minimum of 3,000 international units of vitamin A, 300 international units of vitamin B, 30-50 mgs. of vitamin C and a good supply of vitamin D, besides others. This is of course a very rough scale and is subject to many limitations.

To sum up, the human body needs cereals but these are not all. These should be supplemented in sufficient quantities by other foods, which are required to compensate for the deficiencies

of a cereal diet in respect of proteins, fats, minerals and vitamins. Side by side with cereals people require enough of 'protective foods', viz. milk and milk products, meat, fish, eggs, pulses, vegetables and fruits.

A Balanced Diet

The Nutrition Advisory Committee of the Indian Research Fund Association has suggested the following composition of a balanced diet to provide the various nutrients in sufficient quantities,, taking into consideration the Indian dietary habits:

TABLE XIX

Requirements per day in a Balanced diet for an adult man

	Oz.		Oz.
Cereals	14	Milk	10
Pulses	3	Sugar and Jaggery	2
Green leafy vegetables	4	Vegetable oil, Ghee, etc.	2
Root vegetables	3	Fish and Meat	3
Other vegetables	3		
Fruits	3	Eggs	1 egg

The Advisory Board of the Imperial Council of Agricultural Research in its Memorandum on the Development of Agriculture and Animal Husbandry in India has adopted the following balanced diet:

TABLE xx

Balanced diet for an adult

Cereals	18 Ounces per day
Pulses	3 do
Sugar	2 do
Vegetables	6 do
Fruits	2 do
Fats and oils	1·5 do
Whole milk	8 do
Meat, Fish and Eggs	2-3 do

On the basis of these diets the total requirements of the country have been worked out by the respective bodies as in TABLE xxi overleaf.

The extreme divergence in the two estimates cannot be wholly explained by the difference of some 25 per cent in the consumption units. It is due more to the variations in the compositions of a

TABLE XXI

Annual requirements of food-stuffs for human consumption in India

	Estimated by the Nutrition Advisory Committee, for 60 crores	Estimated by the Advisory Board, I.C.A.R., for 40 crores
1. Cereals ..	5.7 Crore tons	5.4 Crore tons
2. Pulses ..	1..2 do	0.9 do
3. Vegetables—		
(i) Green Leafy ..	1.6 do	} 1.8 do
(ii) Non-leafy ..	2.4 do	
4. Fruits ..	1.2 do	0.6 do
5. Sugar and Jaggery ..	0.8 do	0.6 do
0. Fats (oils and ghee) ..	0.8 do	0.45 do
7. Milk ..	4.6 do	3.2 do
8. Fish and Meat ..	0.9 do	} *0.6* to 0.9 do
9. Eggs ..	102,00 Crore eggs	
Total ..	19.2 Crore tons and 102,00 Crore eggs	13.55-13.85 Crore tons

balanced diet, with which they have started. The balanced diet suggested by the Nutrition Advisory Committee may have much in it to commend and should perhaps be the objective of a long-term food policy, but cannot be applied immediately or within a short transition period to determine the demand and consumption of food-stuffs in the country.

As suggested by the United Nations Conference on Food and Agriculture the food requirements should be considered in terms Of an *intermediate* objective, which may be practical within a short period and can be raised to the ultimate objective in gradual and easy steps.

TABLE XXII

Balanced diet for an adult

1. Cereals ..	16 Ounces	15 Ounces
2. Pulses ..	3 do	3 do
3. Sugar ..	2 do	2 do
4. Vegetables—		
(i) Leafy ..	2 do	2 do
(ii) Non-leafy ..	6 do	6 do
5. Fruits ..	2 do	2 do
6. Milk ..	6 do	6 do
7. Oils and Ghee ..	2 do	2 do
8. Fish, Meat and Eggs ..		2 to 3 eggs

The above scale leaves little room either for under-nutrition or malnutrition and at the same time are more easily attainable than the targets provided by the Nutrition Advisory Committee or in the Memorandum of the I.C.A.R. But it should be borne in mind that dietetically much is left to be desired in the above scale and hence it should not be considered as the ultimate objective. It only represents the basis of the immediate requirements of a country which is poor and where economic conditions do not permit the establishment of the dietary standards based upon a more scientific assessment, at least for some time to come.

CHAPTER III

DEMAND AND ITS ELASTICITY

At the conclusion of the last chapter the composition of a diet is given, which, keeping in view the economic conditions and dietary habits, represents the minimum requirements that must be satisfied to sustain the population in a reasonable standard of health. In the case of cereals the scale of 15 to 16 oz. per day per adult man is to be regarded as the minimum so long as other constituents in the diet do not attain the standards laid down in TABLE xxii. It is however desirable that these other constituents should ultimately be made available in larger quantities than shown therein, particularly the protective foods. But for a decade or so, unless a revolutionary transition in agriculture takes place, this is not practicable. Hence cereals will continue to form the major part of our diet in India; and although for proper nutrition other constituents are of equal or even of greater importance, the line of hunger and starvation is determined by the quantity of cereals available to us.

Total Requirements

On the basis of the minimum needs for a balanced diet as given in TABLE xxii and assuming that one-third of the population is strictly vegetarian, the total requirements of the country for the various food-stuffs for the population of 1941 have been worked out for the different provinces in TABLE xxm opposite.

In all, the country needed in 1941, 466-3 *lakh tons of cereals,* 91.2 *lakh tons of pulses,* 60.8 *lakh tons each of sugar, leafy vegetables, fruits, and oils and ghee,* 182.5 *lakh tons each of non-leafy vegetables and milk, and about* 100 *lakh tons of fish, meat and eggs.* The quantities in each case refer to the amount required for human consumption alone and therefore should not be mistaken to represent the total demand in the country for all purposes.

Demand and Population

Again, the requirements of 1941 do not hold good today since the increase in population, as has already been pointed out, is an annual increase—an addition at the rate of about 1 -5

TABLE XXIII

Total Requirements of the different Foodstuffs in 1941

(Figures in lakhs)

Province	Man value	Cereals (tons)	Pulses (tons)	Sugar (tons)	Vegetables Leafy (tons)	Vegetables Non.leafy (tons)	Fruits (tons)	Milk (tons)	Oils (tons)	Fish, meal and eggs (tons)
Madras ..	384.4	58.9	11.5	7.7	7.7	35.1	7.7	35.1	7.7	11.5
Bombay ..	163.1	24.5	4.9	3.3	3.3	9.8	3.3	9.8	3.3	4.9
Bengal ..	472.0	72.0	14.2	9.4	9.4	28.3	9.4	28.3	9.4	14.2
U. P. ..	430.3	66.0	12.9	8.6	8.6	25.8	8.6	25.8	8.6	12.9
Punjab ..	222.3	341	6.7	4.4	4.4	13.3	4.4	13.3	4.4	6.7
Bihar ..	283.4	43.5	8.5	5.7	5.7	17.0	5.7	17.0	5.7	8.5
C. P. and Berar	131.5	20.0	3.9	2.6	2.6	7.9	2.0	7.9	2.6	3.9
Assam ..	79.5	12.2	2.4	1.6	1.6	4.8	1.6	4.8	1.6	2.4
N..W. F. P. ..	23.5	3.6	0.7	0.5	0.5	1.4	0.5	1.4	0.5	0.7
Orissa ..	68.3	10.5	2.0	1.4	1.4	4.1	1.4	4.1	1.4	2.0
Sind ..	35.6	5.5	1.1	0.7	0.7	2.1	0.7	2.1	0.7	1.1
Other Piovinces	2313.4	354.7	69.4	46.3	46.3	138.8	46.3	138.8	46.3	69.4
States ..	728.0	110.1	21.8	17.6	17.6	43.7	17.6	43.7	17.6	21.8
Total ..	3041.4	466.3	91.2	60.8	60.8	182.5	60.8	182.5	60.8	91.2

per cent—which mekns that the country requires 7 lakh tons of cereals, 1 .4 lakh tons of pulses, fish, and meat and eggs each, 2 .7 lakh tons of milk and non.leafy vegetables each, and 90 thousand tons each of sugar, fats, leafy vegetables and fruits *more* each year than in the previous year. This point is often not properly emphasized and may be overlooked in the West, where population in many countries is now either stable or even declining. *But this addition each year in the demand forms the main crux of the food problem of this country and necessitates not a fixed but an increasing supply offood.stujfs.*

To make the point clear the estimates of the demand of 1946 and 1951 are given in the following table in contrast to that of 1941:

TABLE XXIV

Estimated Total Demand of Food.stuffs in India, 1941.51

(Figures in lakh tons)

	1941	1946	1951
1. Cereals ..	466.3	501.2	536.2
2. Pulses ..	91.2	98.0	101.8
3. Sugar ..	60.8	65.3	69.8
4. Vegetables —			
(i) Leafy ..	60.8	65.3	69.8
(ii) Non.leafy ..	182.5	196.1	209.8
5. Fruits ..	60.8	65.3	69.8
6. Milk ..	182.5	196.1	209.8
7. Oil and Ghee ..	608	65.3	69'8
8. Fish, Meat and Eggs ..	91.2	98.0	104.8
	1246.9	1350.6	1444.4

Within ten years the total requirements will increase by about 1 crore tons for no other cause except the natural increase in the population of the country. Any food policy is liable to fail, which ignores this important aspect of the country's food economy.

Food Consumption and Social Ceremonies

The total amount of food required for human consumption in (India and as estimated for 1941 in TABLE xxm includes the additional quantity required for marriage feasts. It has been argued that there is double counting in this method of calculation as the invitees at marriage dinners would eat even without a feast. The argument is quite plausible and would have been correct

had there been no waste at these social parties. Actually, the arrangements are on such sumptuous scale that a high proportion of waste is inevitable. Thus the total food consumption actually increases on account of the feasts associated with marriages in India. It is not unusual in marriages for the whole community or even the entire population of the village to be invited. In some parts the zamindars on such occasions feed groups of villages. The evil is not less serious in the cities where as many as a thousand people may be invited to a marriage feast. In all it has been estimated that for some 58 '4 lakh marriages annually there is an additional requirement of nearly 10 lakh tons of cereals, besides other food-stuffs. In particular, feasts are occasions for wasteful consumption of large quantities of sugar and ghee.

Cereals the Bare Necessity of Life

Nevertheless, the needs are primarily for human consumption and cereals are by far the greatest part of them. In the absence of any scope for an increase in the intake of other constituents in the diet for the country as a whole, adequacy of cereal consumption is important not only for efficiency of the worker but for maintaining life itself. While the rich and the well-to-do can replace a certain portion of cereals in their diet by fruits, milk, vegetables, meat, fish and eggs, the vast majority of the population, who are notoriously poverty-stricken, have no access to such substitutes. In their case, therefore, a minimum supply of 16 ounces of cereals per day per man is absolutely essential. If they get less there is a serious set-back in their efficiency, which is already low as the full quota of 2,800 calories is seldom available. But what is more tragic is the fact that any diminution in cereal consumption below a certain limit means actual starvation and death.

The basal metabolic rate, that is, the maintenance needs of man under normal conditions is 1,500 calories (p. 21). Hence any reduction in availability and consumption of cereals below 16 ounces per day per man for the masses in the country is fraught with grave consequences. It is possible *in urban areas* for a population to maintain itself even at a ration of 12 ounces of cereals per day as extra calories may be derived from other alternative sources, which, however, are not usually available in *rural* areas. As a matter of fact such a ration is quite adequate for people of

the upper middle classes and hardly implies any hardship in their case. A study of the consumption of wheat and *atta* in the four towns of the Punjab reveals that even a reduction of 33 to 50 per cent in the ration of these articles, as fixed in 1945, will not be felt materially by their urban population as a whole. Nor. mally, the total consumption of these articles in these towns is much less than the total standard requirements on the basis .of the amount of full ration. The following figures are significant:

TABLE XXV

Consumption of Wheat and Atta *in the four Rationed Towns of the Punjab*

Period	Total Registered population	Wheat and *Atta*		Percentage of offtake to requirements
		Total standard requirements	Offtake including (supplementary)	
		Tons	Tons	
		LAHORE		
29—4.45 to 26—5—45	9,10,017	10,258.5	5,764.5	56.2
June, 1945	9,10,017	12,840.6	6,603.4	51.4
1—7—45 to 21—7—45	9,10,017	8,422.8	4,490.4	53.3
22—7—45 to 18.8—45	9,10,017	11,757.0	5,628.0	49.5
19—8—45 to 15—9—45	9,10.017	11,636.0	5,320.6	45.7
16—9—45 to 13.10—45	9,10,017	11,776.0	5,932.8	50.3
14.10—45 to 10.11—45	9,10,017	11,888.0	5,900.3	49.7
		AMRITSAR		
May 1945	3,89,779	5 018.8	2,834.3	54.2
June, ,1945	3 94,039	4,902'1	2,787.1	53.9
1—7—45 to 21—7—45	397205	3,599.9	1,977.1	55.0
22—7—45 to 18—8—45	4.00,892	4,603.6	2,590.4	54.2
19—8—45 to 15—9—45	4,05,093	4 694.7	2,580.5	54.9
16—9—45 to 13.10—45	4,08 543	4,724.9	2,663.5	56.4
14.10—45 to 10.11—15	4,12,651	4,739.9	2,788.9	58.8
		RAWALPINDI		
29—4—45 to 26—5—45	2,27,022	2515.4	1.610.0	64.0
27—5—45 to 30—6—45	2,29.878	3,136.5	1,850.6	59.0
1—7—45 to 21.7—45	2,29 853	1.885.4	1,1b9.0	62.1
22—7—45 to 18—8—45	2,30,023	2,528.6	1,505.5	59.5
19—8—45 to 15—9—45	2,33 355	2,564.8	1,510.2	58.9
16—9—45 to 13.10—45	2,36,901	2,597.7	1,565.7	60.3
14.10—45 to 10.11—45	2,37,751	2,618.5	1,571.9	60.5
		SIMLA		
1—7—45 to 21—7—45	82,065	Rationing was not in force		
22—7—45 to 18—8—45	87,850	186.1	94.0	51.0
19—8—45 to 15—9—45	89,920	761.9	439.4	58.0
16—9—45 to 13.10—45	87,435	824.6	404.0	49.0
14.10—45 to 10.11—45	78,570	843.0	324.9	38.0

This should not be construed to imply that a low quantity of about 6 to 8 ounces per head as suggested by the figures of offtake of wheat and *atta* alone proves sufficient. Besides wheat, there are other cheaper cereals and millets available to the people. There can, however, be no doubt that there is considerable scope for a reduction in the wheat ration in these cities. But the condi. tions pertaining to an urban population cannot be applied to the rural masses and the poorer people even in cities. While cities can pull on even with a ration of 12 ounces of cereals, particularly in an emergency such as faced the country in 1946, the rural communities will have to make sacrifices to withstand a reduction to this extent. The same applies equally to the poorer sections in a city. On the whole, the rich and those engaged in liberal arts and professions do not consume nor indeed require as high a quantity of cereals as the workers and the agriculturists do need and take. Many of the latter require even more than 16 ounces; and hence a pound of cereals a day for each man at an average is no over.estimate. According to the surveys made by the Punjab Board of Economic Enquiry in 1934 and 1935, the total quantity of grain eaten per head per day varied round about 15.20 ounces, but in the case of men only it was 20.28 ounces according to occupation. Mrs Wiser found that about 16 ounces per head was normally consumed in a U.P. village. Dr Aykroyd and his staff at Coonoor made certain surveys in south.east Madras and found that cereals provided 87 per cent of the calories at an average. In all 2,400 calories are being taken per 'consumption unit' so that the amount of cereals exceeds 20 ounces.

To conclude, a cereal requirement of 501 .2 lakh tons for 1946 or 536.2 lakh tons for 1951 for the country as a whole should be regarded as the minimum, with no scope for reduction under the present conditions. These amounts represent the bare necessities, and a fall in supplies below them may result in deaths for many people. It may be argued that the shortage or deficiency may be shared proportionately by all in order to prevent actual deaths from starvation. But first of all, even if the miracle of such equitable distribution does happen, there can be no doubt that health and efficiency will inevitably suffer to the extent of the deficit. There are of course certain sections of the community who do not require to consume 16 ounces of cereals, viz. the rich and middle classes in the cities; their cereal ration

may be reduced while the rest of the population continues to get them at the rate of a pound a day per man. But first of all there is a limit even with regard to this class of people—a minimum of 10 ounces of cereals—beyond which average consumption cannot be further reduced. And again, the number of such people in relation to the total population is so small that the saving effected by this means in the total consumption of cereals in the country is for practical purposes negligible.

Density and Dietary Standards

Cereals, then, constitute the main bulk, almost the whole of the diet of an average man in India. Whether it *should* be so is quite another matter. The choice seems to have been limited by the high density of population together with the late and very slow growth of industries in the country. India has been obliged to live mostly on her own food resources. The net cultivated area was as little as 0'72 acre per capita in 1941, which had progressively declined from 0.80 acre in 1911. Ordinarily, cultivation of cereals yields more calories per acre than production of milk, vegetables, fruits, or meat. Dr Baker calculated for the United States of America that while a diet consisting largely of cereals could be grown on 1 .2 acres per capita, as many as 3 .1 acres per capita are required for a 'liberal diet' with a quart of milk per day and ample quantities of meat, fruit and green vegetables. These scales cannot of course be applied directly to India; but one conclusion is obvious—that in the absence of any possibilities of a revolutionary change in her agricultural economy, India., with less than three.fourths of an acre per capita on which to feed her teeming millions, had no choice but to produce and consume cereals. She had to adopt, under such extreme pressure of population on soil, what Dr Baker has called an 'emergency restricted diet' mainly of cereals, almost permanently, so that now it has become a settled habit.

Habit as a Factor in Diet

Individual tastes and habits always play an important part in the selection of food. In India the choice for many, particularly the poor, is little; and yet long established habit has divided the entire population into two classes, viz. rice eaters and bread eaters. Those who take rice demand little of wheat or millets, while the bread eating population has little consumption of rice.

The former live in the rice belt and though they have no prejudice against taking bread they seldom know how to take wheat, jowar, or bajra. This gives rise to the peculiar problem that a cereal shortage in the rice zone cannot ordinarily be met by wheat or millets: there may be exaggeration in the report that "you could take all the world's wheat to Bengal and Madras and the people would still starve because they do not know how to use it"[1] but it is not entirely incorrect.

The Famine Inquiry Commission of 1945 expressed a similar opinion. They report: "Attempts have been made to relieve the present rice shortage by supplying deficit rice eating areas with wheat. This policy has been only partially successful, since rice eaters on the whole do not take readily to wheat, and have not the knowledge and means needed to prepare wheat for consump. tion in acceptable form. The same applies in general to the use of millets in rice eating areas. Again, the consumption of wheat or millet as part of a daily ration which consists mainly of rice, involves two cooking operations, adding to household work and increasing the demand for fuel."[2]

The position with regard to the bread eating population is somewhat different. Ordinarily the bread eaters, e.g. in the Punjab and North.West U.P., do not take rice except on special occasions and hence their cereal requirements cannot be met wholly by rice. In an emergency, however, these people can be persuaded and do take rice in sufficient quantities. But this happens only under conditions of acute scarcity or shortage. In between is a small number of people of the upper classes in the,urban population who take both rice and other cereals.

Hence, cereal requirements have to be considered in terms of rice and all other cereals separately. These latter can be grouped together because wheat and millets are substitutes for each other, although people accustomed to take wheat will not easily take millets like jowar or bajra or even barley. Apart from taste and habit there is a prejudice against taking cheaper millets in the well.to.do communities, whose diet consists mainly of wheat. As we descend down in the financial scale barley and millets enter largely into consumption until we reach the poor for whom

[1] *Dally Mail's* India correspondent's report on food scarcity in February, 1946.

2 Final Report, p. 199.

jowar and bajra are the staple food. There is almost a universal ambition among the barley and millet eaters to take to wheat; and with every improvement in earnings and wages these are readily replaced by the costlier cereal, whose consumption seems to be associated with a distinct social status. This lends a character of rigidity to the demand for wheat and attempts to relieve its shortage by cheaper millets are not easily successful. Millet eaters, however, take easily to wheat if financial condition permits. Habit or prejudice does not stand in the way of such substitution, so that in the event of a shortage of these cereals an additional supply of wheat can easily relieve the situation—provided it is priced low enough to be within the means of the poor. Under such conditions price level provides the only bottleneck, and if wheat is made as cheap as jowar it becomes a *good* substitute for millets or barley. In considering the total demand for cereals, therefore, the limited extent to which the different kinds are interchangeable must be kept in view. To sum up, rice has no easy substitute in any other cereal, while millets have a good one in wheat, but not vice versa.

Rigidity of Rice and Wheat Demand

This lack of substitutes for rice and wheat makes their demand very rigid, particularly so in the former case; with the result that even in the pre.War years the country was obliged to import rice every year from Burma to the extent of about 17 '5 to 25 lakh tons. It is not possible to say exactly what proportion of population consists of rice eaters, but a rough estimate may be given—that out of the total cereal consumption in the country, half consists of rice, 20 per cent of wheat, and 30 per cent of others including millets.

On this assumption the demand for the various kinds of cereals for the different years for human consumption is worked out in TABLE xxvi opposite.

These requirements have been worked out on the assumption that the proportion of consumption of the various cereals will remain constant, simply to illustrate their respective demands. Actually such static conditions are neither practicable nor desirable.

The demand for the necessities of life is inelastic all over the world. Food, a major portion of it, falls under this category.

TABLE XXVI

Total Requirements of Cereals for human consumption

(Figures in lakh tons)

	1941	1946	1951
Rice ..	233.2	250.6	268.1
Wheat ..	93.2	100.2	107.2
Others ..	139.9	150.4	160.9
Total ..	466.3	501.2	536.2

In India, cereals and pulses provide the bare necessities; and hence, the elasticity of their demand at the present level of consumption is negligible. It is all the more so because a large proportion of consumers in India gets food.grains without the process of exchange or paying a price for them.

The population of the country may be divided into three classes as far as the supply of food.grains is concerned. In the first category are those producers who themselves grow more food.grains than they need for their domestic consumption and have a marketable surplus. But these cannot be compared to the capitalist.farmers of Britain or the U.S.A. as their surplus is very much smaller. There is then the second class of producer. consumers, who have little or no marketable surplus but grow just enough for their own requirements. Finally, there are the non.producer consumers, who purchase their requirements from the market and these include the entire urban population, the cultivators of special crops such as sugar.cane, jute, vegetables and flowers, and the landless workers in the villages.

One would imagine that since nearly three.fourths of the people in India depend on agriculture for their livelihood, and since farming usually implies the cultivation of grain, there should be very few people who have to purchase their cereal supplies from the market. More than 77 per cent of the total area sown in British India is under food.grains, while the total area under all varieties of food crops including oil.seeds is about 90 per cent. Yet the producer.consumers do not form a majo. rity in the country. According to the Census of 1931, the culti. vating owners and the tenant cultivators together comprise less than 40 per cent of the total workers. Twenty per cent of the

actual workers are agricultural labourers and the remaining 40 per cent are distributed in all other occupations including agri. cultural, other than raising of crops. Even if it be assumed that all the cultivators grow enough food for their own consumption and about half of the agricultural labourers are given wages in kind, 50 per cent of the population still remains, which must be purchasing food.grains from the market. The various market. ing surveys undertaken by the Government of India reveal that 40 per cent of rice and nearly 50 per cent of wheat produce is sold in the markets. Moreover, the amount retained in the villages by producers is not all for human consumption, as above all it includes the seed requirements. It will not be therefore far from the truth to conclude that 50 per cent of the people in India belong to the purchaser.consumer class with regard to food.grain supplies.

Producer.Consumers

As far as the producer.consumers are concerned, apparently the rise or fall in the prices of food.grains cannot affect their consumption. Actually the produce per acre is so low and the average size of their holdings so small that prices play an impor. tant part in determining their food consumption. According to the Census of 1921, the average cultivated area per cultivator was 12 .2 acres in Bombay, 9 .2 in the Punjab, 8 .5 in the C.P. and Berar, 4.09 in Madras, 3.1 in Bengal, 3.1 in Bihar and Orissa, 3 '0 in Assam and only 2 .5 acres in the United Provinces. Subsequent investigations indicate a further reduction in the average size. In Bombay, the report of the Land Revenue Administration 1921.2 revealed that 48 per cent of the culti. vators held less than 5 acres each and only 23 per cent had 15 acres or more to cultivate. A recent survey of Bhiwandi Taluka shows that 69.1 per cent of the holdings are under 5 acres.[8] According to a survey by Dr Ghatge and Patel in Charotar in the Kaira district, the net cultivating holding for the tract worked at 6 acres 36 gunthas. In Atagan, a village of Surat district, more than 25 per cent of the holdings are less than 1 acre each. In Madras 76 per cent of the raiyatwari holdings have an average area of 2 .4 acres, and in a typical village surveyed some years ago the holdings between 1 and 5 acres were 70 per

' **Dr M. G. Bhagat:** ***The Farmer—His Welfare and Wealth,*** **p. 93.**

cent. According to the estimates of the Revenue Department the average size for the Province as a whole is about 4 '5 acres. In Northern India conditions are still worse. Even in the Punjab, where holdings are relatively large, an enquiry conducted in 1926 disclosed that 23 per cent of the cultivators had an acre or less, 33 per cent cultivated 1 to 5 acres, 20 per cent held 5 to 10 acres, and only 24 per cent had more than 10 acres. The surveys conducted by the Board of Economic Inquiry, Punjab, bear witness to the same testimony. In Bhadas, a village in the Gurgaon district, 34 per cent of the cultivators in 1936 were tilling 2.5 acres or less. In the United Provinces, according to the pro. vincial Banking Inquiry Committee, the average size of holdings diminishes as we go from the west to the east or from the south to the north. In the southern tract it is 10.5 to 12 .0 acres, in north central 6 .0 to 7 .0 acres, in the south central 5 .04 to 5 «5 acres, in the western 8 '0 to 10.5 acres, and it is only 3 .5 to 4 .5 acres in the eastern tract. According to a report by Mr Shyam Behari Misra in 1924, the average area per ordinary cultivator varies from 18 .83 acres in Bulandshahr to 10 .2 acres in Meerut, 16.3 in Aligarh, 11 .12 acres in Muttra, 7.0 acres in Fatehpur, 8 .72 acres in Jalaun, 4.3 acres in Gorakhpur and 3.1 acres in Basti. A village survey of district Hardoi shows that 31.5 per cent of the cultivators cultivate an area of less than 3 bighas. In village Rudhi in Lucknow district 40 per cent of the holdings are of an acre or less each, while 90 per cent are below 5 acres each. In village Suraya in Mainpuri about 18 per cent of the holdings are of less than 1 acre each and about 58 per cent are under 5 acres. The average size for the province may be. taken to be 6 acres. It is only about 4 .5 acres in Bengal. According to the enquiries made by the Director of Land Records and surveys for the Bengal Land Revenue Commission, covering 20,000 families in selected villages of each district, two.thirds of the families of agriculturists own less than 4 acres. The culti. vated area per family varies from 8 .74 acres in Jalpaiguri to more than 6 acres in Bankura, Birbhum, Burdwan, Jessore, Malda, and Nadia, a little less than 4 acres in Bakarganj and Faridpur, and about 3 acres in Dacca, Howrah, Noakhali and Tipperah.

With such holdings and yields, almost the lowest in the world, on the one hand and high rents and chronic indebtedness on the other, they find it impracticable to retain all the food.grains that

should be consumed by them and their families. If prices are low they have to part with more to pay rent and interest and consume less than even what they need. During the Great Depression the Indian cultivator actually fed the people at ridiculously low prices by starving himself and his family. In a period of relatively high prices his real burden is reduced and the favourable circumstances enable him to retain all that he should. A rise in the prices of his produce improves his intake of cereals, as has perhaps been the case during the present period of high prices since 1943. He has been able not only to take an increasingly adequate amount but also improve the quality of his cereal intake by giving his own requirements the first preference. In the wheat zone he has taken a little more of wheat and less of the cheaper and coarser food.grains.

But apart from the consumption of cereals, any rise in prices of such food.stuffs as sugar, fruits, vegetables, etc. drastically reduces their intake by the cultivator, because he has to buy them, and his purchasing power is very low. When prices are too high for him he almost totally abstains from consumption of these other food.stuffs, which are so very necessary. His elasticity of demand for these necessities is considerable due to his poor income. Dr V. K. R. V. Rao estimated a per capita income of Rs. 51 per year for the rural population of British India in 1931.2 as against Rs. 166 for the urban population. For 1938.9 the respective estimates are Rs. 47 and Rs. 200, whereas the figures for 1942.3 are Rs. 91 and Rs. 483.[4] Taking particular areas, we find the pre.War income of a unit agricultural family in Bengal as Rs: 170 per year, and even when we assume a normal crop disposed of at the highest price it comes to Rs. 276, while the barest minimum expenses are Rs. 293 and may be even Rs. 319.[5] Dr Bhagat has calculated for Bhiwandi Taluka in Bombay for the year 1937.8 a per capita agricultural income of Rs. 57.4, whereas in Borsad Taluka 10 per cent of the cultivators get a negative net income while 45 per cent of the families earn less than Rs. 100 and only 13 per cent make more than Rs. 300. Like.wise in the United Provinces, my own calculations show that the average income per agricultural worker has fallen from Rs. 84 in 1928.9 to Rs. 50 in 1934.5. In a survey of a typical village

[4] *Commerce,* 18 **Dec.,** 1943.

[5] M. Azizul Haque: *The Man behind the Plough,* p. 117.

in the Punjab it was found that of the five families whose incomes and expenses were recorded in detail, four had deficits in spite of very low standards of living and the fifth had a small surplus of Rs. 17.5.[6] Agricultural production has to be multiplied many times before chronic agricultural indebtedness can be remedied and a reasonable standard of living assured to those who are engaged in it. It must be made at least three.fold to bring the agricultural population even to the prevailing low level of indus. trial incomes. It has to be done by increasing the net output per acre, which at present is incredibly low. The average net income per acre varies from Re. 1.1 on holdings below 3 acres to Rs. 8.10 on holdings over 20 acres in the United Provinces, the average of all sizes of holdings being Rs. 2.15.[7] The farm accounts published by the Board of Economic Inquiry, Punjab, show on the tenant's holdings for the year 1938.9 an average net income per acre of Rs. 10.7.3 in the canal colonies and Rs. 2.10 on the unirrigated areas. As against this the net output per acre for 1937 in Europe ranged from £ 12 to £ 15 in Belgium, Netherlands, and Switzerland, £ 9 to £ 12 in Denmark and £ 6 to £ 9 in Germany, France and the United Kingdom.[8] The lowest was obtained in Rumania, Yugoslavia and Albania, but even there it was a little less than £ 3 or Rs. 40. The net output from agriculture per worker is perhaps the highest in the United Kingdom and Denmark—at over £ 120 or Rs. 1,600.

Purchaser.Consumer

Nearly half the population belongs to this class. It contains the entire urban population as well as a considerable portion of the rural section. In 1941, a little more than one.eighth 'of the total population lived in 2,703 towns with a population of 5,000 or more each. There were 58 cities with a hundred thousand inhabitants or more, containing 165 lakhs of people. Urbanization has been going on rapidly since 1931 and the number of people now living in cities or towns must have considerably increased.

There are the capitalists, merchants and high salaried adminis. trators in the cities who can afford to pay any price for their food.

[6] An Economic Survey of Jamalpur Sheikhan in Hissar district by the Board of Economic Inquiry, Punjab, for 1935.6.

[7] Dr R. K. Mukerjee : *Economic Problems of Modern India,* p. 112.

[8] *Food and Farming in Post.War Europe, op. cit.,* p.39.

Their demand is very inelastic and it is they who consume large quantities of fruits, milk, ghee and butter, vegetables, eggs and meat. Their cereal requirements are comparatively low and prices, high or low, hardly affect their food standards. But their number is very small. The so.called middle class people of the cities are really persons with low incomes and though they can afford to pay very high prices for cereals and pulses their demand for other food.stuffs is very elastic. But the bulk of the urban population is the wage.earners and people with very poor incomes, whose standard of food consumption is very much akin to that of the cultivators in the villages. They can ill afford to purchase as much food.stuffs, besides perhaps the cereals and pulses, as they need. Their demand is very elastic and even with regard to cereals the consumption of wheat is subject to variations with change in prices. A rise in earnings due to increased employment or wages leads to a replacement of the coarser grains by wheat and finer varieties of rice in their diet and a little more consump. tion of all the food.stuffs including cereals. In the present era of high prices, wages and employment have both increased and this may have increased the demand for richer grains and other foods in the cities and towns.

Among the rural people who have to buy their food, the majority is of the landless labourers, whose standard of living and nutrition is the lowest in the country as is their income. They take the poorer cereals and little of any other food. If there is scarcity and prices rise they find it difficult to buy even the mini. mum quantities of the coarser food.grains forced on them by their low standard of living. It is this section of the Indian people which is most vulnerable. In the event of food shortage in the country as a whole or in their own part of it they are the first victims. In the Bengal Famine of 1943, a Calcutta Uni. versity Sample Survey of the destitutes revealed that 72.7 per cent of the sufferers were farm labourers and cultivators, the former accounting for the majority.

To sum up, consumption and demaad of food.stuifs is increasing due to the growth of population, and there are other factors as well which tend to operate in the same direction. In recent years the growth of employment in the cities accompanied by higher wages and earnings has raised the food standards of large sections of the urban population. The demand for wheat

and fine rice has significantly increased. Very few in the larger cities now purchase and consume poor millets or barley. Simi. larly, the high prices of food.grains have increased their consump. tion by the producer.consumers and their families, who are now required to sell a smaller proportion of their produce to meet their standing payments or out'of.pocket expenses. The needs of the defence services, including the overseas forces in and based on India, have also increased, amounting to approximately 8,00,000 tons of food.grains. It is true that a part of it is offset by the recruitment of the Indian soldier, for he would eat even if he remained a civilian. But there has been a net increase even on account of him as the ration for Indian troops is 1£ Ib. of food. grains per day, which he does not get as a civilian. The main net increase in this regard has however been due to the overseas forces, which have been consuming large amounts of meat, eggs, fruits, vegetables, milk and butter. In many areas this has caused an actual scarcity for the local people and in a number of towns the consumption of milk in the normal way in which many Indians take it by converting into 'khoa', was prohibited. With the repatriation of foreign troops the situation in this respect is gradually easing.

CHAPTER IV

CROP PRODUCTION

Area under Cultivation

The total land area of India is about 100 crore acres (or 15.80 lakh sq. miles). Of this 51 .20 crore acres are in British India. The figures about the classification of area in Indian States are not complete and of the 49 crore acres comprised in them, statistics are available only in respect of 14 .80 crore acres, i.e. for about 30 per cent of the area. Of the total area of land in British India 35 per cent is cultivated, 7 per cent is current fallow, 13 per cent is forest, 22 per cent is totally unfit for cultivation, and 23 per cent is culturable waste. The net cultivated area in British Provinces amounted to about 21 .40 crore acres in 1940.1, i.e. 0.72 acre per head. Taking the major provinces separately it is noticed that the net cultivated area per head varies from 0.5 acre in Bengal, to 0.6 in Bihar, 0.8 in Orissa, the U.P. and Madras, 1 .2 acres in the Punjab, 1 .4 in Bombay and 1 .6 in the C.P. and Berar.

About 3 '50 crore acres of cultivated area in British India is double cropped. The gross area sown, therefore, comes to nearly 24'90 crore acres in 1940.1, i.e. 0.84 acre per head. Another 4.50 crore acres is reported as current fallow and so the gross cultivated area including current fallow is 0.99 acre per capita. For the country as a whole the area under cultivation has been estimated at 36'20 crore acres and that under current fallow 7 .90 crore acres. The per capita acreage comes to 0 .93 acre of cultivated area excluding the current fallow.

There has been a progressive decline in the cultivated area per capita throughout the present century and while the popula. tion of British India has increased from 22 .06 crores in 1901 to more than 29 .50 crores in 1941, i.e. by nearly 34 per cent, the net cultivated area has registered an increase of only about 5 per cent and even if the double.cropped area is taken into considera. tion, the total cultivated area has increased by only 10 per cent. The net sown area per capita in British India has declined from 0.90 acre in 1911 to 0.88 acre in 1921, 0.82 acre in 1931 and 0.72 acre in 1941, i.e. by 20 per cent from 1911 to 1941.

The cultivated area per capita is undoubtedly low and ob. viously suggests over.population if it is remembered that in the West 2 to 2 .5 acres of cultivated area is considered as a minimum to supply the needs of an individual. Even with the relatively low standard of living in India her per capita figure of cultivated area is a most disquieting feature.

Cultivable Wastes

Naturally, all eyes are turned to the area shown in official statistics as culturable wastes extending to some 920 lakh acres in British India and 790 lakh acres in Indian States. In addition, there are 790 lakh acres reported as current fallow. It is believed, though there is no definite information on the point, that a substantial portion of these can be made fit for agricultural colonization by the State through a programme of integral land reclamation, irrigation development, improvement of communi. cations and transport, and anti.malarial measures. Dr Gorrie has estimated for the Punjab that out of 130 lakh acres of *Barani* cultivation and 140 lakh acres of uncultivated waste, possibly 160 lakh acres are capable of a higher standard of land use. In addition he estimates that in the Punjab out of current fallow and land under intermittent cultivation some 50 lakh acres more can be improved. The possibilities of land reclamation and improvement in this province alone thus extend to about 210 lakh acres. The U.P. Agricultural Reorganization Committee has estimated that the province can increase its productive capacity easily by about 25 per cent by reclaiming all the culturable waste, which is equal to about 28 per cent of the culturable area of the Province.[1] In the C.P. and Berar, nearly 40 per cent of the culturable waste is already known to be definitely cultivable and it is probable that the remaining areas are also cultivable.

Area under Food Crops

More than 80 per cent of the cultivated area is under food .crops. In 1940.1 it amounted to 19 .84 crore acres in British India, i.e. 0.57 acre per capita. It was 20.07 crore acres in 1931.2, i.e. 0.74 acre per capita, on the basis of the 1931 population. For the country as a whole the area under food crops declined from 2041 crore acres in 1909.10 to 20 crore

[1] See Report, Vol. I, p. 251.

acres in 1929.30. *Within ten years, i.e. from* 1931 *to* 1941 *the area under food crops per capita has declined by nearly* 23 *per cent in British India.* Of the 19 .80 crore acres under food crops in 1941 in the provinces, 18 .70 crore acres were under food.grains. Farming in India implies usually cultivation of food.grains and it is only in a very small proportion that other crops are grown. During the last decade, the acreage in British India under food. grains touched its peak in the year 1933.4. The area under food.grains in that year was more than 19.10 crore acres, while it was only 18.70 crore acres in 1940.1.

Dependence on Monsoon

The truth about crop.production in India is that it is liable to serious variations both in area and yield caused by rainfall. The physical environment has still ascendancy over man in cultivation and the farmer in India has as yet little control over production, which is largely determined by a capricious monsoon. The area which is served by the great irrigation works enjoys relative security, but about four.fifths of the cultivated area has no such facilities and a low output is inevitable whenever the rains fail or deviate from the normal. This may mean anything from ordinary scarcity to actual famine. Let us go through the various agricultural regions of the country.

We begin our journey from the arid west in Northern India. Here is an area which has little or no rainfall, comprising the tableland of Baluchistan, the alluvial lowlands of Sind and the uplands of Rajputana. The mountains of Baluchistan are barren while the entire valley of the Indus from Attock to the sea lies in a region of deficient rainfall—the annual average being nowhere more than 10 inches. Little agriculture is possible here without artificial irrigation, and so in Sind, out of some 50 lakh acres of cultivated area more than 46 lakh acres depend on artificial water.supply. Crops here are more or less secure as rainfall is not an important factor. Rajputana, further east, is a sandy waste with little cultivation of anything except millets. The average rainfall is low and irrigation facilities are almost totally lacking. The standard of cultivation is poor. We then come to the Punjab plains, where in the north.west the soil is rugged and rocky, and people live mostly by meadow husbandry. But the northern sub.montane zone is very fertile and thickly populated,

with a rainfall varying between 30 and 40 inches. The irrigated area does not exceed 7 per cent of the gross cultivated area but the soil has sufficient moisture to resist anything except absolute drought. Further south is the eastern humid plain on the one side with an average rainfall of about 20 inches, and the dry western plain on the other having less than 10 inches of rain. fall. It is here in this dry region of the Punjab that the world's most remarkable system of canal irrigation has developed, supple. mented at places by well irrigation. Crops here depend little on the insignificant amount of rainfall. But in the south.eastern plain rainfall is a factor of vital importance to agriculture and well irrigation, besides being too expensive, fails to give protec. tion, particularly to the kharif crops. Here droughts have been frequent and famines are recurrent. In the Hissar district an economic survey of a village indicates that about 40 per cent of the crops grown fail to mature, and in a typical village of the Ourgaon district, about 37 per cent. On the whole, the Punjab has about 260 lakh acres of cultivated area, of which about 170 lakh acres are irrigated. About one.third of the total cultivated area is under wheat, contributing nearly 33 per cent to India's production of this cereal. There is also a remarkable development of dairying and animal husbandry.

From the Punjab plains we go to the Ganges Valley, which ranks among the most productive and populated regions of the world. It covers about 3 .65 lakh sq. miles, stretching over the provinces of Assam, Bengal, Bihar, Orissa and the United Provinces, with some 880 lakh acres under cultivation, i.e. about 42 per cent of the country's total cropped area. The Upper Ganges Valley has two distinct agricultural regions, the east and the west; and the normal rainfall decreases as we go from east to west. In the western portion the rainfall does not exceed 30 inches and is usually deficient. But the agricultural security of this region has been safeguarded by a phenomenal development of canal irrigation combined ingeniously with well irrigation which is easy due to the nearness of sub.soil water. And yet, the least deviation from the normal annual rainfall registers an effect on the cropped area, while the distribution of rains in a year determines the yield. The cultivation of rice is insignificant as the average rainfall is insufficient, and wheat is the most important crop, followed by gram and barley. As we go eastward in the

Upper Ganges Valley, agricultural security tends to increase with an increase in the amount of the normal rainfall. In this portion more important than the amount of rainfall is its distri. bution for crop production. Rice becomes an important crop and occupies nearly one.third of the eastern portion of the Upper Ganges Valley. Wheat is sown here in less than 9 per cent of the cultivated area. Barley is an equally important crop, while the area under gram is half as much. There is hardly any cotton cultivation, while sugar.cane is the chief commercial crop as in the western part. Protection is afforded here against failure of rainfall by a remarkable development of well irrigation. The entire Upper Ganges Valley has considerable areas under double cropping, while the development of dairying and canal irrigation in the western portion has stimulated a more intensive and scientific cultivation there than in the eastern part.

Further east is the Middle Ganges Valley with a rainfall of more than 40 inches, enabling a succession of even three crops in a year in contrast to only two of the Upper Ganges Valley. This portion too has more or less two well.defined regions, the northern and the southern parts. The northern portion in Bihar would enjoy a greater agricultural security than the southern part owing to a relatively higher normal rainfall and the spill. irrigation in its sub.montane region supplemented by water.supply from numerous tanks and *tals,* but for the fact that its irrigation system is liable to fail in years of drought and since well irrigation has not been practicable, agriculture in this part can hardly be called secure. In the south rainfall is still more capricious, while the drainage is more rapid. Consequently, agricultural insecurity and variations in crop production here are even greater than in the northern portion. On the whole, the Middle Ganges Valley has the advantage of three crops, viz. *Bhadoi, Agheni* and *Rabi.* There is a predominance of rice cultivation both in winter and autumn crops. Winter rice, however, is more liable to failure in this region and so increases its agricultural insecurity. Maize and gram are also important, while sugar.cane rather than cotton is the chief commercial crop.

Finally, we reach the Ganges Delta consisting of the old, where land formation is all but complete, and the new where alluvial formations are still being built, year after year, rich in agricultural possibilities. The former comprises the Western and

Central Bengal while the latter extends to a greater part of the Eastern Bengal. Rainfall is relatively high throughout the Ganges Delta but it increases as we go from the old to the new. There is hardly any development of irrigation in the old Delta and agricultural production depends exclusively on rainfall. Normally, there is a heavier rainfall in the new Delta, which has also the benefit of river flood irrigation. The soil too is very fertile, enabling farmers in East Bengal to get both *Aman* and *Aus* rice crops. Such a system of double cropping is not possible in West Bengal, where cultivators have to choose between the *Bhadoi* and *Agheni* rice crop. *Aus* rice, a cheap coarse grain, is the chief *Bhadoi* crop of the old Delta. Cultivation of rice is predominant throughout Bengal, covering nearly 80 per cent of its net cultivated area.

Further north and east are the Brahmaputra and Surma Valleys having a normal rainfall of more than 100 inches. Agricultural security here is enhanced by the seasonal river floods. The Surma Valley is comparatively the more fertile of the two as the swift current of the Brahmaputra river leaves only the heavier portion of matter rather than silt in its valley.

Having surveyed the Northern India we go to Peninsular India, a region primarily of tablelands. Here are the coastal plains with two well.marked strips in the west and the east. Rainfall in the almost evergreen west coast strip exceeds 100 inches and the agricultural season is long, becoming longer as we go to the south until the slack season disappears altogether. The east coast gets about 40 to 60 inches of rainfall and agricultural insecurity increases towards the south. Owing to the nature of soils, both in the east and west coast plains, irrigation is the determining factor of agricultural progress and prosperity. Tank and well irrigation has developed in the west coast, while in the east canals have been made. The agricultural economy of these plains is based on a combination of food and cash crops. Rice is important throughout but jowar and ragi are also much in the fields in the west coast, .strip.

From the Western Ghats we go to the Deccan Plateau, beginning with a distinct border region in the west. This region has scanty rainfall and, with scanty irrigation and sub.soil water at a great distance from the surface, is always exposed to droughts and famines. The chief crops are cotton, wheat, millets (jowar)

and oil.seeds. We then reach the Eastern Deccan comprising Mysore, Madras Deccan, and East Hyderabad. The average rainfall here is again scanty, with little development of irrigation, based largely on tanks which naturally fail in years of drought. Rainfall is particularly capricious in the Madras Deccan, which is one of the blackest spots on the famine map of India. Coming back to the Black Soil Region, we find a more fertile

TABLE XXVII[2]

Total Area and Total Production of all Major Food.grains (Rice, Wheat, Barley, Jowar, Bajra, Maize and Gram) in British India

Year	Area (crores of acres)	Production (lakhs of tons)
1911.12	15.05	..
1912.13	15.50	..
1913.14	14.76	..
1914.15	15.73	..
1915.16	15.68	..
1916.17	16.17	..
1917.18	16.08	..
1918.19	13.74	..
1919.20	15.48	545
1920.21	14.36	416
1921.22	15.86	543
1922.23	15.92	543
1923.24	15.13	476
1924.25	15.41	480
1925.26	15.01	468
1926.27	15.04	466
1927.28	14.99	439
1928.29	15.29	478
1929.30	15.19	496
1930.31	15.45	496
1931.32	15.69	501
1932.33	15.30	477
1933.34	15.77	471
1934.35	15.27	473
1935.36	15.32	446
1936.37	15.70	492
1937.38	15.49	478
1938.39	15.39	433
1939.40	15.48	473
1940.41	15.54	436
1941.42	15.65	457

[2] This table has been taken from Statement 28 in *Technological Possi. bilities of Agricultural Development in India* by Dr W. Burns.

soil but a less regular rainfall. The irrigated area is not even 1 per cent of the cultivated area and crop failures are chronic.

It is this dependence of crops on rains, which is the weakest link in India's food supply, and each year as people are multi. plying the strain on it is increasing. Possibly, the breaking point has been reached. The irregularity in area and yield of the major food.grains tends to increase, year after year, as the plough extends to the less fertile lands. Had irrigation not been extended, it would have become even more marked. As against this irregular production, the country has a constantly increasing demand adding to the difficulties of any adjustment between the two. The course of irregular production of food.grains, due largely to the vagaries of rainfall, is clearly indicated in TABLE xxvu.

Analysing statistics of individual crops, we find the same marked and occasionally even violent fluctuations, pointing unmistakably to the extreme dependence of production and acreage on the amount and distribution of rainfall in the country. (See TABLES xxvm and xxix.)

Further, it is not merely a deficiency in normal rainfall or drought that adversely affects crop production; its timely arrival and proper distribution are equally vital. An untimely heavy rain proves harmful. Besides these important determining factors, there are other elements in Nature, beyond man's control, which have a bearing on the area and yield of different crops from year to year. To illustrate from the black year of 1942.3, cyclones and floods were no less responsible than the failure of rains for damage to crops. In 1943.4 heavy rain and hail at the' harvest time caused considerable damage to the wheat crop. Rice crop re. corded a large fall in 1944.5 owing to very unfavourable monsoon. The food situation became critical again in 1946 on account of cyclones in the rice region, and failure of winter rains. The shortage in rice production in South India was estimated at 20 lakh tons while the failure and late arrival of winter rains damaged the wheat crop to the extent of about 30 lakh tons. A serious famine could be averted only by an over.all effort to import food.grains and by proper distribution through strict rationing.

Progress of Irrigation

Security against uncertainty of rainfall is rendered possible only by irrigation, which at present is confined in British India

TABLE XXVIII[3]

Area under Food.grains in British India

(In lakhs of acres)

Year	Rice	Wheat	Barley	Jowar	Bajra	Maize	Gram	Others'
1911.12	667	250	85	180	128	54	141	..
1912.13	084	239	75	206	161	61	125	..
1913.14	664	227	72	209	152	60	93	337
1914.15	669	255	79	207	159	60	143	366
1915.16	681	239	80	224	143	65	135	365
1910.17	703	251	80	212	152	64	156	365
1917.18	698	264	85	204	127	63	166	359
1918.19	670	192	65	200	112	59	76	303
1919.20	680	235	76	219	146	65	128	344
1920.21	676	204	63	220	120	60	94	328
1921.22	686	224	74	233	159	61	149	349
1922.23	692	244	74	219	139	57	166	342
1923.24	657	243	72	204	137	57	143	343
1924.25	671	248	70	217	120	52	164	338
1925.26	679	240	67	199	123	53	142	336
1926.27	659	242	64	204	138	54	144	339
1927.28	643	246	69	207	141	57	137	345
1928.29	882	299	76	200	130	58	134	344
1929.30	665	248	71	227	133	63	113	352
1930.31	674	247	67	223	177	62	134	350
1931.32	686	253	65	210	139	59	157	355
1932.3S	670	249	64	208	140	60	137	354
1933.34	673	275	67	208	131	58	163	355
1934.35	667	256	66	212	131	59	135	350
1935.36	674	251	62	210	131	60	146	343
1936.37	690	252	65	235	115	57	155	343
1937.38	695	266	63	207	125	56	137	334
1938.39	699	268	62	208	128	57	117	337
1939.40	701	261	61	217	134	58	117	334
1940-41	688	264	63	212	141	57	127	330
1941.42	696	261	65	218	142	56	127	..
1942.43	704	259	..	..	..	..	..	..

to only about 22 per cent of the cultivated area. Not only therefore is production irregular and uncertain, exposing millions to the scourge of famine, but it is much less and varied than what it ought to be. The primary security of food as well as develop. ment of agriculture on sound lines are both eclipsed in India by the paucity of irrigation facilities, since the main limiting factor in increasing yield of crops is water.supply.

The area under irrigation increased from 290 lakh acres in 1880 to 440 lakh acres in 1903 in British India. Another 100 lakh

3 Compiled from Burns' Note.

[4] Includes Ragi, Miscellaneous food crops and other food.grains.

TABLE XXIX

Production of Food.grains in British India

(In lakhs of tons)

Year	Rice	Wheat	Parley	Jowar	Bajra	Maize	Gram
1911.12	282	85	..	..	..	..	..
1912.13	257	82	..	..	..	..	..
1913.14	248	71	..	..	..	..	..
1914.15	233	87	..	..	..	..	..
1915.16	284	74	32	60	..	..	..
1916.17	304	84	34	50	..	..	..
1917.13	309	85	34	44	..	..	45
1918.19	203	65	28	34	..	..	19
1919.20	280	86	33	56	28	26	37
1920.21	233	57	35	36	20	21	24
1921.22	278	84	32	56	26	24	43
1922.23	285	82	32	50	21	19	52
1923.24	236	80	30	43	22	22	44
1924.25	253	72	27	48	22	17	42
1925.26	252	72	26	42	20	18	38
1926.27	241	74	26	42	25	19	39
1927.28	227	64	21	49	24	22	32
1928.29	265	73	25	47	21	20	26
1929.30	258	90	23	51	20	24	30
1S30.31	265	77	24	50	24	24	33
1931.32	278	73	21	44	22	22	37
1932.33	254	76	24	46	23	21	33
1933.34	249	75	25	46	21	19	37
1934.35	248	78	26	46	21	21	34
1935.36	223	76	24	45	23	21	36
1936.37	268	79	23	46	19	18	38
1937.38	258	87	21	40	19	20	32
1938.39	229	80	19	41	18	18	27
1939.40	246	89	20	45	20	21	31
1940.41	210	81	23	46	23	28	32
1941.42	243	82	20	40	22	19	30
1942.43	230	90	..	..	..	..	..

acres have been added since then; and if extent of irrigation is an index of food security, the people of India are not more protected today than they were at the beginning of the present century, as the irrigated area per capita has been more or less constant. The relative security enjoyed by people in the different provinces increases with an increase in the proportion of the irrigated to the cultivated area and the amount of normal rainfall. The percentage of the irrigated to the net cultivated area is 4 in Bombay, 7 in Bengal, the C.P. and Berar, 14 in Assam, 30 to 33 in Bihar, Madras and the U.P., 60 in the Punjab, and 84 in Sind. The security enjoyed by the different crops also varies.

TABLE XXX

Percentage of Irrigated to Cultivated Area in British India (Figures for 1940.1)

Crop	Rice	Wheat	Barley	Jowar	Bajra	Maize	Sugar.cane	Cotton
Percentage ..	29	46	44	7	9	22	63	29

To sum up: more than three.fourths of the cultivated area in British India alone and decidedly a much higher proportion in the Indian States is still insecure against the uncertainties of the rains, giving an ordinary yield in fair weather while failing miserably in years of drought. Irrigation implies security as well as prosperity. Crop yields in all parts of the country respond markedly to artificial watering. The following figures about rice and wheat provide a good illustration:

TABLE XXXI

Average Yield per Acre in Pounds

	Irrigated	Unirrigated
1. Paddy.		
Madras ..	1.694	1,138
C. P. and Berar ..	1,200	900
U. P. ..	1,100	850
Punjab ..	1,269	587
2. Wheat[5]—		
U. P. ..	1,200	800
Bombay ..	1,250	510
Punjab ..	967	572
Sind ..	937	734

Manorial Treatment

Next to water, crop yields respond markedly to manurial treatment and the best results are obtained when the two go together. Indian soils are generally deficient in nitrogen and organic carbon, with their averages as low as 0 .05 and 0 .06 per cent respectively, representing about one.third of the proportion of these ingredients in the arable soils of England.

Dr W. Burns has recorded in his *Note on Technological Possibilities of Agriculture in India* a mass of data from manurial

5 Standard Yield.

experime nts proving that yields in India are greatly increased by fertilizers and manures. Some of it is summarized in the follow. ing table which illustrates the situation:

TABLE XXXII

Increase in Yields due to Manures

Crop	Place of Ex. periment	Manurial treatment per acre	Yield per acre		Percentage increase in yield per acre by manuring
			Without manure Ibs.	With manure Ibs.	
1. Rice ..	C. P.	250 Ibs. of bone. meal +50 Ibs. of sulphate of am. monia	515	1,149	12'
	Orissa	110 Ibs. of bone. meal with green manuring	970	1,500	54
	Patambi (Madras)	Neemcake + sul. phate of am. monia	1,481	1,806	22 0'
	Ratnagiri (Bombay)	40 Ib. castor cake	1,250	1,670	33
2. Wheat ..	Cawnpore	Cowdung, 100 Ibs. nitrogen	1,261	1,805	43
	U. P	25 Ibs. nitrogen in compost	800	1,000	25.
	U. P.	20 Ibs. nitrogen + 20 Ibs. P_2O_2	800	1,440	80
	Punjab	Green manuring with irrigation	..	..	15.32
	..	Green manuring without irrigation	..	..	Inconsist. ent resuits
3. Jowar ..	C. P.	?	538	727	33
	Madras	5 tons of farm. yard manure	427	910	115
4. Maize ..	Pusa	..	?	?	Great
5. Rapeseed	Punjab	Ammonium sul. phate	700	1,026	46
6. Potatoes	U. P.	..	5,776	10,944	90

The few results that are quoted in the above table are sufficient to show the vigorous response of practically all crops to manuring. It has been estimated by Dr Burns that the various crops in India require no less than 26 lakh tons of fixed nitrogen for proper manuring, which would be contained in 132 lakh tons sulphate of ammonia or 52 .60 crore tons farmyard manure. Of the total nitrogen requirements, 6 .8 lakh tons are for rice and 5.1 lakh tons for wheat cultivation. Actual supplies in the

country hardly stand any comparison to these requirements and the farmer grows his crops mostly without any manures.

The principal sources of nitrogen are:—(1) farmyard manure, (2) compost made from plant waste matter, cowdung and village refuse, etc., (3) compost made from town refuse and night.soil, (4) oil.cakes, (5) green manures, (6) bones, fish manure, etc. and (7) artificial manures. The most important is the farmyard manure but the annual production of cattle manure in British India amounts to only 83 .95 crore tons, of which two.thirds is used as fuel, leaving a balance of 27 .98 crore tons to be used as manure, i.e. about 1 ton per acre at an average or about 10 per cent of the requirements. Even if the whole of the farmyard manure in the country were used for manuring, the total nitrogen supply would be in the neighbourhood of 8 lakh tons, that is about one.third of the amount needed. But this cannot be achieved unless there is an alternative cheap supply of fuel, and as pointed out by Sir John Russell, the solution lies in planting quick.growing trees near the villages. The supplies of farmyard manure may be increased considerably by the collection of cattle urine by adopt. ing the practice of providing litter for cattle and the use of manure pits for storing garbage and sweepings. These together with other decomposed vegetable matter may be used as compost. The crop residues, weeds, leaves, jungle.grass, etc. are available in enormous quantities. Their conversion to compost will add greatly to the productivity of the soil. But the Indore process, the only method popularized as yet, is too complex for the simple Indian cultivator.

The possibilities of compost from town waste may be judged by 'the fact that 6 crore people in India live in towns having a population of 5,000 or above. Dr C. N. Acharya estimates that 50 to 60 lakh tons of good quality compost could be prepared annually out of their waste. An equal amount of compost may further be obtained by tapping the waste in towns having a population between 2,000 and 5,000.

The total quantity of oil.cakes produced in the country amounts to only 14½ lakh tons per annum, and with the exception of neem and castor cake these are largely used as cattle feed. The amount available for being used as manure is not much. It is of utmost importance that no oil.seeds be exported and the oil.crushing industry be firmly established.

Green manuring is applied still less, its scope being limited by the poverty of the cultivator and the small size of average holdings. Its importance for the rice zones where rainfall is heavy is particularly great. In other tracts a more effective proposition will be the cultivation of crops such as 'dhaincha' and groundnut whose leaves may be used as green manure, while there is a direct financial return on the yield of the crop. Attempts should also be made to introduce more of leguminous crops. Bone.meal and fish manures are important agents for phosphates as well. But their present supply is very scanty.

Finally, we must deal with chemical fertilizers, whose appli. cation was slowly but steadily increasing before the last World War from 810 in 1910 to nearly 110,000 tons in 1939. The total production in the country was very low—28,000 tons of sulphate of ammonia. Artificial fertilizers increase yields remarkably, provided the water.supply is adequate. The Foodgrains Policy Committee (1943) recommended that arrangements should be made for setting up plants for the manufacture of ammonium sulphate to the extent of 3,50,000 tons a year. A Technical Mission has already examined the proposal and the Government of India have decided to establish the plant, which, however, is not likely to come into production before 1947.

Cultivation of Improved Varieties

Heavier yielding and drought resistant varieties have now been evolved for the principal crops. The improved varieties are superior in yield, quality, or suitability to special condition^ of the environment. But their cultivation is confined at present to about 240 lakh acres, i.e. 80 lakh acres for wheat, 60 lakhs for cotton, 40 lakhs for rice, 30 lakhs for sugar.cane and about 15 lakhs for jute. In other words, three.fourths of sugar.cane, half of jute and nearly one.fourth of wheat and cotton are under improved strains.

It has been estimated that the increased yield per acre in case of the improved varieties is at an average 2 mds. for rice, wheat and jute, 1 md. for jowar and bajra, 1.75 mds. for groundnut, 0 .5 md. for cotton.seed, and 200 mds. for sugar.cane. There are possibilities of increasing crop yields through the intro. duction of superior strains, but these are ultimately limited by farming practices and soil management. It is true that when the

improvement in the strain is in the direction of quality no addi. tional nutrients are perhaps taken away from the soil. But the heavier yielding varieties remove nutrients from the soil at a higher rate and hence unless their cultivation is reinforced by adequate manuring, soil fertility, which has stabilized at a com. paratively low level, may be depressed further. The new equili. brium under such circumstances will be at yields lower than that of the indigenous varieties at present. The problem of improving strains should be viewed from the point of view of a triangular adjustment between soil fertility, farm practices, and crop yields,

Equipment and Organization

Farming in India is carried on practically by everybody who cannot find a place in commerce, industry, or the liberal arts and professions. Millions of farmers in the country have neither any education nor sufficient means at their command to carry on their business efficiently. Truly speaking, more often than not, they represent the unemployed staying on land as an alternative to starvation and death. These have been further burdened by too many middlemen, who pull them down still more by the pressure of their weight. The rentiers, the money.lenders, and the middlemen in the marketing of agricultural produce, all tend to lower the standard of cultivation and yield.

With our agriculture in the hands of farmers who have little capacity and no incentive to learn and use scientific methods of farming, and who, moreover, possess holdings which can in no *way* admit of modern implements or methods, our standard of production is necessarily low and its costs comparatively very high. A vastly greater all.round efficiency must be achieved by helping the over.crowded and poverty.stricken farmers through a proper reorganization of the agricultural industry, which may take any shape from co.operative to collective farming.

A cultivator's equipment is confined almost wholly to a hoe, a country plough, and a beam and thus he struggles against his hostile environment almost without any outfit or capital and makes a poor living with a sadly low standard of farming. To raise production from the present low levels agriculture requires a thorough reorganization based on adequate capital and use of modern implements and scientific technique. Such a break from the traditional structure of agricultural industry in India to

large.scale exploitation will not be easy, but its effect on crop production will be tremendous.

Low Average Yields

The net result of the various factors discussed in the previous sections has been the very low average yields per acre which compare very unfavourably with those in other countries. Figures in the following table illustrate the fact with respect to some of the important crops:

TABLE XXXIII

Average Yield' in India and Abroad

(Figures in quintals per hectare)

	Wheat	Barely	Rice	Maize	Potatoes
1. British India ..	8.0	9.0	14.4	8'8	64•3 (estimated)
2. United States ..	11.2	11.8	22.3	20.2	93.9
3. Canada ..	11.3	13.8	..	21.2	91.4
4. U. S. S. R. ..	7.3	11.1	23.9	7.0	70.4
5. Australia ..	9.3	9.5	42.0	16.6	86.2
6. United Kingdom ..	25.0	23.1	..	..	177.3

The other crops too have low average yields per acre as compared to those obtained in some of the foreign countries. Dr Burns is of the opinion that the average yields per acre can be raised to 1,000 Ibs. in case of rice, 1,200 Ibs. for irrigated and 600 Ibs. for unirrigated wheat, 400 Ibs. for non.irrigated bajra, 1,000 Ibs. for maize, 600 Ibs. for gram, and 1,000 Ibs. for ground. nut. This will represent increases of 20 to 50 per cent over the present levels. There is a similar or even more scope in most of the other crops as well. All in all, there are tremendous possibilities of increasing agricultural production in India even without taking more land under the plough, provided proper farming methods, technique and organization are adopted.

Crop Planning and Food Shortage

Not only are the present average crop yields per acre very low, leaving a wide margin for improvement, but the existing

[6] **The figures have been worked out from the Statistical Year.Book of the League of Nations 1942.4 and refer to the year 1943.4 except in the case of the U. S. S. R. which relate to pre.War years.**

distribution of arable land under the various crops does not give the maximum food values, which it is perfectly possible to obtain even with these low levels of yield by a judicious crop.planning. The following table from the Report of the recent Famine Inquiry Commission is very significant:

TABLE XXXIV

Food Values per Acre

	Rice	Wheat	Potato	Sweet potato	Tapioca	Plantain
Estimated yield per acre (in mds.)	10	10	50	50	50	224
Protein yield (kilograms)	31	43	29	22	13	56
Carbohydrate yield (kilograms)	284	258	416	563	522	1,190
Calories per acre (in thousands)	1,280	1,260	1,790	3,880	2,880	5,040

In the above table the yield per acre for wheat and rice is taken at a somewhat higher level than the all.India average,, while that for potato, sweet potato and tapioca at much below the average. Even then the food values with the possible excep. tion of proteins obtained per acre for cereals are much below the non.cereal foods. Yet these are the cereals which are largely cultivated as may be judged from TABLE xxxv opposite.

Mr Afzal Hussain has very ably argued in his Minute to the Report of the recent Famine Inquiry Commission as to how substantial increases in food supply can be made by developing prdper cropping schemes. He has suggested tentative lines for redistribution of crops which may result in increasing the present supplies per 100 acres available for human consumption, of protein by 16 per cent, carbohydrate by 9 per cent, fat by 63 per cent, and calories by 30 per cent. The redistribution of crops he has suggested is tabulated in TABIE xxxvi opposite.

Whether redistribution to the extent suggested by Mr Afzal Hussain is practicable within the present frame.work of rural economy and social structure and with the existing resources of irrigation, manures and farm equipment, is very doubtful. But it is clear that there is tremendous scope for increasing food supply in the country by switching over emphasis in production from cereals to other vegetable and animal foods.

TABLE XXXV

Percentage of area under different crops to total sown area in British India

Crops	1901.02	1938.9
Rice	31.8	28.9
Wheat	8.4	11.1
Barley	2.8	2.5
Jowar	9.8	8.9
Bajra	5.9	5.2
Ragi	1.7	1.4
Maize	2.8	2.4
Gram	4.4	4.8
Others	12.4	11.9
Total Food.Grains	80.0	77.1
Fruits and vegetables	?	1.6
Oil.seeds	5.4	6.6
Sugar.cane	1.3	1.3
Spices and others	3.7	1.1
Total	90.4	87.7

TABLE XXXVI

Yield and Food Values per 100 acres of cultivated area Under Existing Distribution of Crops per 100 acres of sown area

(Average of 5 years ending 1938.9)

	Cereals	Pulses	Tubers[7]	Oil-seeds[8]	Total	Milk
Area (acres)	64	11	Negligible	7	82	11.5 tons [per 100 acres
Protein (Ibs.)	4,442	1,156	..	880[9]	6,478	979
Corbohydrate (Ibs.)	34,018	3,432	..	805[9]	38,255	1,262
Fat (Ibs.)	641	194	..	1,431	2,266	1,417
Calories (in 000's)	72,448	9,141	..	8,876	90,465	9,837
Under Proposed Distribution of Crops						
Area	45	13	5	14	77	18.4 tons per 100 acres
Protein (Ibs.)	3,110	1,366	400	1,761[9]	6,637	1,713
Carbohydrate (Ibs.).	23,919	4,057	12,219	1,610[9]	41,805	2,209
Fat (Ibs.)	450	230	1	2,862	3,543	2,479
Calories (in 000's)	50,940	11,203	34,000	17,752	113,895	17,215

[7] Excluding castor.seed and coconut.

[8] Represent potatoes, sweet potatoes, tapioca and banana.

[9] In oil.cake. Therefore not considered available for human consumption.

CHAPTER V

FOOD PRODUCTION LEVELS

A study of food position in the country reveals that while there has been an absolute increase in the area under food crops it has lagged behind the increase in population since the Great War, so that production per head has been on the decline. The area under food crops per head of population in British India increased from an average of 0.829 acre between 1903.4 and 1907.8 to 0.882 acre between 1908.9 and 1912.13. But during the next quinquennium it declined to 0.873 acre and registered further decreases in the subsequent years. During the quinquen. nium ending with the year 1932.3 it was only 0 .785 acre and has now fallen to the low level of 0 .663 acre. Within about three decades there has been a diminution of nearly 25 per cent in the area under food crops per head.

Major Food.grains

The area and production of major food.grains per capita is obviously much less today in the country than it was a generation ago. The decline during the last two decades may be judged from the following figures:

TABLE XXXVII

Area and production of all major Food.Grains (Rice, Wheat, Barley, Jowar, Bajra, Maize and Gram) per head of population in British India

Year	Area per head (Acre)	Production per head (lbs.)
1921.2 ..	0.678	524
1931.2 ..	0.611	436
1941.2 ..	0.529	347

The decline in the area per capita under major food.grains was a little less than 10 per cent in the decade ending with 1931.2 but more than 13 per cent in the next. Similarly, the production per head diminished at a higher rate in recent years than in the previous decade. In other words, not only has there

been a lag in the rate of growth of food supply and an increase in the population but the gap between the two is constantly widening. If this tendency is not arrested in the near future, the solution of the country's food problem will in course of time become increasingly difficult, and in the end impossible. We do not produce even a pound per head per day of all the major food.grains taken together. Nothing can be more disquieting than this low level of food production.

The position with regard to the acreage of major food.grains in relation to population has changed as follows in the different provinces:

TABLE XXXVIII

Area of all major food.grains per head of population in the different provinces

Year	Assam	Bengal	Bihar and Orissa	Bombay including Sind	C.P. and Berar	Madras	N.-W. F. P.	Punjab	U. P.
1911-12 ..	0.683	0.473	0.618	1.005[1]	1,007	0.488	1.045	0.934	0.673
1921-2 ..	0.573	0.478	0.582	1.067	1.000	0.506	1.043	1.039	0.700
1931-2 ..	0.535	0.451	0.495	0.904	0.974	0.419	0.876	0.900	0.647
1941-2 ..	0.490	0.406	0.435	0.815	0.881	0.359	0.733	0.732	0.562
Decline from 1911-12 to 1941-2 ..	28.3%	14.2%	29.6%	18.9%	12.5%	26.4%	30.0%	21.6%	16.5%

Invariably, in every province there has been a diminution in the area under food-grains per head of population since the year 1921-2, although the tendency was not so marked previous to that year. During the decade 1911-12 to 1921-2 the per capita area under food-grains actually increased in Bengal, Bombay, Madras, the Punjab and the United Provinces. Population growth in that decade, however, was only 0 .8 per cent for British India. Later on there was a notable increase in population, which reduced the per capita acreage of food-grains in all parts of the country.

The position is particularly alarming in Madras and Bengal. In the former province the production of food-grains is limited to about one-third of an acre per head of population, while in Bengal it is two fifths. The situation in Bihar and Assam is not less serious, for the area of major food-grains per head is less than

[1] Figures for 1912.13.

half an acre and fertility is not so high as in the active Ganges Delta. In Bombay and N..W.F. Province soil is very poor and in spite of a relatively higher per capita acreage, production per head is rather low. The position in the United Provinces too, with only 0 .562 acre of major food.grains per head of population, is alarming. At present only the Punjab and C.P. and Berar seem to give little cause for anxiety; but there too, particularly in the former, if the present disparity in the rate of population growth and production of food.grains continues, the same situation is bound to arise.

Cereal Production and Fall in Nutritional Standards

Taking the production of main cereals into consideration the following situation is revealed:

TABLE XXXIX

Per Capita Production in British India of the Main Cereals (in Ibs.)

Year	Rice	Wheat	Barley	Jowar	Bajra	Maize	Total
1921-2 ..	267	81	31	54	25	22	480
1931-2 ..	242	63	20	38	20	20	403
1941-2 ..	184	63	18	31	18	13	327

The production of main cereals per capita declined from 480 Ibs. in 1921.2 to 327 Ibs. in 1941.2. The production of rice alone declined by 83 Ibs. per capita between these two decades, while all the other cereals taken together have registered a fall of 70 Ibs. The nutritional standard of our rice eating population must have been dreadfully affected by this. During the last decade the per capita production of rice declined by 58 Ibs. and that of the remaining cereals by 18 Ibs. only, which means that not only has there been a decline in the production of cereals per head of about 32 per cent in twenty years but the proportion of rice in the total has also been reduced from 60 per cent to 56 per cent. This has brought about new adjustments in the food intake of our rice eating population, with disastrous results on the nutri. tional value of their diet. The proportion of inferior cereals has remained almost constant in the last decade while that of wheat has slightly increased.

Limits of Wheat Cultivation and Expansion of Inferior Cereals

It appears that unless fresh areas are brought under irrigation wheat acreage is not likely to increase. Hence, as the margin of cultivation falls it will bring about an increase in the production of the less nutritive cereals. The present decade has already registered such a trend.

TABLE XL

Production of Cereals in India
1941-2 *to* 1943-4

Crop	Average of three years ending		
	1941-2	1942-3	1943-4
Acreage (in lakhs of acres)			
Wheat	343	344	337
Jowar	337	359	360
Bajra	179	222	211
Barley	63	68	67
Maize	63	69	69
Rice (excluding Bengal)	614	519	534
Rice (Bengal)	223	233	246
Yield (in lakhs of tons)			
Wheat	103	110	97
Jowar	67	67	67
Bajra	29	40	37
Barley	21	22	21
Maize	21	24	24
Rice (excluding Bengal)	163	179	188
Rice (Bengal)	81	70	103
Total (excluding Bengal)	404	442	434

The above figures are taken from the Report of the recent Famine Inquiry Commission and as has been pointed out by them, the 1943-4 figures of rice for Bengal are not comparable with the figures for previous years owing to the change introduced in estimating the acreage under *Aman* rice. Anyway, these figures definitely indicate that while the acreage under jowar and bajra expanded, particularly of the latter, the area under wheat has either remained steady or shows a tendency to decline. The area under rice has increased but not as much as that of the inferior cereals. The yield of jowar remained steady in spite of increased

acreage but that of bajra increased by more than one-third. Nutritional standards will be dangerously reduced if the increased food requirements are met by only growing more of inferior cereals. It is necessary therefore to concentrate all efforts on increasing the proportion of wheat in the total production of cereals in India; and this is possible only by making far-reaching improvements in the standards of farming and irrigation.

Diminution in Rice Production

It has already been shown that the largest shrinkages have been registered in the per capita production of rice. This has affected more severely the food supply in the rice zones than in the rest of the country. The situation may be illustrated with reference to the provinces of Assam, Bengal, Madras and Bihar and Orissa.

TABLE XLI

Production of Rice

	Total in lakhs of tons			Quantity per head of population in lbs.		
	Average for					
	1920-21 to 1922-23	1930-31 to 1932-33	1940-41 to 1942-43	1920-21 to 1922-23	1930-31 to 1932-33	1940-41 to 1942-43
Assam ..	14	16	16	419	412	352
Bengal ..	88	94	76	421	419	282
Madras ..	51	54	49	284	273	222
Bihar[1] and Orissa	62	52	40	383	289	202

Assam and Bengal are almost exclusively rice producing and rice eating zones and so are the major portions of Madras, Bihar and Orissa. The decline in the per capita production of rice has been the largest in Bengal and has reached exceedingly low levels. The province is suffering constant scarcity, and its famines will become recurrent unless the agricultural situation is radically improved. Even if the statistics be not all correct it cannot be denied that the average per capita production of rice in Bengal is now much less than what it was say 20 years ago. If at least the old nutritional standards have to be maintained in this province its food supply has to be materially increased. The same applies to parts of Madras and Bihar.

Production of Minor Food-grains

Among the minor food-grains ragi is a millet of considerable importance in Mysore and Madras. Its area in British India has declined from more than 40 lakh acres in 1918-19 to about 34 lakhs in recent years. The all-India figures for ragi acreage are 54 lakhs with an estimated yield of about 18 lakh tons.

Besides ragi there are other minor food-grains as well. In British India alone about 14 per cent of the total cultivated area is shown under 'other food crops'. These include some minor cereals and millets, but mostly pulses. Statistics are not available separately for these. It may be assumed very roughly for the purpose of calculating total food production in the country that two-thirds of this area is under pulses. It would mean nearly 1 crore acres in British India under minor cereals and millets, with an estimated yield of about 25 lakh tons. The corresponding all-India figures would be 130 lakh acres and 33 lakh tons.

Total Cereals and Millets

To sum up the position with regard to cereals and millets, their average total production has been in the neighbourhood of 4 .60 crore tons in British India in 1941.2. Of this, 4 .20 crore tons represent the yield of the six major food-grains, viz. rice, wheat, jowar, bajra, barley, and maize; and the remainder of ragi and other minor grains. The average all-India production for the same period has been about 4 -90 crore tons of major food-grains and 50 lakh tons of ragi and others, making a total of 5 40 crore tons. Due to the 'Grow More Food' campaign and certain other factors, production has increased a little since .then; but the different cereals have not contributed equally to this higher level. It is a poor millet, viz. bajra, which has expanded most during the last 3 or 4 years.

Production of Pulses

India is rich in the variety of its pulses, the most important being gram, while legumes like urd, moong, moth and masur are also widely grown. Arhar is another important pulse both from nutrition and production points of view. Pulses are of particular importance in the nutritional and agricultural economy of the country. Pulses contain about twice as much protein as wheat and four times as much as does polished rice. Their

consumption helps to balance the rice diet, which has a preponderance of starch and a deficiency of protein. Certain beans and grams give more calories per ounce and per acre. Their cultivation is of considerable importance for cattle as the *chunni, chilka. chapar,* etc. of the various pulses provide the main concentrates in cattle feed. In certain parts of the country some pulses are grown for green fodder. Finally, soil is enriched by their cultivation as the leguminous crops fix nitrogen.

Gram is the most important pulse and is even consumed as a partial substitute for cereals in certain parts of the country. It is also considered a very good feed for cattle and perhaps not less than half of the total production is utilized in this way. Like most other pulses it is usually grown without any irrigation—as a second crop after millets if the monsoon has been good towards the end of season which factor determines its yield. Owing to this extreme dependence on rains its area has varied between 74 lakh acres to 164 lakhs in British India during the last 30 years. Similarly the yield has fluctuated between 19 and 45 lakh tons. No other major food-grain has registered such violent fluctuations. Its average yield may be taken for 1941-2 at 30 lakh tons for British India and 35 lakhs for the country as a whole.

For the other pulses, in the absence of any detailed statistics, there cannot be any accurate estimates. As already explained before, the area under other pulses may be assumed as two-thirds of the area under 'other food crops', i.e. 2 crore acres for British India and 2 crore 60 lakhs for the country as a whole. The yield is estimated at 45 and 58 lakh tons respectively.

The total yield of all pulses including gram thus comes to 75 lakh tons for British India and 93 lakhs for the whole of India. This estimate is higher than that of the Advisory Board of the Imperial Council of Agricultural Research, which assumes a figure of 85 lakh tons as the production of pulses in the country.[2]

Pulses are grown mostly without any irrigation and hence in years of drought or excessive rainfall their production is inevitably affected in a very adverse manner. It is usually forgotten and less emphasized that in years of scarcity, pulses are

[2] Memorandum on the Development of Agriculture and Animal Husbandry in India, p. 16.

the first to show shrinkage; and this aggravates the almost chronic protein deficiency in an average diet, placing a severe strain on the digestive system.

Tubers and Root Crops

Statistics for fruits and vegetables separately are not available. Among vegetables potato is the most widely grown, though even that is not much, the area under potato being only about 4 .5 lakh acres or less than 1 per cent of its world acreage. Its total yield is even less, only 0 .8 per cent of the world total. Before the War the annual production of potatoes in India was estimated at about 18 lakh tons. During the period 1930-31 to 1938-9 the area under potato increased by nearly 50,000 acres, while during the War years the additional area sown with potatoes has reached the figure of 75,000 acres. These increases have been much less than the rate at which the population has increased and it may be assumed that the average per capita production of potato in the country has gradually declined. It is only about 9 Ibs. per annum per head of population, and as compared to cereals is insignificant. In contrast to this potatoes play a very important part in the dietary of the European and American people. In countries like Germany, Belgium and Poland potatoes and cereals are consumed almost in equal quantities. The present potato acreage in India is about 0 .3 per cent of that of cereals, as against 25 per cent in Germany, 18 per cent in United Kingdom, 14 per cent in France and 6 to 7 per cent in Italy, Hungary and U.S.S.R. Even in the United Kingdom and U.S.A. the consumption of potatoes per adult man is as. high as 171 Ibs. and 141 Ibs. respectively, as against 214 Ibs. and 175 Ibs. of cereals. In contrast to this the annual per capita consumption of potatoes in India varies from 28 Ibs. in the U.P. to only 2 Ibs. in the C.P. and in Madras. The main limiting factors have been the shortage of good seed at a reasonable price and lack of irrigation and manuring facilities. Considering the fact that the calories yield per acre is about 50 per cent higher for potato as compared to cereals, extending its cultivation will help to solve the food problem of millions of people in India.

Sweet potatoes are grown extensively throughout the country. Accurate statistics are not available but it is estimated that the C.P. has 10,000 acres under it, while in Madras the district of

Malabar has 40,000 acres, South Kanara 20,000, and Vizagapatam 5,000. In these three districts of Madras alone the yield is more than 2 lakh tons. During the War its cultivation has increased remarkably. It is usually a supplementary food for the poor man, adding variety to his diet. As staple food it is very poor and may seriously reduce protein intake if it is allowed to replace cereals to an appreciable extent.

Besides potatoes and sweet potatoes carrots are also widely grown both for rural and urban consumption. The total production is, however, negligible. But its cultivation can easily be extended as it can be grown without much effort and extra expenditure by the ordinary cultivators at least for domestic requirements. Similarly the cultivation of radishes, which at present is nominal, can be greatly extended.

In the south-western part of the Peninsula tapioca is widely grown and consumed. There has been a notable expansion of its cultivation during the War years, and in Travancore, out of a cultivated area of 22 lakh acres no less than 5 lakh acres are under tapioca, with an estimated yield of 7 .5 lakh tons. Cochin produces another 30,000 tons and Malabar 1 .2 lakh tons. Tapioca is a rich source of starch but like sweet potatoes a very poor source of protein; hence its consumption in large quantities is likely to lower nutritional standards. But as compared to the yield of rice and wheat at 12 to 13 lakh calories per acre it yields nearly 30 lakhs. An extension of its cultivation, therefore, during a food emergency, as has arisen at present in the country, will be very much helpful in fighting against starvation and famine.

Other Vegetables

No figures are available separately about the area under leafy and other vegetables, such as brinjals, ladies-fingers and the different types of gourds. Except around the cities and larger towns the cultivation of vegetables is almost nil in the countryside. In the villages, vegetables are hardly grown as such, but the green leaves of crops like gram and rapeseed are widely consumed. On the whole, the cultivation of vegetables even in urban areas is so limited that during the War years when troops were stationed in certain centres it led to a virtual scarcity of fresh vegetables and prices rose to very high levels. Besides, the paucity of irrigation facilities and manures and the shortage of

seeds hampered an extension of their cultivation. The Army has tried to establish its own vegetable farms to meet vegetable shortages; and the different provincial Governments started 'Grow more vegetables' campaigns during the War years. It is estimated that supplies of fresh vegetables have considerably improved for the troops and in the urban areas. According to the estimates of Dr Burns the area under all vegetables is about 7 lakh acres. Potato alone occupies about 5 lakh acres. The estimate about the total production of vegetables at 90 lakh tons made by the Advisory Board of the Imperial Council of Agricultural Research seems to be therefore, rather high: 80 lakhs would perhaps represent more truly the present production of vegetables of all kinds including tubers and roots in the country.

Cultivation of Fruits

A recent rough estimate indicates that fruit trees cover about 25 lakh acres, the chief fruits being mangoes, bananas and citrus. According to the marketing surveys their total production is about 1 crore tons and when allowance is made for stones, skin, etc., it comes to 60 lakh tons net, i.e. a little less than 1 .5 ounces per capita per day. Nutrition surveys have shown that people do not consume as much as that in most parts of the country. Therefore, production of fruits seems to have been over-estimated at 60 lakh tons. Taking into account the acreage under fruits and vegetables it is noticed that there has been a deplorable decline in production, particularly in Madras, Bihar and Orissa, Bengal and Bombay. The all-India acreage has declined from 57 lakh acres, the average for 1914-15 to 1918-19, to about 45 lakhs in the pre-War years. The decline in British India has been from 49 lakh acres in 1914-15 to 39 lakhs in 1940-41, i.e. of about 20 per cent. Since population has increased the decline per capita has been considerably greater. During the War years a fuel scarcity has caused an extensive felling of fruit trees.

Fruits are very important for balancing a cereal diet as these are an important source of supplying vitamins and mineral constituents. Oranges and mangoes cannot perhaps supply as many calories per acre as rice or wheat, but plantains and bananas at about 224 mds. per acre, the present average yield, supply nearly 4 times as many calories as cereals. The increased production of fruits like mangoes, oranges and papayas is very desirable

to remove the defects of the present diet; but since the calorie production per acre may fall if land is diverted to their cultivation, attempts should be made to increase the area under plantains and bananas in the immediate future, as the cultivation of these latter will increase rather than diminish the supply of calories per acre as well.

Oil-seeds

Oil-seeds are grown extensively in the country either separately or amidst other crops. Madras, Central Provinces, Bihar and Orissa, and Bombay are the main oil-seeds growing regions. Among the seeds giving edible oils, groundnut, rape and mustard, linseed and sesamum are the most important.

According to the report on the marketing of linseed its average production is estimated at 4-75 lakh tons per annum. "Estimates of Area and Yield of Principal Crops in India" issued by the Government indicate that the total average production of linseed in India in the quinquennium ending 1940-41 has been about 4-44 lakh tons. Only about 20 per cent of the produce is retained in the villages, where it is used, after being crushed, as edible oil, particularly in the C.P. and Central India States.

The area under rape and mustard is about 60 lakh acres, of which nearly 35 lakhs is in British India. The total production for 1940-41 has been estimated at 10-9 lakh tons. In the U.P. it is grown mainly as a mixed crop, and therefore, acreage figures cannot be exactly ascertained. On the whole, half the acreage is to be'found in the U.P. and the Punjab comes next. Its cultivation since 1931-2 was declining till the outbreak of the War but seems to have recovered again during the War years. It has been estimated that production can be increased to the extent of 15 per cent by the use of improved varieties and another 10 per cent through proper manuring, bringing the total possible increase through these two methods alone to 25 per cent.

The cultivation of groundnut is now firmly established as a cash crop. Its acreage is now about 4 times as much as it was 30 years ago. It appears that the area under it is no longer expanding as it has remained almost stationary since 1937-8. In British India it has actually declined from 62 lakh acres in 1937-8 to 55 lakhs in 1939-40; and 45 lakhs in 1941-2. Madras

is the chief groundnut producing province, having about 40 lakh acres under it. For 1940-41 the total yield has been estimated at 37 lakh tons. As the area has considerably declined now it is much less at present, being in the vicinity of 30 lakh tons only.

Sesamum occupies about 40 lakh acres, of which nearly 30 lakhs are to be found in British India. The area under sesamum has also shown a tendency to decline in the last decade and the average per capita production has been considerably reduced. The present yield is estimated at about 4-33 lakh tons.

Taking all these oil-seeds together the average production in 1940-41 amounted to 51 lakh tons. Assuming 40 per cent extraction of oil, it may be said that the country could produce about 20 lakh tons of edible oils, provided all these seeds were locally crushed. The actual supplies, however, are much less as large quantities of oil-seeds have been usually exported abroad. Moreover, average production per capita has been definitely declining, particularly since the last 10 years or so.

Sugar Production

According to the estimates given in the Statistical Year-Book of the League of Nations 1942-4, out of a world total production of 17-12 crore quintals of cane sugar in 1942-3, India produced 3*09 crore quintals, i.e. a little more than 18 per cent. The Report on the Marketing of Sugar in India puts the average production for the period 1936-7 to 1938-9 at 45 -3 lakh tons. The area under sugar-cane in India has increased from 33 lakh acres in 1938-9 to 48 lakh acres in 1940-41 and production for 1940-41 has been estimated at 60 lakh tons of *gur*. The figures for the year 1942-3 show that the sugar-cane acreage has declined again. In fact, sugar-cane cultivation has increased from some 25 lakh acres in 1929-30 to more than 40 lakh acres at present. Between 1930 and 1940 the area under cane increased by 44 per cent, and its yield per acre by another 15 per cent. The average yield per acre, however, is still very low—about 350 mds. of cane per acre. In contrast to this Java gets more than 1,400 maunds per acre and Hawaii 1,515 maunds per acre. The present production falls far shorter than the requirements, and supplies have been rationed strictly since the year 1943-4. The average production of *gur* per head of population was about 25 Ibs. per annum

in 1931-2. It increased to 34 Ibs. in 1940-41, and is slightly less than this at present.

The cultivation of sugar-cane is concentrated in the sub-tropical parts of Northern India, more than 50 per cent of its acreage being in the United Provinces. Another belt of sugar-cane cultivation is to be found in Madras, but acreage is not much. An obvious outcome of this uneven distribution is that while farmers in the United Provinces and Bihar get considerable quantities of *gut,* people elsewhere experience almost a chronic shortage in the rural areas.

Production of Milk

The total annual gross production of milk was estimated by Dr Wright at 80 crore maunds in 1937, while Oliver and Vaidyanathan made an estimate of over 100 crore maunds in 1934. The Agricultural Marketing Adviser after a careful survey in 1941 estimated a gross production of 74.4 crore maunds and allowing for a consumption of 11 .5 crore maunds of milk by the calves and kids directly from their dams, the net supply of hand-drawn milk in India has been put at 62 .9 crore maunds or 2.31 crore tons. Of the total net production, 3 per cent is contributed by goats, 46 per cent by cows, and 51 per cent by she-buffaloes. In British India the average milk production per head of human population is only 6 .42 oz. per day. There are many parts in the country where production is much less, as the number of milking animals is not evenly distributed. According to the Marketing Report the average daily per capita consumption is 5 .8 oz., varying from 18 oz. in Sind to 15 .2 in the Punjab, 7 in the United Provinces, 6 .8 in the North-West Frontier Province, 5 .5 in Bombay, 4 .2 in Bihar, 2 .8 in Bengal, 1 .8 in the Central Province and 1 .3 oz. in Assam. Obviously, in Provinces or States where the average production of milk per head per day is less than 4 oz., large sections of the population get no milk at all.

Thus the production of milk too has lagged behind the increase in population in India. The population in 1941 increased by 27 per cent as compared to that of 1921; but the number of milch cattle and the production of milk increased by only 5 .3 per cent and 7 .8 per cent respectively during the same period. In fact, between 1915-16 and 1934-5 the number of

cows recorded an increase of only 3 per cent while that of she-buffaloes by 13 per cent. There was a decline in the number of cows in 1940 as compared to 1930 of about 5 lakhs, while the she-buffaloes increased by about 1 lakh. During the war years the number of cows seems to have declined further, and the Census figures of 1944-5 for the United Provinces reveal a fall of 11 per cent in the number of cows between 1935 and 1945. The Census in Madras corroborates the same tendency. It appears that since she-buffaloes are better milk-yielders than cows and their milk has a higher fat content, there is a tendency to prefer she-buffaloes for milk production and dairying. Goats are not very important for production of milk and only about 16 per cent of the total goats are milked, giving an average net yield of 112 Ibs. of milk per annum. At the Hissar Government Farm some goats have given a yield of over 700 Ibs. while goats of certain breeds have given 400 Ibs. even under ordinary conditions. Considering the large number of goats the scope for increase in milk yields through improved feeding and selective breeding appears to be considerable and a good milk-goat may be easily accommodated where it is impossible to keep a cow.

The present milk production in India is very low as compared to the minimum requirements of a balanced diet. As already noted its production is showing a tendency to decline. In contrast, milk production between 1934 and 1942 has increased by 17 per cent in the U.S.A. and 70 per cent in Germany. The average per capita production of milk is very high in most of the countries in Europe and America as compared to that of India. The per capita daily consumption of milk is 57 oz. in Capada, 56 oz. in New Zealand, 49 oz. in Switzerland and 41 oz. in Great Britain.

India has a large number of milch cattle, the number being 4-9 crore cows and 2.1 crore she-buffaloes in 1940. In addition, there are 6 .2 crore goats of which nearely I crore are hand milked. But the average yield of milking animals in India is sadly low: it has been estimated at 487 Ibs. per year for a cow, and 1229 Ibs. for a she-buffalo. These are insignificant in comparison to the average yield of milk per cow per annum, say, in Denmark, Australia, or Egypt, which have been reported at 7005, 3463 and 2663 Ibs. respectively. It has been estimated that at present 25 per cent of the cows yield less than half

a pound milk per day, and only 6.8 per cent give 3 Ibs. or more per day. The she-buffaloes have a higher efficiency. About 11 per cent of the she-buffaloes yield less than 2 Ibs. per day, 42 per cent 2 to 3 Ibs., 22 per cent between 3 and 4 Ibs., 9 per cent 4 to 6 Ibs. and 17 per cent more than 6 Ibs. That the standard of milk yield is so low is in most cases due to under-nourishment and semi-starvation of the animals. Dr Wright has estimated a total supply of 11 •! crore tons of dry fodder in the country and 10 crore tons of green fodder in addition to 15 lakh tons of concentrates and 23 lakh tons of cotton-seeds, in contrast to the minimum requirements of 50 crore tons of fodder for a proper feeding of the animals. The deficiency in concentrates is even greater, about 60 per cent. The milk yield of cows and buffaloes increases substantially by proper feeding under farm conditions and in certain Government dairies as much as 5,200 Ibs. has been obtained from she-buffaloes. In fact, the total milk production is likely to increase with a decrease in the number of milking animals, provided efforts are made to improve feeding. Similarly by selective breeding milk production can be increased appreciably. By careful selection an indigenous strain of the Indian cattle with a far higher milk capacity can be evolved. It has been observed at a Government breeding farm that the average milk yield trebled in two Sahiwal herds within twenty years. At another centre the average lactation yield has been maintained at 7,000 Ibs. to 10,000 Ibs. Careful selection, elimination of the unfit, and adequate feeding are necessary if such results are to be obtained.

A combination of agriculture and dairying is perhaps the best jnethod for meeting the nutritional needs of India. Such dove-tailing of the arable and animal husbandries into a system of mixed farming will increase the output and net return per acre. Mixed farming will involve cultivation of more fodder crops, but on account of the resulting increased supply of manure a higher grain yield per acre can be assured. On the Tvhole, it will give more food per acre than what pure grain farming gives at present and more stable supplies at that. Besides, the shifting of the present emphasis in agricultural production from cereals to live-stock products will ultimately result in a balanced diet for the people.

The present small size of agricultural holdings is a great drawback for the development of a proper system of mixed

farming, which requires an extension of the area under fodder crops. So long as holdings are too small for growing fodders as well as food-grains, a development of dairying on sound lines cannot be envisaged. Consolidation of holdings into economic units either on collective or on co-operative basis is a pre-condition for reorganizing agriculture on the lines of mixed farming. The country does not need a factory system of dairying as cities are few and the population is largely rural. What is required is a very substantial increase in the production of milk in the villages for the villagers themselves; and this can be achieved best by combining dairying with farming on a village scale.

At present milk is mostly converted into various milk products, and only about 28 per cent is consumed as liquid milk. Ghee is the most important milk product, which takes up about 57 per cent of the total milk produced and is sold mostly in the urban areas. In all, about 18 .2 crore maunds are utilized as fluid milk, 37 crore maunds for ghee, and 7 .7 crore maunds for other milk products. The production of ghee may be estimated at 2 .3 crore maunds per annum, i.e. 4 .7 Ibs. per capita. The producers retain at present only about 17 per cent of milk, 9 per cent for drinking and 8 per cent in the form of milk products. In other words, while some 95 per cent of the milch cattle are in the rural area, little milk and fewer milk products are consumed in the villages; and hence, the rural nutritional standards are even lower than those of the urban people. This anomalous and tragic fact is very often overlooked. The growers retain at best butter-milk, i.e. *maththa* or *lassi*, estimated at about 35 crore maunds.

Fisheries

Fish is of particular importance as a supplementary food to improve the average cereal diet in India as it is rich in protein content and a good source of certain vitamins and mineral salts. A marketing survey in 1941 estimated a total net annual production of 1 .79 crore maunds or 6 .59 lakh tons of fish. This amounts to 3 to 4 Ibs. per capita per annum or less than 0 .2 oz. daily, as compared to the pre-War production in Great Britain of 40 Ibs. per capita. One-third of the total production of fish in India is fresh water fish and the remainder

sea-fish. Considering the country's potential resources and present output it may be stated that fish supply can be increased to about 10 times within a short period.

The reasons for this extremely low annual production of fish are many and varied—the primitive and inefficient fishing methods, the illiteracy, backwardness and poverty of fishermen, lack of transport facilities along the coastline, absence of any organized fish trade, crude and ineffective methods of handling, packing and marketing fish, etc. In fact, fishing has been so much neglected that even a detailed and reliable estimate of the country's resources in this respect is not yet available. To organize fishing industry on sound lines, extensive surveys and detailed investigations will have to be undertaken so that all valuable fishing grounds may be located, plans may be prepared on accurate knowledge of piscine distribution, migration and life history, fishing methods may be improved so as to be effective, and production and trade may be organized on the most suitable lines. The Policy Committee on Agriculture, Forestry and Fisheries has recommended the establishment of an Indian Central Fish Committee and a Central Fishery Research Institute. The recommendation needs to be implemented very early.

Fish has gradually become scarce, particularly during the War years. This is most regrettable, as the trend has affected adversely the nutritional standards of the poor, especially in Bengal. It is possible to effect a rapid increase of fish production in the country immediately through the co-operation of the Navy while the work of reorganizing the fishing industry on modern lines goes on. Gradually the Navy should be relieved of its task, which it may be called upon to do in the existing emergency as a short period programme, by a well-organized fishing industry depending on modern and large-scale methods.

Poultry

Poultry rearing has not yet been adopted by the farmer as ancillary to his main occupation. Religious prejudices and absence of any proper marketing organization and transport facilities have limited its development. In certain countries of Europe poultry-keeping now occupies an important place in agricultural economy and is one of the most important sources of agricultural income. In British India it is estimated that in

1940 there was a total poultry population of 8.5 crores laying 1844 crore eggs per annum, i.e. about 7 eggs per year per head of human population. Dr Burns has estimated that egg production can be increased by the application of scientific methods from 50 to 130 per bird or by 160 per cent. In any case, at least half of this increase can be obtained in the near future and the potential egg production per annum may be estimated for British India at more than 330 crore eggs.

It is desirable that poultry-keeping should be developed as a subsidiary industry to agriculture, so that the present diet of the farmer may be improved. At present egg is an expensive article of diet and it is not ordinarily consumed either by the villagers or the poor in the cities. It may not be possible to supply it at such cheap rates in urban centres that it may be available easily even to the poor; but the problem is not so difficult for the villages, if only farmers can be persuaded to combine poultry -with farming to meet domestic requirements. This type of mixed farming suits eminently the present small size of agricultural holdings in the country. Little capital is needed for such dove-tailing, running expenses are not very high, the waste products from the farm and the home can mostly be utilized and the Jurn-over will be fairly rapid.

Pig Farming and Meat

The present production of meat in India is almost nominal and considering the high density of population it is not conceivable that India will ever become a meat-eating country. It is, however, possible to develop a suitable combination of farming with pigs in certain parts of the country. Such a combination is largely responsible for the agricultural prosperity of the entire region from Holland to Denmark, where nearly every farm has a long row of pigsties behind the cow-houses. There were about 28 lakh pigs in the country according to the Census of 1940, but these are not usually kept by the farmers and the pig-fattening industry has not developed at all. There is, however, scope for its development in areas which are not quite hospitable to the development of mixed farming based on dairying. But it is doubtful whether the existing abhorrence and prejudices will ever permit such a development.

All-India Food Production

To sum up, food production in India is mostly cereal production liable to violent fluctuations due to the extreme dependence of crops on rains. Non-cereal vegetable foods and live-stock products occupy an insignificant place. On the whole food production per capita has declined and the trend has become prominently marked since 1931. An estimate of the production of all kinds of foods is given in the following table:

TABLE XLII

Average Food Production in India in 1940-41

Food	Quantity in lakh tons
1. Cereals	536
2. Pulses	93
3. Vegetables—	
(i) Non-leafy	40
(ii) Leafy	40
4. Fruits	60
5. Oil and Ghee[3]	29
6. Sugar (raw)	60
7. Milk (fluid)	64
(curd)	12
Butter-milk	130
8. Fish and meat	10
9. Eggs	200 crores (number)

It has already been observed that the all-India crop figures do not cover about 34 -2 crore acres comprised in those Indian states about which statistics are not available, i.e. about 34 per cent of the total area in the country. To complete the picture the recorded all-India figures for the area for which statistics are available may be increased by 30 per cent for cereals and pulses. This is admittedly a very rough and inaccurate method and so the figures in the above table are mostly illustrative rather than absolute. They should therefore be interpreted more as indicating the proportion of output under various groups rather than absolute quantities.

[3] Estimated on the assumption that all oil-seeds produced are crushed in India, which however is not a fact.

CHAPTER VI

FOOD VALUES AND SUPPLIES FOR HUMAN CONSUMPTION

Irregular and Uncertain Supplies

While the demand for food is growing year after year due to an increase in population, production does not indicate any general rise although there is a slightly rising trend in acreage under food crops. But more important than even this factor in the supply position is the irregularity and uncertainty in the production of various crops due to their dependence on rainfall and weather. Scientists have not yet been able to establish conclusively any weather cycle which may help in forecasting famines in India; but it has been observed that the main weather features are determined by the cycle of solar activity and there appears to be some correlation between sun-spots and the amount of rainfall. To illustrate, every sun-spot minimum each year is accompanied by a serious drought, while other droughts closely follow the sun-spot maxima. In fact, crops fail in one part or the other almost every year, but when failure is widespread there is scarcity or famine.

In the early years of the present century and up to the twenties any shrinkages in the production used to be reflected by shortages in exports and thus there was little room for an actual famine, but as population increased and the exportable surplus gradually declined to zero, years of lean crops have begun to imply actual starvation for many unless local supplies are supplemented by imports. The extent of violent fluctuations in production may be judged by the fact that the total area in British India under major food-grains was as low as 13 .74 crore acres in 1918-19 as compared to 16-17 crore acres in 1916-17, the maximum reached so far. The production of rice in British India has fluctuated between 309 lakh tons in 1917-18 and 203 lakh tons in 1918-19. Similarly, wheat production has fluctuated in British India between 90 lakh tons, the maximum level reached in 1929-30 and 64 lakh tons, the minimum recorded so far in 1927-8.

Famine Years

Clearly, food supplies are extremely irregular and liable t< fall suddenly in any year of unfavourable weather conditions The following table gives a rough idea of the recurrence o famine and scarcity in India:

TABLE XLIII

Years of crop failures since 1911-12

(Years in which production was less by 10 *per cent or more than the average of the decade)*

Rice	Wheat	Barley	Jowar	Bajra	Maize	Gram
1914-16	1913-14	1913-14	1917-18	..	..	1913-14
1918-19	1918-19	1918-19	1918-19	1918-19	1918-19	1918-19
1927-28	1920-21	1927-28	1020-21	1920-21	1922-23	1920-21
1936-36	1927-28	1928-29	1925-26	1925-26	1924-25	1927-28
1938-39	1931-32	1929-30	1926-27	1929-30	1925-26	1928-29
1940-41	1946-46	1937-38	1937-38	1936-37	1926-27	1929-30
1944-46	..	1938-39	1938-39	1937-38	1933-34	1938-39
..	..	1939-40	1941-42	1938-39	1936-37	1939-40
..	..	1941-42	..	..	1938-39	1941-42
..	..	..	..	..	1941-42	1944-45

During the last forty years there has been a serious diminution in the production of gram in ten years, that in maize and barley in nine years, eight years in jowar, seven years in rice and bajra, and six years in wheat. Almost every alternate year, one crop or the other records a substantial fall in production and the'country is almost constantly faced with a shortage in production of some major food-grains. When the shortage is of rice or wheat, the situation becomes serious and it turns out to be calamitous, if the shortages are widespread, as these two food-grains have a prominent position in the country's food economy, A 10 per cent deficit in the production of rice amounts to almost the total amount of normal production of bajra, barley, or maize. Since rice and wheat crops fail by more than 10 per cent once in every six years on an average, there should be a Central Food-grains Reserve consisting of rice and wheat, stocks from which may be utilized in years of deficiency to regularize supplies. It needs to be built up gradually from any unutilized surpluses or imports so that any adverse weather conditions in any year

in future may not seriously affect tjie nutritional standards of the people.

The liability to serious reductions in production is not confined to cereals only; as has already been observed, pulses are liable to suffer even more. Fruits and vegetables too record the same characteristic. Milk production is not directly affected so much by weather conditions; but since a drought manifests itself first in a fodder famine, milk yield is no less seriously diminished by it. On the contrary due to cattle mortality in a famine year the effect is cumulative and scarcity continues even in succeeding years in spite of good rains and favourable weather.

The Marketable Surplus

Production is carried on in India under a system of subsistence farming and commercialization in the sense of cultivation mainly for the market is confined to a few cash crops like sugar-cane, potatoes, groundnuts, or linseed. The farmers retain a major portion of their produce directly for their own use and hence in lean years the market supplies are reduced in a much larger proportion than the diminution in the total production of a crop. The marketable surplus of rice has been estimated at about 43 per cent and no less than 57 per cent of the produce is retained in the villages. In years of deficiency the amount retained in the villages proves to be inelastic and the marketable surplus is very much less. Nearly 73 per cent of rice is hand pounded and at an average only a little more than one-fourth of this reaches the market. Of the machine-milled rice, as high a proportion as 87 per cent represents the marketable sifrplus but machines process only 27 per cent of the total produce. This is so more or less with regard to every food-grain. Thus, approximately 45 per cent of the total wheat grown is retained in the cultivator's village, the proportion being as high as 70 per cent in the north of the Central Province, about 60 per cent in the Punjab and Jammu, and between 50 and 55 per cent in the United Provinces and Bengal. The proportion of millets retained by the farmers is perhaps still higher. It is however not so high in the case of pulses excepting gram. An obvious outcome of this system of subsistence farming is that in years of lean crops a deficiency is not distributed equally and manifests itself mainly in short supplies in the market. It is not so with

regard to sugar and oil-seejjs or potatoes as the amounts retained by growers are small in proportion to the total produce; and hence, yearly variations in market supplies reflect the changes in production.

Prices, Production and Supplies

The supplies in markets are affected not only by weather conditions and the total amount of produce but also by prevailing prices. The latter have an immediate bearing and the amount that is brought to the market by the cultivators is very much influenced by the price level. Normally, a rise in prices should stimulate supplies and vice versa, but actually cultivators in India have little to sell. Supplies are not *drawn* to the market but are *driven* for the payment of rent, interest and other dues. A very small proportion of sales is utilized by farmers to purchase a few necessities like cloth and salt on a minimum conceivable scale. Such hand to mouth economy, both in production and consumption, leads to increased supplies when price level is lew, although in practice it may amount to a curtailment of food consumption by the cultivator and his family or underfeeding of his cattle or both. Further, if the par of industrial and farm prices is affected adversely against the interests of cultivators as happened during the Depression, the farmers are compelled to make still greater sacrifices. To illustrate, the ratio between the level of farm and industrial prices was 110 in 1929 assuming the ratio of 1913 = 100. The price parity fell to 68 in 1931 and then gradually improved to 81 in 1939. There was not any proportionate fall in his expenses of production, in which certain elements on the contrary revealed a biased rigidity. In other words a farmer had to part with a larger proportion of his produce to pay rent and interest and to purchase the few necessities he required, than was sufficient at a higher price level and parity in the pre-Depression years. In the early years of the last war the barter terms of exchange moved rapidly against the cultivators and so in spite of higher prices their standard of living was pulled down. But conditions have changed altogether since the first quarter of 1943, and this has had a very adverse effect on the supply position. A comparatively much smaller amount of produce sold is now sufficient for the payment of rent, interest, etc. and also for the few purchases that a cultivator can possibly make. The amount

that was *driven* to the market has been considerably reduced and any surplus that could be *drawn* to it is limited by the paucity of consumers' goods. The cultivator, who was previously taking less food than was necessary or adequate for full efficiency is now consuming more and probably his cattle too are better fed. In a few cases he might be holding more than he requires as he does not find enough commodities in the market to exchange. An increase in the magnitude of consumption and/or holdings of cultivators has led to a reduction in market supplies, which can be traced to the relative high prices of food-grains prevailing at present in the country. It has been due largely to the gap in the past between the amount of food-grains which the cultivators needed for direct consumption and the amount they could retain when prices were low and the price parity between farm and industrial prices moved against them. Market supplies have recently suffered such serious diminution that the various provincial governments have now to procure and in certain cases even requisition the surpluses under various orders and rules.

Price movements and levels exert their influence on acreage and production apart from determining the marketable surplus. Due to the high pressure of population on soil in the country, the margin of cultivation is no longer determined by price movements, but at the same time very high agricultural prices tend to stimulate production. A fall in prices is not accompanied by a corresponding decline in agricultural output, but high prices do give an incentive for increased effort. This is witnessed in the rise in acreages since 1942 under rice, jowar, bajra, maize, gram and vegetables. The area under kharif cereals—jowar, bajra and maize—has increased by 66 lakh acres in 1942-3 and 1943-4 as compared to the average of six years ending 1941-2, i.e. by more than 11 per cent. Rice recorded an increase of 10 lakh acres. The increase in the area under potato is about 75,000 acres. It is true that a part of these accretions can rightly be ascribed to the 'grow more food' and 'grow more vegetable' campaigns, and the various measures adopted under these, but the main incentive has come from the high level of prices.

Supplies Not Available for Human Consumption

The entire production of food is not available for human consumption as a certain portion of it is used for seed and

cattle feed. There are also wastes in storage, transit and processing, and then whatever is exported is not available for consumption within the country. The seed rate differs from crop to crop and the Famine Commissions of 1880 and 1900 estimated it at about 6 per cent of the output. The various marketing surveys conducted by the Agricultural Marketing Adviser indicate a very much higher rate. For the major food-grains the seed rate may be taken at about 100 Ibs. per acre. These are very rough estimates but can give satisfactory results for computing the total amount of food supply actually available for human consumption. On these assumptions the seed requirements for the year 1941 are calculated in the following table:

TABLE XLIV

Seed Requirements

Crop	Total Seed lakh tons	Crop	Total Seed lakh tons
Rice ..	34	Gram ..	5
'Wheat ..	35	Other pulses ..	8
Jowar ..	15	Total pulses ..	13
Bajra ..	7	Oil-seeds ..	3
Barley ..	3	Tubers and roots	3
Maize ..	8		
Other cereals and millets	8		
Total ..	85		

'Deductions have also to be made for all quantities used for cattle feed. In fact, a considerable portion of gram and other pulses is given to cattle in the form of *chunni,* bran and pollard. Cereals are not given to any appreciable extent in that way except bran obtained from flour or certain minor food-grains. It will not be far from the truth to estimate consumption by cattle at 2 per cent of the major cereals, 5 per cent of minor cereals, 33 per cent of gram and 25 per cent of other pulses. There appears to be an over-estimation at first sight for gram and pulses used as cattle feed; but it has to be remembered that there are no less than 20 lakh horses and ponies besides 6-4 crore bullocks. The total number of cattle, buffaloes, horses, donkeys, camels, mules, sheep and goats is about 21 .3 crores. Moreover,

when pulses are turned into *dal,* the usual way these are eaten in India, about one-fourth is lost in *chunni* and *chilka.* The deductions therefore as estimated above seem to be quite adequate. These are estimated in the following table:

TABLE XLV

Estimate of consumption of Cereals and Pulses by Cattle

(In lakhs of tons)

Major cereals	9.8
Others	2.5
Gram	11.6
Other pulses	14.5
Total	**38.4**

Loss in Storing and Other Wastage

There is first the waste caused by wild animals, insects and rats. An inquiry in Bombay Presidency revealed that the damage caused by wild animals alone amounted to Rs. 70 lakhs annually. The crops are open to damage, practically in every part of the country, by wild pigs, jackals, black buck, monkeys, birds and rats. But more serious than this is the loss caused by the village cattle, which is usually turned adrift to find a living for itself. These cattle raid standing crops and sometimes, cause heavy losses. The Famine Commission of 1880 estimated the loss from wastage at 5 per cent of the output.

The crops are open to loss not only in fields but a considerable quantity is lost every year through deterioration and ravages of insects and rodent pests in the process of storing. This loss may be put at a minimum at 5 per cent of the total output and even higher in the case of food-grains. The Marketing Survey of Wheat puts the losses due to defective storage at 3 lakh tons a year in wheat alone. The loss has been estimated at 2 to 10 per cent of the value of the produce in the case of *gur.* On the whole, on a conservative basis wastage and loss in the field and the store house due to wild animals, insects, pests and rats, etc. are at a minimum 10 per cent of the- total production. It is of the utmost importance that storage accommodation should be improved and the problem of minimizing losses and wastes should be fully investigated. The amount that is being lost at present

due to deterioration and wastage can be put at 54 lakh tons of cereals, 9 lakh tons of pulses, 5 lakh tons of sugar and about 8 lakh tons in tuberous and root vegetables.

Shortages Caused by Exports

Finally, account has to be taken of the quantities that are exported as these are not consumed within the country. In 1938-9 the exports of cereals amounted to 6 lakh tons and that of pulses to 80 thousand tons. During the War years there has been a sharp decline in exports of food-stuffs and at the present moment, all such exports are prohibited. In the years 1940-1 and 1941-2, the net exports of wheat amounted to 1 -2 lakh tons and 2-6 lakh tons respectively. But the most serious leakage in food economy is caused by the export of oil-seeds. During the pre-War quinquennium ending with the year 1913-14 on an average about 15 lakh tons of oil-seeds were exported. At the outbreak of World War II such exports amounted to 12 lakh tons for the year 1938-9. There has been a slight shrinkage in the export of oil-seeds during the War years. But it is not much. The value of oil-seeds exported was Rs. 11 .90 crores in 1939-40 and Rs. 10.57 crores in 1942-3. On an average 71 per cent of total linseed, 3 .1 per cent of rape and mustard, 2 .1 per cent of sesamum and 15.5 per cent of groundnut produced in the country were exported in 1941-2. The proportion of exports to total output was considerably less before the war except in the case of groundnuts. It is absolutely essential, that the exports of oil-seeds should be banned altogether to provide people in the country the very small quantity of fat that they can possibly take on the basis of local production of oil-seeds.

To sum up, quantities that are not available for human consumption due to one reason or the other are put together, and the net food supplies available for human consumption in the year 1941 are estimated in TABLE XLVI opposite.

Only about 71 per cent of the output of cereals and 46 per cent of pulses is available for human consumption. In the case of sugar and oil and ghee the quantities that are not available for consumption are 13 and 21 per cent respectively. These high leakages in the different articles can certainly be reduced and more food made available out of the present production, since wastage and exports can largely be eliminated. The

TABLE XLVI

Food Supply in India[1]

(In lakhs of tons)

Food	Production	Deduction for					Net supply	Percentage of net supply to production
		Seed	Cattle	Wastage	Exports	Total		
1	2	3	4	5	6	7	8	9
Rice	244	34	5	24.4	3	66.4	177.6	73
Wheat	103	15	2	10.3	3	30-3	72.7	70
Jowar	67	152	1.3	6.7	0.2	23.2	43.8	68
Bajra	29	72	0.6	2-9	--	10.5	18.5	64
Barley	*21*	3	0.4	2.1	0.1	5.6	15.4	73
Maize	21	3	0.4	2.1	--	5.5	15.5	74
Others	51	8	2.5	5.1	---	15.6	35.4	70
Total cereals	536	85	12.2	53.6	6.3	157-1	378.9	71
Pulses	93	13	26.1	9.3	0.8	49.2	43.8	46
Vegetables	80	3		8	--	11.0	69.0	86
Fruits	60				--	---	60	100
Oil and ghee[3]	29	1-2			5	6.2	22.8	79
Sugar (raw)	60	3		5		8.0	52.0	87
Milk (whole)	64						64.0	100
Milk (curd)	12						12-0	100
Buttermilk	130						130.0	100
Fish and meat	10						10-0	100
Eggs (number)	200 crores				--		200 crores	100

present loss due to the defective storage of cereals amounts to 30 lakh tons annually, i.e. about 22 days' food for the whole country. Rats alone eat away as much as 10 lakh tons. Improved storage can restore all this amount for human consumption. A proper system of cattle management and protection agajnst wild animals can check further losses to the extent of about 30 lakh tons more of pulses and cereals. Exports can be totally banned, as has been done by the adoption of a right policy recently. It is only for seed and cattle that the expenditure is necessary and may have even to be increased in future.

For the country as a whole, the following estimate of net food supply has been made by adding 30 per cent to the

[1] For area for which statistics are available.

[2] Includes seed for fodder also.

[3] The amount of oil-seeds is converted into oil at 40 per cent of the output in all the columns and the figures represent the quantity of oil and ghee.

corresponding figures of cereals, pulses and vegetables for the unrecorded area:

TABLE XLVII

Estimates of all India net Food Supply available for human consumption

(In lakh tons)

1	Cereals	492.6	6	Fruits	60.0
2	Pulses	55.0	7	Milk (whole and curd)	76.0
3	Sugar	52.0	8	Buttermilk	130.0
4	Oil and ghee	22.8	9	Fish and Meat	10.0
5	Vegetables	89.0	10	Eggs (number)	200 crores.

The above figures may err on the side of over.estimation,, but the error in general is not so high as to vitiate their utility for illustrating the trends in consumption and ascertaining the nutrition standards of people in the country. These estimates do not include the supply supplemented by imports. Since 1941, while increase in population and the operation of certain other factors have added to the demand, there has not been a proportionate increase in supply. If total supplies were short to meet people's requirements on an adequate scale in 1.941 the position has deteriorated further by 1946, and unless the tempo of production is raised, the rate of aggravation is likely to increase in future.

Distribution of Food Supplies

The available food supplies are not by any means evenly distributed and if there is any deficiency, it is not equally shared by all. The main difficulty in the way of an even distribution of food supply is the present organization of agriculture, where production is carried on by a multitude of farmers having very little marketable surpluses. As the food situation became acute after the fall of Burma and the flow of the supplies in the market diminished causing great hardships to the urban con. sumers, procurement machineries were set up in the different Provinces and the States according to the exigencies of the situa. tion. Madras was the first province to take steps in this direction as early as 1st September, 1942. Progress made in this direction and extent of procurement differ in different parts of the country, and in fact, there is no uniform pattern to which all the schemes adhere.

In general, there has been a tendency towards 'monopoly' procurements of food.grains. The fifth All.India Food Con. ference held in Delhi in January 1945, recommended a further extension of the system. It was of the opinion that, "the develop. ment of monopoly procurement should be in the direction of acquisition by Government of grain offered for sale voluntarily. Nevertheless, in those areas where it is deemed advisable, monopoly procurement may be extended by (i) a compulsory levy and the acquisition, in addition, of any balance that any producer may desire to sell, or (ii) the assessment of the surpluses of the individual producer and the compulsory acquisi. tion of such surpluses." In actual practice procurement machinery does not give full results unless the surplus of every producer at a pre.determined scale is at the disposal of the Government. Such a system, however, throws a very heavy burden on adminis. tration and may prove even impracticable in the permanently settled areas where there is no field to field survey of each crop every year.

Apart from procurement, distribution cannot be even without a system of rationing. In times of actual or supposed scarcity the rich and well.to.do classes purchase quantities more than required ordinarily by them for personal and family 'security' reasons, thus aggravating the shortage for the poor and the many. In such circumstances while there is waste and abundance for a few, it may often imply actual starvation for others. But rationing has its own difficulties in India and does not anywhere cover all food articles. At best rationing of food.grains has been carried out in the cities and there too no uniform policy has been adopted by the different Provinces and the States. The Fo6d.grains Policy Committee, 1943, recommended the introduc. tion of rationing in the larger cities both in deficit and surplus areas. At present there are more than 500 towns in India, having a total population of about 5 crores which have been rationed; but while rationing has been introduced widely in Bombay and Madras, there are many parts of the country which have lagged very much behind. In the Punjab, out of eight towns each with a population of one lakh and over, only four have been rationed. In the United Provinces, over.all rationing of food.grains was introduced as late as 1945. The policy of the surplus provinces in regarding themselves as isolated units

and, therefore, of looking upon rationing as unnecessary is not conducive to the best interest of the country as a whole. Rationing is at present confined to only about 12 per cent of the total population and that too mostly of cereals and crystal sugar only. It, therefore, fails to play the important part that it should in conserving food supplies and providing for their equitable distribution. It is true that people in India live largely in small villages where due to administrative reasons it is not a practical proposition at present to introduce rationing. But, at the same time, it has to be remembered that, according to the Census of 1941, there are no less than 4,223 towns in India with a population of 5,000 or over where administrative difficulty may not be overwhelming. Moreover, it is quite possible to include other essential food articles as well in a rationing scheme, where it is already in operation for food.grains or sugar. Such a system will enable the workers and poor consumers in the cities to have a more balanced diet than what they can get at present.

Food Values

Showing only quantities of food articles without reference to their nutritive value fails to present the true picture regarding the food position. Accurate information about the nutrients contained in the various/0/my in which food articles are consumed in India is lacking, yet their food values apart from the way in which they are used are available. A table giving the value of Indian foods is reproduced as an appendix to this Chapter. It is compiled from Health Bulletin No. 23 published by Director Nutrition Research Laboratories, Coonoor.

The net food supply available for human consumption as estimated in TABLE XLVII (page 90) would have yielded 2,51,61,000 crore calories for the population of 1941 as shown in TABLE XLVIII opposite.

The calorie value of all the home.grown foods available amounted to 2,51,61,000 crore calories in 1941, of which 70 per cent was derived from cereals, and pulses accounted for another 8 per cent. The live.stock products including milk and eggs yielded only 10,00,000 crore calories, i.e. 4 per cent of the total. In between 1941 and 1946 the average production of cereals and pulses taken together has increased by about 5 per cent, but there is little or no increase in the production of other food.stuffs. It

TABLE XLVIII

Total calories available in 1941

Food.stuff	Quantity in lakh tons	Calories in crores	Food.stuff	Quantity in lakh tons	Calories in crores
1 Cereals ..	492.6	1,76,70,000	6 Fruits ..	60	3,53,000
2 Pulses ..	55.0	19,61,000	7 Milk ..	76	6,89,000
3 Sugar (raw) ..	52.0	18,64,000	8 Buttermilk	130	1,90000
4 Vegetables ..	89'0	6,45,000	9 Fish and meat	10	1,10,000
5 Oil and ghee	22.8	16,59,000	10 Eggs (number)	2.00 crores	20,000
Total 2,51,61.000 crore colories					

may be presumed that under normal conditions in 1946 the total calories available would have been about 2,62,00,000 crore calories and the net output of cereals and pulses available for human consumption would have amounted to 575 lakh tons. Actually, due to cyclones and failure of rains, the output of rice and wheat has been estimated to have suffered a damage of 50 lakh tons; and therefore, the net supply of cereals and pulses is likely to be in the neighbourhood of 525 lakh tons and the total calories available would be about 2,54,00,000 crores from local food production of all kinds for the population of 1946.

TABLE XLIX

Food Values

Food. stuff	Protein %	Fat %	Carbo. hydrate %	Calcium %	Phos. phorus %	Iron mgs. %	Carotene vitamin A (Interna. tional units per 100 gms.)	Vitamin B (Interna. tional units per 100 gms.)	Vitamin C mgs. per 100 gms.	Calorie per oz.
CEREALS										
1 Bajra	11.6	5.0	67.1	0.05	0.35	8.8	220	110		102
2 Barley	11.5	1.3	69.3	0.03	0.23	3.7		150		95
3 Jowar	10.4	1.9	74.0	0.03	0.28	6.2	136	115		101
4 Maize, dry	11.1	3.6	66.2	0.61	0.33	2.1				97
5 Ragi	7.1	1.3	76.3	0.53	0.27	5.4	70	140		98
6 Rice, raw home.pounded	8.5	0.6	78.0	9.01	0.17	2.8	4	60		100
7 Rice, raw milled	6.9	0.4	79.2	0.C5	0.11	1.0	91	20		99
8 Wheat, whole	11.8	1.5	71.2	0.04	0.32	5.3	108	180		93
9 Wholewheat flour	12.1	1.7	72.2	0.03	9.32	7.3			9u	100
10 Wheat flour refined	11.0	0.9	74.1	0.02	0.09	1.0		40		99
PULSES										
1 Bengal gram (with outer husk)	17.1	5.3	61.2	0.19	0.24	9.8	316	100		103
2 Urd (without outer husk)	24'0	1.4	60.3	0.20	0.37	9.8	64	140		99
3 Moong (with outer husk)	24.0	1.3	56.6	0.14	0.28	8.4	158	155		95
4 Masur dal	25.1	0.7	59.7	0.13	0.25	2.0	450	150		98
5 Arhar dal (without husk)	22.3	1.5	57.2	0.14	0.26	8.8	220	150		95
LEAFY VEGETABLES										
1 Bathwa	4.7	0.4	3.7	0.15	0.08	4.2				11
2 Bengal gram leaves	7.0	1.4	11.7	0.34	0.12	23.8				25
3 Cabbage	1.8	0.1	6.3	0.03	0.05	0.8	2,000	50	124	9
4 Gram leaves	8.2	0.5	27.2	0.31	0.21	28.3	6,700			41
5 Rape leaves	5.1	0.4	7.1	0.37	0.11	12.5				15
6 Spinach	1.9	0.9	4.0	0.06	0.01	5.0	2,600 to 3,500	70	48	9
ROOTS AND TUBERS										
1 Carrot	0.9	0.1	10.7	0.08	0.03	1.5	2,000 to 4,300	60	3	13
2 Onion small	1.8	0.1	13.2	0.04	0.06	1.2	25	40	11	17
3 Potato	1.8	0.1	22.0	0.01	0.03	0.7	40	20	17	28
4 Radish (White)	0.7	0.1	4.2	0.05	0.03	0.4	3	60	15	6
5 Sweet potato	1.2	0.3	31.0	0.02	0.05	0.8	10		24	37
6 Tapioca	0.7	0.2	38.7	0.05	0.04	0.9		15		45
OTHER VEGETABLES										
1 Brinjal	1.3	0.3	6.4	0.02	0.06	1.3	5	15	23	10
2 Cauliflower	3.5	0.4	5.3	0.03	0.06	1.3	38	110	66	11
3 Ladies finger	2.2	0.2	7.7	0.09	0.08	1.5	58	21	16	12
4 Pumpkin	1.4	0.1	5.3	0.01	0.03	0.7	84	200	2	8
5 Tinda	1.7	0.1	5.3	0.C2	0.03	0.9	28			8
6 Tomato green	1.9	0.1	4.5	0.02	0.04	2.4	320	23	31	3
7 Turnip	0.5	0.2	7.6	0.03	0.04	0.4	trace	40	43	10
FRUITS										
1 Apple	0.3	0.1	13.4	0.01	0.02	1.7		40	2	16
2 Banana	1.3	0.2	36.4	0.01	0.05	0.4		50	1	43
3 Dates (Persian)	3.0	0.2	67.3	0.07	6.08	10.6	600	30	ta ce	80
4 Guava, country	1.5	0.2	14.5	0.01	0.04	1.0	trace		299	19
5 Lemon	1.0	0.9	11.1	0.07	0.01	2.3			(Juice) 39	16
6 Mango (ripe)	0.6	0.1	11.8	0.01	0.02	0.3	4,800		13	14
7 Orange	0.9	0.3	10.6	0.05	0.02	0.1	350	40	68	14
MILK AND MILK PRODUCTS										
1 Milk, cow's	3.3	3.6	4.8	0.12	0.09	0.2	trace	17	2	18
2 Milk, buffalo's	4.3	3.8	5.1	0.21	0.13	0.2				33
3 Curds	2.9	2.9	3.3	0.12	0.09	0.3				14
4 Buttermilk	0.8	1.1	0.5	0.03	0.03	0.8	0			4
OTHERS										
1 Groundnut	26.7	40.1	20.3	0.05	0.39	1.	63	300	0	156
2 Mustard seed	22.0	39.7	23.8	0.49	0.70	17.9	270		trace	151
3 Jaggery	0.4	0.1	95.0	0.08	0.04	11.4	280			109

CHAPTER VII

FOOD SHORTAGE AND NEED FOR IMPORTS

Provincial Deficits and Surpluses

Normally, certain Provinces and States in India do not grow enough cereals to meet their ordinary requirements at the prevail. ing level of food consumption, while a few are surplus provinces. On the basis of difference between exports and imports of food.grains, the Food.grains Policy Committee found an annual normal deficit of 14,000 tons in Assam, 5 lakh tons in Bengal, 2 .75 lakh tons in Bihar, 4 46 lakh tons in Cochin and Travancore, 7 .64 lakh tons in Bombay, 8 .48 lakh tons in Madras and 38,000 tons in the North.West Frontier Province.

It is estimated that Assam has an exportable surplus of rice, which cannot be determined accurately, because the exports are mostly by country boats and not recorded. Actually, the recorded figures show a deficit, which amounted to 9 lakh maunds of rice in the year 1939.40. It also imports wheat though not much. Bengal normally depends to a great extent on Burma rice. It also imported about on an average 35 lakh maunds of wheat in pre.War years. Bihar is deficient in both wheat and rice, and according to the estimates of the Bihar Government the normal net imports of food.grains amounted to 2 .75 lakh tons, besides 74,000 tons of paddy from Nepal. The United Provinces is heavily deficient in rice, the average imports being more than 50 lakh maunds. It used to export some wheat, but now has a deficit of about 50,000 tons. The North.West Frontier Province normally imported 25,000 tons of wheat and 8,000 tons of rice as against a yearly export of 15,000 tons of barley. Madras is deficient, besides rice and wheat, in millets as well. It imports rice chiefly from Burma to the extent of about 3 lakh tons and wheat from other parts of India approximately 65,000 tons. In addition, large quantities of millets are imported from the neigh. bouring States and other Provinces. Bombay falls in the same category as Madras and depends to a very large extent on imports of rice from Burma and of wheat and millets from other parts of the country. Among the Indian States Travancore and Cochin depend largely upon imports of rice from outside. Accurate figures are not available and the annual deficit of rice

for both the States works out at about 4 .30 lakh tons, on the basis of an average yearly per capita consumption of 275 Ibs. of rice for 75 per cent of the population, that is adults, and 68¾ Ibs. for the remainder. The total deficits of the major cereals and millets of these Provinces and States taken together amount to nearly 30 lakh tons per year. The deficit increases in years of bad rainfall according to crop conditions.

As against these deficit areas, the Provinces which have normally surpluses to export are, the Punjab, the Central Province and Berar, Sind, and Orissa. The exports from the Punjab are mainly of wheat, besides some quantities of rice, millets and barley. Its normal average net exports of food-grains amounted to 7 .54 lakh tons; but it has to be noted that the exports of wheat were showing a weak trend even in the pre-War years. C.P. and Berar exports about 2 .34 lakh tons of food-grains consisting chiefly of rice. It has also a surplus of about 10 lakh maunds of wheat in normal years. Sind has an exportable surplus of approximately 3 .28 lakh tons, i.e. nearly 30 per cent of its yield of food-grains. The exports consist of both rice and wheat. Orissa is another surplus region, exporting normally about 1 -82 lakh tons of food-grains, chiefly rice. The total normal surpluses amount to nearly 15 lakh tons, i.e. not even half of the normal deficits in the pre-War years. Moreover, the net deficit in rice has been even larger than the total deficit in rice and wheat taken together.

Normal Dependence on Imports

It has, therefore, to be observed that the country was not self-sufficient in cereals before the outbreak of War and its dependence on foreign rice was progressively increasing s'ince the separation of Burma, which cut off a large slice of the country's food. Before that, not only India (including Burma) was self-sufficient in cereals but also exported some quantity to other countries. This self-sufficiency was so complete that the Crop Planning Sub-Committee in 1934 called for a halt to any further expansion of rice cultivation and protective measures had to be adopted to check imports of wheat and rice during the period of depression. But the situation has changed altogether since 1937 when Burma was separated, an action which has placed India's food position in serious jeopardy. Incidentally it may be mentioned that it has also made us poorer in minerals.

India imported 17.2 lakh tons of rice in 1937-8. These imports increased to more than 20 lakh tons in 1939-40, and would have been even higher as the demand for rice in the country has been increasing, but the War intervened. In 1940-1, the imports of rice amounted to only 10.9 lakh tons and ceased altogether on the fall of Burma in the early part of 1942. The Food-grains Policy Committee estimated in 1943 that the country required for current consumption an annual import of 10 lakh tons of food-grains but this was too low an estimate since normally 20 lakh tons of rice were imported in the pre-War years and the demand has been ever growing.

India has thus, normally, been dependent on foreign supplies for her most essential staple food, viz. rice. This is really a very uncomfortable position, for had the dependence been for such supplementary foods as ham or bacon, butter or cheese, milk or fruits, there would have been no danger of actual starvation or death in the event of any cessation of imports in any emergency as is the case at present. The country is far from self-sufficient even in these latter, but then, they do not constitute the bare necessities of life. In the pre-War years the imports of fruits and vegetables amounted to more than Rs. 120 crores, those of biscuits and cakes to another Rs. 25 lakhs, besides some 2 lakh cwts. of condensed milk and milk food.

Exports without any Real Surplus

While the country depended so vitally on imports of rice it was exporting some quantities of wheat and oil-seeds. In the quinquennium preceding the Great War, on an average about 14 per cent of the total output was exported. Since then an increase in the internal demand has been associated with a gradual shrinkage of the export trade in wheat. In the year 1940-1 the exports amounted to only about 0 .4 per cent of the total output. During the period of depression a protective import duty had to be levied under the Wheat Import Duty Act at Rs. 2 per cwt. in March 1931, and although it lapsed on 31st March, 1937, it had to be revived again as late as January, 1939 at Re. 1-8 per cwt. and reduced to a nominal figure of annas 2 per cwt. in September 1941. The levy of an import duty was a clear indication of the fact that the country could not grow wheat at competitive rates. But, what is more important is that

the wheat exports of India during the last decade did not represent a net surplus in cereal output. During the year 1937-8 the exports of wheat and wheat flour amounted to a little more than 5 .22 lakh tons and to about 3 lakhs in the following year; but at the same time there were large imports of rice. The wheat exports, therefore, did not constitute a real surplus, but were the result of the absence of any adjustment between consumption and output of cereals of all types in the country. If rice eaters could have been persuaded to take some wheat as well, which would have gone a long way in balancing their poor diet, the small exports of wheat would have disappeared and the dependence on foreign supplies of rice would have been correspondingly diminished. In addition to these small exports of wheat, the country normally exported in the pre-War years seeds, oils, oil-cake and even fresh vegetables, all of which were really more under distress than representative of any surpluses. There were exports of about 15 lakh cwts. of onions, 90 per cent of our castor-seed production, 55 per cent of the linseed output, 20 per cent of groundnuts and a small percentage of rapeseed produced in the country during the immediate pre-War period. In fact, for adequate nutrition the country required not only all these exports for home consumption but considerably more from outside. It actually exported instead of importing, because of its poverty and low purchasing power.

Under these circumstances the exports of food-stuffs in India should not be construed to imply any surplus over requirements on an adequate scale. These are largely the result of unemployment, under-employment, and a faulty system of distribution prevailing in the country. To some extent, they reflect a subordination of the truly economic and national interests of the country to the requirements of the foreigners. Since 1943 the Government of India has recognized the necessity of stopping all exports of food-grains, but has not yet formally committed itself to a similar policy with regard to all other food-stuffs. Even the embargo on export of food-grains has not been very strictly and scrupulously observed; and from April to November 1945, no less than 42,860 tons of rice were exported. It has been explained by the Government that these exports were more apparent than real. If it is so, it may not be very objectionable but the mere fact that exports were allowed shows the light-heartedness with which

the Government is handling the food situation even in the present extremity.

Present Food Requirements and Output

Apart from normal imports, if we consider the requirements of food on an adequate scale and the amount available for consumption out of the total output in the country, the shortage looms still larger. The relevant data is summarized in the following table:

TABLE L

Disparity between Requirements and Availability of Food-stuffs for Human Consumption in India

Food-stuffs	Required (in lakhs of tons)	Available (in lakhs of tons)	Percentage of shortage in proportion to requirements
1 Food-grains ..	599.2	575.1	4.2
2 Sugar (raw) ..	66.3	52.0	21.6
3 Vegetables ..	261.4	89-0	66.0
4 Fruits ..	65.3	60.0	8.1
5 Milk (whole and curd) ..	196.1	76.0	61.3
6 Oils and ghee ..	65.3	22.8	65.1
7 Fish, meat and eggs ..	98.0	12.0	87.8

The requirements in this table have been calculated on the basis of a balanced diet including an adequate consumption of 'protective' foods and live-stock products. The shortage in the case of cereals and pulses taken together amounts to 24 lakh tons on an average in the year 1946, presuming normal weather conditions. It has been assumed that two-thirds of the population would partake in the consumption of meat, fish and eggs, and the total cereal requirements would be 501 .2 lakh tons. Normally, about 517.6 lakh tons of cereals would have been available for consumption and thus, apparently there is no deficiency of cereals. But this is far from the truth as the quantities of other food-grains, i.e. pulses and fish, meat and eggs, are not available in adequate quantities. Out of 98 lakh tons of pulses required, only 57 .5 lakh tons are available and similarly, the quantity of fish, meat and eggs falls short by about

88 per cent of the requirements. Hence, people take on an average a little more of cereals than say, 15 oz. per adult per day assumed for the non-vegetarians for making estimates of requirements in the above table.

Actually, the cereals and pulses act as substitutes to a certain extent and the quantities required of the two should be treated together, for estimating shortage of food-grains. This amounts to 24 lakh tons at present, only if other food-stuffs are available in adequate quantities—which, however, is not the case as vegetables, whole milk, oils and ghee, are short practically by two-thirds of the requirements, and the non-vegetarian foods are available only to the extent of one-eighth of the amount necessary. There is a deficiency even with regard to sugar to the extent of 21 per cent and of fruits, 8 per cent.

So long as the deficiency in food-stuffs other than grains continues on the present scale and the supply of pulses remains low, people will continue to have a diet unbalanced by larger amounts of cereal consumption. In any case, the average shortage of 24 lakh tons in food-grains represents the minimum amount that must immediately be made up mostly by imports to avoid actual starvation. This amount does not include any imports that may be necessary in 1946 or the years immediately following, on account of adverse weather conditions or natural calamities.

Estimate of Shortage of Total Food Supply

Leaving aside the requirements of different items for a balanced diet, 3,34,14,000 crore calories represent the annual requirements for the population of 1946 on the basis of 2,800 calories per day per man. As against this, only 2,62,00,000 crore calories would have been available from the present food production under normal weather condition. India's food shortage, therefore, amounts at present to an equivalent of 72,00,000 crore calories, i.e. about 21.6 per cent of the requirements. In other words, the present food supply with reference to a minimum scale of 2,800 calories per average man daily, falls short for some 7.04 crores of India's 'average men' representing nearly 9 crore persons. This shortage increases in years of lean crop and bad rains. But, even in a normal agricultural season the daily ration per ' average man available from the country's own

output amounts to only 2,194 calories, which allows for subsistence at a very low level. The over-all deficiency is of relatively recent origin, for it hardly existed a few decades back and has increased strikingly since 1931 and in particular after the separation of Burma in 1937. Nevertheless, the situation had not deteriorated to such an extent till as late as in the immediate pre-War years and the amount of energy from all food-stuffs available in the country, including imports of 20 lakh tons of rice, amounted to 2,58,70,000 crore calories for 30 crores 41 -4 lakh 'consumption units' in terms of man value, i.e. 2,334 calories daily for an 'average man'. A daily reduction of 140 calories per man on an average amounting to a fall of 6 per cent in the customary standard of food consumption, which itself is at an alarmingly low level, signifies not only India's great War effort even at the expense of under-nutrition of her people, but what is more important to bear in mind cannot be sustained for long.

Emaciation threatens to be chronic and might soon reach its limits pulling down further the efficiency of the worker, both in the field and the farm, and causing more widespread epidemics and deaths, if the per capita average food supply in the country is not improved and restored to at least the pre-War levels in the near future. It is really tragic that while peace is being celebrated in another part of the world with plenty, as it ought to be, people in India have not enough to fill their bellies even with the simplest and coarsest foods.

Actual Deficiency of Food-grains in 1946

How in a year of unfavourable weather conditions food supply falls considerably below subsistence level may be illustrated with reference to the situation that developed during 1946. To recapitulate, normal production of food-grains falls short by about 25 lakh tons than the amount people were accustomed to eat in the immediate pre-War years. There is not much room for economy in this customary standard or any scope of tightening the belt further to maintain average health and efficiency at the prevailing standards, which, it should be emphasized, are already incredibly low.

The output of rice and wheat in 1946 has been estimated to be short by nearly 50 lakh tons than the normal. Adding to it the amount of 25 lakh tons which represent the normal deficit

over requirements, there was a shortage of no less than 75 lakh tons of food-grains during 1946. In other words, if people were to eat the amount to which they were accustomed in the pre-War years, there were no cereals for as many as 6 crore people in India; and therefore, without a proportionate reduction in the rations of all those who could bear it and unless the shortage was shared in a co-operative spirit by all, crores would have faced starvation in that year. The gravity of the situation is realized when it is remembered that the total amount of food-grains in India in 1943 was more than in the preceding two years and only Bengal among the major provinces had a short rice crop of 70 lakh tons as compared to the average output of 81 lakh tons for the three years ending 1941-2; and yet according to the most conservative estimates 15 lakhs of people died of starvation in that year. In 1946 the country was faced with an over-all shortage of 75 lakh tons of wheat and rice taken together, which amounts to nearly 20 per cent of the entire output of the country and approximates to one-eighth of the total requirements of all food-grains including pulses. Shortage was more pronounced in the south; in Madras Presidency alone it amounted to as much as 25 per cent. The normal shortage of rice in Madras used to be of about 3 lakh tons, which in the pre-War years \vas made up by imports from Burma. In 1946 the shortage of all grains taken together was estimated at 20 lakh tons and in the absence of local supplies being supplemented by imports, people in Madras would have got a ration of only 8 oz. of grains daily, which was hardly sufficient for the maintenance of life.

Comparison with Europe and America

Examining the question from another angle, it may be noted that the total calories available from all types of foods produced in the country amounted to 2,54,00,000 crore calories in 1946. The population for this year has been estimated in a previous Chapter at 41 .68 crores and the consumption units in terms of' adult men' at 32 crores 69 .4 lakhs. The average daily calories available to an 'adult man' in 1946 would actually be only 2,128 as against 2,800 needed for adequate nutrition, and 2,334 to which he was accustomed in the pre-War years. It has to be remembered that the averages have been worked out on the basis of all kinds of foods available for the total population.

In actual practice the farmers and the villagers constituting the majority get a very small proportion of food-stuffs other than grains and thus, while town-dwellers would be able to get more than the average, rural people would have to subsist on much less according to circumstances. If the machinery of distribution failed as it did in 1943 and resulted in a famine, which could and should have been avoided even without imports, villagers in drought and cyclone-stricken areas might not get even a daily ration of 1,000 calories and deaths would be widespread. But if that happened the disaster would be attributable to the men who hold the reins of administration; for, there is no reason as to why a single man should die of starvation when an average of about 2,100 calories are available daily for each adult man. The barest minimum requirements are represented by 1,500 calories for living, all men may survive even with 1,000 for some time. Hence, in spite of the gravity of the situation famine accompanied by deaths is not inevitable provided administration is not corrupt and irresponsible. It does not, however, mean that there is room for self-complacency or the present supply is adequate for the maintenance of efficiency and health at the required level.

Comparing food position in India with that of Europe and U.S.A. during 1946 we meet with a striking contrast. It is estimated that the Americans got a ration of 3,300 calories a day for each man and the British about 3,000. In Denmark, it was above 3,000 calories and even in such countries as Norway and Czechoslavakia, which were devastated by War, the calorie value of daily ration was about 2,400. In France which represents a scarcity area in Europe the daily calorie value of the ration food-stuffs amounted to 2,000 per adult. But, in spite of an apparent lower calorie value of its ration as compared to 2,128 available in India, the situation is really much better. It was only in January that bread rationing was reimposed in France after two months ' off the ration'. The present ration for adults amounts to 10 oz. of bread per day in addition to an equivalent quantity of meat per week besides cheese, fats, sugar and milk. Practically speaking, it is the Central and South-Eastern Europe which may show several 'starvation zones'. It is estimated that 2 .8 crore people are getting here a ration of less than 1,500 calories, but it is being fairly well maintained.

Daily Ration of 1200 Calories in India

In India, on the contrary, the only assured supplies are, truly speaking, for the urban people in those towns where rationing has been adopted and Government has assumed the responsibility of food supply. Elsewhere, people may be living in any condition ranging from acute scarcity to over-abundance. In the rationed towns the amount of ration is limited to 12 oz. cereals a day per adult, since February, 1946. In other words, the calorie value of the food ration per adult averages some 1,200 only. Besides, sugar has also been rationed, but there is no uniformity of scale and in the producing areas it is about 21bs. a month. Thus, India's food position today is in a way even more critical than of the worst starvation zones of Europe.

The Need for Imports

Under the circumstances, India's need for import of food-stuffs is paramount. Here is a case of shortage of bread itself threatening the lives of millions of people and as such supplies from abroad should be immediate. The demand for food cannot be postponed and the internal supplies of the country cannot get us through the year without a great effort and equal sacrifices on the part of all.

The output of cereals is estimated to be shorter by 50 lakh tons than the average, which would have ordinarily enabled people to maintain the pitiably low standard of some 2,100 calories a day. It is to maintain Indians at this low level of subsistence that imports to the extent of 50 lakh tons of food-grains at a minimum were required in 1946. It should be clearly understood that this amount does not represent normal requirements but the minimum needs of the country under an extreme emergency. With a better system of administration and under favourable weather conditions there may be no demand of this nature in 1947; but it may even increase under adverse conditions. In fact, so long as agricultural output continues to be so low and liable to violent fluctuations as at present, Indian demand for food-grains will ever be uncertain and a disturbing factor in the cereal exporting markets of the world.

But in addition to this irregular requirement of imports, which makes itself felt suddenly and with gravity as has been the case in 1946, India now falls short by another 25 lakh tons

for the ordinary feeding of her people. For the present it has also to be made up largely by imports and unless agricultural output increases within the country this part of the demand may be growing each year. It will of course be unfortunate and dangerous if the gulf is allowed to remain unbridged, but taking facts as they are the importance of these imports cannot be minimized at present. It is another thing that if in the projected constitutional progress, Burma, which constituted an important limb of the country, is linked again with India as a part to the mutual advantage of both, self-sufficiency in food may be attained much earlier. But during the current year she can hardly come to the rescue of her sister-country in this respect as according to the latest estimates available her rice output is less than 20 lakh tons as against the pre-War average of 60 lakh tons out of which she used to export 35 lakh tons.

Finally, India will require some imports of wheat and rice during the next few years for the building up of Central Food-grain Reserve, which will relieve the outside exporters of the element of uncertainty in Indian demand and enable the country to have assured and stable supplies for consumption in the country irrespective of crop conditions. Without such a Reserve the country may be faced with famine and starvation in any year of unfavourable weather conditions, which are notoriously frequent. Essentially, it will be in the nature of a protective measure serving primarily as a Famine Insurance Fund, which must be established without any further delay. It may be suggested tentatively that the amount in the Reserve should be 50 lakh tons to be contributed fully within the next five years by an accretion of 10 lakh tons annually. Incidentally, a Reserve of this magnitude and nature will be very effective in executing successfully a policy of price stabilization.

To sum up, India has a three-fold need for imports, viz.: (i) to balance shortages in yearly crop production as in the absence of any adjustment hunger, epidemics and death stalk naked in the country; (ii) to make up the normal shortage in her food requirements for subsistence; and (iii) to help her in having a grain Reserve as a measure of famine insurance. The respective requirements for the current year are at a minimum, 50 lakh tons, 25 lakh tons and 10 lakh tons, making a total of 85 lakh tons.

It has to be remembered that the world food economy has been put to a very serious strain during 1946 due mostly to ravages caused by the last War. Production has suffered in many countries and according to some estimates importing countries needed in the first half of 1946 about 170 lakh tons of wheat and flour while only 120 lakh tons were available. This estimate of imports does not include India's requirements on the scale they would be necessary and hence it is not practicable for India to get all that she needs. But the world situation can certainly be improved by foresight, co-operation and fellow-feeling and the surplus countries may be in a position to export considerably more than the amounts included in the above estimates. This is however only a temporary phase and as happened last time after the Great War the world may soon plunge itself into over-production and agricultural depression unless a world Food Plan is immediately drawn up after a careful assessment and scrutiny of resources and requirements of each country, and a way is found to realize and implement it.

An Average Diet in India

Let then the country's requirements be examined to determine food production targets lest the prevailing panic and shortage lead us into a dangerous position a few years hence. In the following years, each country will strive at self-sufficiency and any maladjustment in production over requirements will be difficult to be resolved by exports. To illustrate, if India produces more cereals than what she needs, her agriculturists will be hit hard as they will not find it easy to compete in the world markets and may have to sell their produce below costs. The present panic should not therefore be allowed to divert production into uneconomic lines, resulting in bankruptcy tomorrow.

In a normal season with an average production the amounts available daily at present per 'consumption unit' (adult man) as against requirements for a balanced diet are as in TABLE u overleaf.

For a balanced diet people require more of everything else except the amount of cereals available at present. Taking the food-grains together there is a shortage but it is due to the deficit in the supply of pulses. People take more rice than they should because they do not get and eat as much *Dal* as is desirable.

TABLE LI

An Average and a Balanced Diet

(figures for an adult 'average man')

Food-stuffs	Daily requirements for a balanced diet (in oz.)	Amount normally available (in oz.)
1 Cereals	15-16	16.39
2 Pulses	3	1.73
3 Sugar	2	1.57
4 Vegetables	8	2.68
5 Fruits	2	1.80
6 Milk	6	2.29
7 Oil and ghee	2	0.69
8 Butter-milk		3.90
9 Fish, meat and eggs	2-3	0.36

It will perhaps require some effort to effect this change in an average diet in India but it cannot be done unless the requisite supplies of pulses are available. Our cereal policy should therefore be to raise the present production (i) in proportion to an increase in population, (ii) to compensate for shortages in bad years, and (iii) to allow for an increased consumption than necessary for a well-balanced diet so long as the supply of pulses does not attain the required standard. The supply for the last purpose should be strictly checked and no effort should be spared to substitute pulses for it as early as practicable. In a drive for more food crops pulses should be in the forefront.

Besides the sole exception of cereals a well-balanced diet has to be supplemented by larger quantities of every other foodstuff than the amounts which can possibly be obtained at present by an average man. The shortage is particularly acute in the case of vegetables and live-stock products of all kinds. It is not so pronounced for fruits and sugar although larger quantities of these are undoubtedly required.

Hence in planning food for more than 40 crores of people in India provision has to be made for more, many times more, than available today, of milk and vegetables and even flesh foods. These three are highly perishable commodities and the nutritive value of the preserved tinned varieties is greatly reduced. Imports, even if profitable, cannot therefore make up this shortage. India must make a tremendous effort in the direction

of improving production of these commodities, viz. milk and vegetables rather than of anything else. It is wrong to assume that an increased quantity of rice or wheat will compensate for their deficiency in average consumption. The former should receive the highest priorities for liquidating under-nutrition but topmost priority should be given to the production of milk and vegetables for the elimination of the wide-spread evil of mal-nutrition.

Analysis of Average Diets

The following analysis of average diets as distinct from actual consumption of any particular class is based on the amount normally available per 'average man' (adult) per day. Four types of average diets have been analysed. Cereals are presumed to consist exclusively of rice, wheat, and inferior grains in diets Nos. 1, 2, 3 respectively and the quantity of flesh foods available have also been added. Diet No. 4 consists of wheat as cereals but without any quantity offish, meat or eggs. The food values have been based on averages in the case of vegetables, fruit and flesh foods as it was not practicable to take into consideration the many varieties under these heads. It has however not vitiated the relative value of the analysis given in the following table:

TABLE HI

Relative value of Nutrients in Average Diets

Diet numbers	Proteins in grams	Fat in grams	Carbohydrates in grams	Calcium in grams	Phosphorus in grams	Iron in mgms.
1 (Rice) ..	53.95	27'66	458.98	•387	1.217	30.92
2 (Wheat) ..	72.56	32.26	431.05	•525	2.019	49.95
3 (Inferior) ..	63.26	32.26	398'89	•479	1.566	50.45
4 (Vegetarian)	70.73	31.80	431.05	•517	1.999	43.75

Taking Dr Aykroyd's standard regarding requirements, i.e. 65 grams of protein, probably 45-60 grams of fat, 20 mgms. iron, some 0 .6 grams calcuim and 1 .0 grams of phosphorus the most consistent deficiency is that of calcium and fats. Leaving aside the wheat eaters mostly in Northern India there is also a protein deficiency, which is striking in the case of rice eaters. Carbo-hydrates supply nearly three-fourths of the calories which is a

very high proportion as compared with a corresponding contribution of 50 per cent in Western diets. Live-stock products supply only 5 to 10 per cent of the proteins as against a minimum of requirement of 20 per cent. It may therefore be concluded that what is needed for proper nutrition is increased supply of foods, which may provide more calcium, fats and proteins of live-stock origin, i.e. milk and eggs. Larger supplies of vegetables will also contribute towards more calcium intake. Another common deficiency in Indian diets is that of vitamins, which can be made up by including more milk, fruits and vegetables in an average diet. An analysis of food values available in an average diet leads to the same conclusion—that not more but possibly less of cereals, and very much larger quantities of milk, eggs and vegetables that are needed. In this connexion, before final target figures of production can be determined, more nutritional research will have to be carried out in co-operation of the physiologists and economists. For example, it has yet to be established whether a diet based largely on food-grains as at present leaves sufficient spare stomach-room for leafy vegetables or fruits, which are bulky. There cannot be a similar doubt about the desirability of increased consumption of roots and tubers or bananas and plantains.

Rural and Urban Standards

Malnutrition is more pronounced in the villages than in the towns as the consumption of milk, milk products, vegetables and fruits is even more limited than in the cities. A village enquiry in seven Breeding tracts of India in 1939 revealed that even in the predominantly dairying districts, 16 per cent of the villagers did not consume any milk or milk products. Conditions are worse in other parts. Dr Aykroyd and B. G. Krishnan found in a survey of South Indian villages that milk and milk products were entirely absent from the diets of 31 out of 44 families investigated and the average milk consumption of the remaining 13 families less than 3 oz. per day. In cities like Bombay, Cawnpore, Calcutta and Delhi the daily per capita consumption of milk and milk products amounted to 15.6 oz., 15.8 oz., 9 .8 oz. and 22 .7 oz. respectively in 1935. But even in the cities the lower income-group families take little milk or milk products. To illustrate, mill-workers at Bombay and Sholapur consume on an

average 1.3 to 1 .8 oz. of milk and milk products per head per day.

Similarly an inquiry in the city of Lahore covering 952 families showed that whereas families with an income of Rs. 100 per month took milk regularly with a daily consumption per head increasing from 13 .6 oz. to more than 30 .0 oz. according to income, only one-third of the families with an income of less than Rs. 25 per month were regular consumers of milk. The daily consumption per head in the case of these latter families amounted to only 2.8 oz. Similar considerations apply to consumption of the other nutritive and protective foods.

Obviously, the deficiency of calcium, fats, vitamins and of proteins of live-stock origin increases as we go from the towns to the villages or from the higher income groups to the lower ones in the cities. Dr Aykroyd found in a survey in South-East Madras a daily intake per 'consumption unit' of 62.7 grams protein, 26.9 grams fat, 488.9 grams carbohydrates, 0.31 grams calcium, 1.51 grams phosphorus, and 32.8 mgms. iron. Mrs Charlotte Wiser studied diets in a U.P. village and found a deficiency of protein, fats, and calcium. The intake of fats was found to be as low as 14.13 grams for a village in the Punjab (Barry), 23 .9 grams for U.P. farm-hand and 2 .75 grams for agricultural workers in Madras (McCarrison).

Production of milk, vegetables and eggs has therefore to be greatly increased in the villages for the villagers. The aim in this respect should be not only national self-sufficiency but regional and even village self-sufficiency as problems of distribution of these essential commodities are extremely difficult to be solved.

CHAPTER VIII

MALNUTRITION AND STARVATION

The Low Expectation of Life

Deficiencies in diet and inadequate quantities of food result in poor physique, little resistance to disease, high mortality and small span of life. 'Expectation of life', which represents the average number of years of life still remaining to a person of a given age, is a good index of living standaids ard that of food in particular. The low level of nutrition in India is reflected in the exceedingly low expectation of life at birth (age 0) indicating the average age, to which a new-born would live, of 26 -91 years for males and 26 .56 years for females. In contrast to this span of less than 27 years for males in India, it has increased from 59.12 years in 1929-31 to 63.65 years in 1942 in U.S.A.; and it is as high as 65 .46 years in New Zealand, 63 .48 years in Australia, 60.7 years in Switzerland, 64.30 years in Sweden, 60.18 years in the United Kingdom, 63.5 years in Denmark, 59 .86 years in Germany and 54 .30 years in France. Not only is the average span of life in the other civilized countries of the world two to two and a half times of that in India, but it is continuously increasing. On the contrary, there is no such uninterrupted increase in India, the mean after-life time' having actually recorded a fall from 24.59 years in 1881 to 23 -63 years in 1901 and 22 .59 years in 1911. In certain parts of the country, particularly where nutritional standards are very low, the expectation of life for males does not reach even the all-India average and is as low as 23 .60 years in the Rajputana deserts and 24.91 years in the deficit province of Bengal.

The expectation of life in the case of females is still lower at 26.56 years as against 68.61 years in U.S.A., 65.8 years in Denmark, 64.40 years in the United Kingdom, 66.92 years in Sweden, 64.6 years in Switzerland, 67.14 years in Australia and 68.45 years in New Zealand. Throughout the world females have a larger span of life than males except in India. Attempts have been made to ascribe the conspicuous lower female longevity as compared to males to frequent child-bearing from a relatively early age. Thus, the Age of Consent Committee observes that there is "a large element of truth in the theory that the frequency

of births has a very direct bearing on maternal and infant mortality"; and "according to the medical evidence the effect of frequency of births at short intervals is far more disastrous when maternity starts at an early age."[1]

But, analysing the problem more deeply, it is noticed that whereas early marriages and frequent births at short intervals have dominated social relations and family life in India since several generations, the lower expectation of life for females than for males is relatively a recent feature recorded for the first time in 1931. In 1881 females in British India enjoyed an expectation of 25 .58 years of life as compared to 23 .67 years for males; and thus had a span longer nearly by 2 years than that of males. It was reduced by about one year in 1891, 4 months in 1901 and less than 9 months in 1911; and ultimately by the year 1931 the scales were so much turned against the weaker sex that females had actually six months less than their selfish and dominating partners in life. What happened during this period was not an increase in the rate of child marriages or births at a premature age, nor even a higher frequency of child-bearing: but the burden of the growing food shortage and the pulling down of the nutritional standards fell mainly on women in whose case neglect now takes a heavy toll in childhood; and physical exhaustion, anaemia of pregnancy, nervous breakdown and other ailments, which are the aftermath of child-bearing, have added to mortality at a young age due to insufficiency of food.

The increase in the longevity of males in India from 23.67 years in 1881 to 26.91 years in 1931 does not mean any improvement in nutrition standards, since it has been achieved, so far as it is shared with females, by a better public health service. But the loss of the relative advantage of two years in longevity which females enjoyed over males in 1881 and a reduction of their comparative span by six months is an index of the deterioration of the food situation in the country. In other words, malnutrition and food-scarcity have reduced by at least two and a half years the relative expectation of life of some 20 crores of females in India within 50 years. The Indian's food history may be clearly read from the relative expectation of life enjoyed by females, and in unequivocal terms it depicts a mute

[1] **Quoted by Dr R. K. Mukerjee in *Food Planning for Four Hundred Millions.***

tragedy. Nowhere else in civilized and economically advanced parts of the world, the suffering of the tender sex is so acute or sacrifice equally great.

High Female Mortality

TABLE LIII

Expectation of Female Lives in Years

Age	India	United States	Australia	United Kingdom
0 ..	26.56	68.61	67.14	64.40
1 ..	33.48	69.99	68.67	66.79
10 ..	33.61	61.74	61.02	59.69
20 ..	27.08	52.19	51.67	50.40
30 ..	22.30	42.92	42.77	41.60
40 ..	18.23	33.86	34.04	32.78
50 ..	14.65	25.25	25-58	24.28
60 ..	10.81	17.42	17.74	16.48
70 ..	6.74	10.87	10.98	9.47

The figures in the above table indicate the exceedingly low expectation of female lives in India at different ages as compared

TABLE LIV[2]

Number of females surviving out of 1,00,000 *born*

Age	British India	U.S.A.	England and Wales
1 ..	76,766	96,621	94,545
5 ..	62,817	95,890	92,024
10 ..	59,369	95,549	91,082
15 ..	56,757	95,263	90,420
20 ..	52,833	94,800	89,383
25 ..	47,032	94,100	88,133
30 ..	42,675	93,340	86,792
35 ..	37,266	92356	85,353
40 ..	31,778	91,058	83,690
45 ..	26,409	89,292	81,660
50 ..	21,464	86,780	78,958
56 ..	17,065	83,238	75,290
65	9,761	70,812	63,046
75 ..	3,841	47,301	40,040

2 Coippiled from the *Statistical Year Book of the League of Nations* for 1942-4.

to that in U.S.A., Australia and the United Kingdom. At the age of 20 females in India have an expectation of only 27 years as compared to more than 50 in these other countries. The high disparity reflects the heavy wear and tear of mothers caused generally by food deficiency under conditions of frequent child-bearing.

Nearly one-fourth of the girls in India die within one year of their birth, about 53 per cent reach the age of 20 and only a little more than one-fourth survive after they have ceased to have babies. In England and Wales, no less than three-fourths of the total girls born reach the age of 55 and all but 10 per cent reach the age of 15. Mortality during the child-bearing age (15-45 years) is confined to 10 per cent as against 54 per cent in India. Of 56 Indian girls out of every 100 born that reach the age of 15 nearly 30 die before the age of 45. On the other hand in the United States of America, 95 out of every 100 girls born reach the age of 15 and of these all but 6 survive at the age of 45. The comparison is simply astounding, and while there is an element of truth in the theory that better sanitation, and health services and more wide-spread education has reduced infant and maternal mortality in these countries, the high disparity cannot solely be explained by these factors. Above all, the most important cause is inadequacy of food. Many under-nourished mothers lose their lives in child-bearing and when they survive babies have little chance of survival for the same reason, while a malnourished child is often small for its age and light for its height with very low resistance to diseases. According to the estimates of Sir John Megaw 2 lakh mothers die in India in giving birth' to children every year. His inquiry also indicated a maternal mortality rate of 24.5 per 1000. A later estimate[8] puts these figures at 20 per 1000 as compared to 2.9 of England and Wales.

The high maternal mortality coupled with even a higher infantile mortality largely as a result of under-nourishment and malnutrition has been responsible for the low proportion of females in the Indian population and represents a corresponding loss of reproductive potential, which, if continued unabated, might affect seriously the growth of population in future and may under certain circumstances lead to its actual decline. In spite

[3] Report, Census of India, 1941, p. 34.

of being better equipped for survival than the male, the female suffers almost invariably from a step-motherly treatment about care and food in infancy and childhood, and later from a poorer diet generally as compared with that which she herself prepares for her partner, which in itself is very often insufficient and deficient. As food shortage tends to increase so does her grim struggle with deficiency. The menace to infants and mothers is now more grave than ever. Special attention should be paid immediately to their food, in order to conserve the reproductive potential and powers; otherwise the coming generations may have to face the problem of a declining population say, during the fourth quarter of the present century. It is of the utmost importance that infants and females should be the first recipients of the benefits of planned food economy.

Food Shortage and Infant Mortality

Infant mortality, although registering a downward trend, is still very high. There is a reduction in deaths occurring in the first year of life from 195 per thousand live-births in 1920 to 160 in 1940. It may be argued that infant mortality is not caused by deficiency in food as it is declining when the food position is still deteriorating. Statistics about the causes of deaths of infants are not compiled but it is clear that while an improvement in public health service has brought about a reduction in infant mortality due to epidemics and endemic diseases, lack of proper nutrition is a vital factor limiting further and rapid progress in this direction.

In fact, children between the ages of one and five years suffer directly from excessive malnutrition and even scarcity of food. During the last decade, as the food situation worsened the ratio of deaths in this group has not only recorded an upward trend but it has even registered an inverse variation with total production of food-grains. The years 1935 and 1938 recorded the highest death rates among children of the age-group 1-5 years, with the exception of the year 1931, in the last decade. It was during these two years, viz. 1935-6 and 1938-9, that production of major food-grains was at its lowest level during the decade 1931-2 to 1939-1940. There was a bumper crop in the year 1931-2, but then its advantage was neutralized by the slump and so child mortality was high.

In other words, food shortage is usually so chronic as to be primarily responsible for a high infant and child mortality, apart from a very low standard of health and physique in general. Food supplies are so much limited that in years of crop failures the rate of child mortality actually increases.

TABLE LV

Infant and Child Mortality

(Specific Rates per 1000)

	Infants under 1 year		Children 1 4 years	
	Males	Females	Males	Females
British India ..	163.3	147.4	34.3	31.6
U.S.A. ..	41.6	32-7	2.4	2-0
France ..	73-4	57.4	5.6	4.8
England and Wales ..	63-1	48.1	5.2	4.5
Australia ..	44.1	34.7	3.5	3.1
New Zealand ..	35.0	27.4	2.8	2.1

It is significant to note that while the rate of infant mortality in British India is two and a half times to four times of that in U.S.A. and other foreign countries included in the above table, the ratio of deaths among children between the ages of 1 to 4 years is six to sixteen times as high. This indicates a very high incidence of food shortage and deficiency which is

TABLE LVI

Mortality among Children of I to 4 years

(Specific Rates per 1000)

	1931		1940	
	Males	Females	Males	Females
India' ..	32.9	30.3	34.3	31.6
England and Wales[5] ..	7.5	6.8	3.7	3.7
U.S.A.[6] ..	6.1	5.3	3.1	2.7

[4] Figures for 1932 and 1939.
[5] Figures for 1930-2 and 1939.
[6] Figures for 1929-31 and 1940.

also revealed by the fact that whereas the decline in infant mortality rate in foreign countries has been appreciable in our own times, progress in India has been extremely slow. From 1920 to 1940, the infant mortality rate in India declined by only 18 per cent, although it was as high as 195. In England and Wales it has been reduced by no less than 30 per cent during the same period from a comparatively low level of 90 for males and 69 for females in 1920-2. The progress in other foreign countries has been equally remarkable. Reduction in the rate of child mortality has also been phenomenal in these countries even during the last decade, while India recorded a rising or a stationary trend. Above all, it indicates malnutrition and food shortage.

A Death-Ridden Country

In no other country so many deaths occur as in India. More than 60 lakh persons die each year according to the statistics published by the Public Health Commissioner. Since deaths are not registered for the entire population but for a little less than two-thirds of the total, actual deaths each year in India must be in the vicinity of 85 lakhs. The population of the United States is nearly one-third of that of India and if deaths in India were to be in the same proportion as there, it is noticed that there is an excess of nearly 40 lakh deaths each year in India. The total population of Europe excluding U.S.S.R. is almost equal to that of India and yet normal deaths each year in Europe total only 53 lakhs as against 85 lakhs in India. In other words, people in India are dying at a higher rate than in any other civilized country in the world. Within ten years more than 8 crore Indians die, i.e. one in every five living persons. In the United States of America only one person out of ten dies during the same period. Similar is the case in most of the countries of Europe.

Death in its most gruesome form stalks the entire face of the country and what is still more woeful is the fact that it takes its toll at an early stage in the period of a man's life. In 1942 the total number of deaths recorded in the registering population was 63 -4 lakhs, out of which a little less than 30 lakhs were under 10 years. In general, 50 per cent of the total deaths occur before the age of 15 years and nearly 40 per cent before the age of 5 years. Deaths above the age of 40 are confined to

20 lakhs or less than one-third of the total. In a country like the United States, where the standard of health and physique is much higher, one-fifth of the total deaths occur after the age of 75 and the total deaths up to the age of 25 years are less numerous than after the age of 75 years. In fact, young deaths are relatively few and far-between in Europe, America or Australia. The ratio of deaths below the age of 15 to total deaths in these countries is only about 15 per cent as compared to a corresponding rate of 50 per cent in India. The large excess of deaths in India and its visitation at an early age in comparison to the foreign countries suggests a low resistance to both epidemic and endemic diseases caused largely by insufficiency of food and malnutrition.

The number of total deaths recorded between the years 1931 and 1942 has varied as follows in relation to the production of major food-grains in British India:

TABLE LVII

Number of Deaths and Production of all major Food-grains in British India

Year	Deaths in lakhs	Production in lakh tons
1931	66.2	496
1932	58.1	601
1933	61.0	477
1934	68.6	471
1935	63.3	473
1936	81.1	446
1937	61.1	492
1938	66.9	478
1939	61.7	433
1940	61.2	473
1941	64.1	436
1942	63.4	457

During these 12 years the largest number of deaths was recorded in the year 1934 and the production was also the least in that year in the quinquennium 1931-5. Again, 1938 recorded the second largest number of deaths and production in that year was short by nearly 15 lakh tons than in the previous year. The year 1941 also records a large number of deaths and production in the year 1940-1 was among the lowest during the last

12 years. These facts indicate the general scarcity of food under which people are living in India and if there is not a closer co-relationship between deaths and production, that is due to the total food demand being met to some extent by imports. Nonetheless, it is clear, that Indians get almost the minimum quantity of food necessary for subsistence and hence, a fall in the production of food-grains increases the number of deaths as from year to year.

Causes of High Mortality

The cause of death is seldom known, most of the deaths being recorded as due to fevers. The following table shows the average annual number of deaths in British India during 1932-1941, from the epidemic diseases of cholera, small-pox and plague and from certain groups of causes, under which the remaining deaths are classified:

TABLE LVIII[7]

Average Annual Deaths in British India, during 1932-1941

(excluding Burma)

	Cholera	Small-pox	Plague	Fevers	Dysentery and Diarrhoea	Respiratory diseases	Other causes
Number	1,44,921	69,474	30,932	36,22,869	2,61,924	4,71,802	15,99,490
Percentage to total	2.4	1.1	0.5	68-4	4.2	7.6	25.8

More than 58 per cent of the deaths are attributed to fevers, of which the largest single cause is malaria. Colonel Sinton calculated in 1935 that "at least 100 million individuals suffer from malaria every year in India", and taking into consideration both the direct and indirect effects of malaria on mortality he was of the opinion that a death rate of 8 per 1000 of population due to malaria might not be an unreasonable estimate. Still, a large number of deaths recorded under fevers are due to other causes. In fact, there is little definite information about causes of deaths recorded under fevers and other causes, and yet these

[7] See Report of the Health Survey and Development Committee, Vol. I, p. 10.

together account for nearly 85 per cent of the total deaths. It is therefore, not possible to ascertain statistically the extent to which malnutrition and food scarcity are responsible for actual deaths; but that their incidence must be very high is indicated by the fact that diseases like tuberculosis, cholera, dysentery and diarrhoea take a very high toll of life in India.

It has been estimated that there are at least 5 lakh deaths from tuberculosis annually in the whole of India with an average of 25 lakh active cases.[8] Besides other factors, malnutrition and under-nutrition are no less responsible for the spread of the disease, which has been increasing widely since the last few decades. The death rate from tuberculosis has reached very high levels in some of the cities in India, being more than 400 in Cawnpore and Lucknow, about 300 in Madras and 230 in Calcutta per 1,00,000 persons as against only 47 in New York and 96 in London. The incidence of cholera, dysentery and diarrhoea reflects again malnutrition and consumption of contaminated food due to scarcity. In 1935 and 1938, one out of every 12 deaths in British India was caused by these diseases. It is significant to observe that they become wide-spread in years of acute food scarcity.

The Toll of Famines

Famines were recurrent and severe during the nineteenth century and their frequency and severity increased as it closed and population grew. It has been estimated by Digby, Lehy and others that in the first three quarters of the last century 13 famines occurred taking a toll of 64 lakhs of lives; but in the last quarter no less than 18 famines were recorded, with a'total mortality of 2 -60 crores.

Another 10 lakhs of people perished in the famine of 1901 and then it seemed for some time that mortality due to privation was a matter of past history. The Bengal Famine of 1943 belied all such hopes and no less than 10 to 35 lakh persons died for no other reason than lack of food. The country is still in the grip of famines, which cause wide-spread deaths due to scarcity. The struggle for existence is hardly so acute in any other part of the civilized world today.

[8] Dr P. V. Benjamin, quoted in the Report of the Health Survey and Development Committee, Vol. I, p. 97.

Leprosy and Blindness

There are at least 10 lakh persons suffering from leprosy in India. It has been observed that leprosy is more common in the south, e.g. Madras than in the north. According to the Report on Leprosy (1941) by the special committee appointed by the Central Advisory Board of Health, there is in India "a belt of high incidence including the whole of the east coast and the south of the peninsula, including West Bengal, South Bihar, Orissa, Madras, Travancore and Cochin. In the central parts of India the incidence tends to be lower but there are some foci of higher incidence. There is a belt of moderate incidence in the Himalayan foot-hills, running across the north of India, while in most of the north-west of India there is very little leprosy." Further investigations are required to explain the high incidence of leprosy in predominantly poor, rice-eating areas and the degree of variation may prove deeper than a simple co-relation. The Public Health Commissioner (1929) observes that a high leprosy rate is associated with a poor soil where vegetables and fodder do not thrive and where the cereal crops are apt to fail, with inadequate consumption of vegetables and milk, and with the consumption of food of bad quality such as spoiled rice and rotten fish. It appears that whereas malnutrition might not well be a cause of leprosy it is certainly a contributory factor in the prevalence of the disease.

Blindness accounts for the highest proportion of infirms in India. It has increased per 1,00,000 of the population from 121 in 1901 to 157 in 1931 in the case of males and from 120 in 1901 to 185 in 1931 in the case of females. The increase is both rapid and significant as it has been stated that lack of vitamin A in the extreme form of Keratomalacia is responsible for more than half the blindness in India and China. It is in the opinion of Colonel Wright the greatest single cause of preventable blindness in India. This is not generally recognized. In fact, ophthalmic features are simply localized signs of a multiple-deficiency complex, Blindness may be prevented considerably by proper feeding of children as its chief primary aetiological factor is lack of fat-soluble vitamin A in the diet. Keratomalacia is common in the rice eating South and the Ganges Valley but it is practically unknown in the wheat and milk consuming Punjab. Malnutrition rather than any other factor is responsible for

a large section of the blind in India. Attention may be drawn here to the fact that the incidence of blindness is higher among females, who are comparatively more poorly nourished than among males of the same class or area. Blindness from cataract associated with advanced years is also wide-spread and can be traced to a deficiency of vitamin C in the diet, which is also associated with retinal and subconjunctural haemorrhages. Glaucoma heads the Public Health Commissioner's list (J929) of the main causes of blindness in the country and its most important contributory cause is a lack of vitamin B in the diet. The incidence of partial blindness and defective eye-sight is not yet fully known and it is possible that a considerable number of the several million illiterates in India might find reading and writing, when they are taught, too strenuous for their eyes. At present illiteracy literally conceals blindness and consequently food, especially vitamin, deficiency.

Deficiency Diseases .

There are a number of diseases prevalent in India due to dietetic causes, which do not invariably cause actual death or infirmity but account for much inefficiency, morbidity and low standard of health. Such conditions of malnutrition are wide-spread. Increased liability to infections, arrested growth, lack of enthusiasm for work or play, rough dry skin and papular eruptions, defective formation of gums, xerophthalmia, lesions in gastric mucosa and nervous system are characteristic of vitamin A deficiency. Beriberi, which is very common in the rice eating zones, epidemic dropsy, optic and alcoholic neuritis and even ocular paralysis are met frequently, indicating the deficiency of vitamin B. Scurvy and spongy bleeding gums usually suggest lack of fresh fruits and vegetables in the diet; whereas rickets, which is often the cause of infant mortality may be due largely to the deficiency of vitamin D Indian diets, as has been observed, are usually deficient in vitamins and hence people are a constant victim of so many deficiency diseases. They are often lean with sunken eyes and cheeks and occasionally having marked symptoms of anaemia due primarily to an ill-balanced and inadequate diet, which lacks not only the minimum quantity of vitamins but suffers by a deficiency of proteins, particularly those derived from animal foods, calcium and even iron. In

certain parts even iodine deficiency is noticed, resulting in a high proportion of goitrous cases, while retardation of puberty in females and even sterility are caused by malnutrition. In brief, food shortage in India is so acute that in normal years, when there are no apparent deaths due to famine or actual starvation, one-fourth of the children born die before the age of one year and only half survive up to the age of 20 years. Longevity is very much restricted and the average expectation of life at birth is as low as 26 .91 years for males and 26 .56 years for females. Among the survivors the standard of health is very low while infirmities and deficiency diseases are quite common. No wonder human efficiency is at its lowest. Malnutrition increases as we pass from the wheat eating areas of the North and the Punjab plains to the rice eating areas in Bengal and South Madras and so does the incidence of certain diseases as beriberi, pellagra, xerophthalmia, lesions, cataract, epidemic dropsy and rickets, A diet largely composed of raw milled rice contains insufficient vitamin B_1 and is therefore associated with beriberi. 'Soreness" of the angles of the mouth and of the tongue is more common in large areas of Southern India, where milled rice is the staple article of food, than in the North caused by deficiency of vitamins belonging to the B_2 complex. It has been estimated that in South India the incidence of premature births is three times as great as it is in Northern India and similarly tuberculosis is twice as prevalent here as in the Punjab. The rate of infant mortality too is higher in Madras and Bengal than in Sind or the Punjab. Dr Aykroyd has found that whereas pellagra is uncommon in India, a large percentage of children in South India show a pellagra-like stomatitis. The incidence of infirmities like blindness and leprosy is also higher in the poor rice eating zones than elsewhere.

Faulty Practices

It is tragic that in spite of inadequate supplies and their ill-balanced character food values are destroyed to some extent at least by faulty practices of food preparation and cooking. To illustrate, the raw rice loses all its vitamin A and a greater proportion of vitamin B in the process of milling, whereas home pounded parboiled rice yields the highest values. Yet 27 per cent of the rice production is machine milled, and while producers

retain the major portion of the hand-pounded rice the purchaser-consumer has to depend largely on the former in the market. Again, parboiled rice, even when highly milled, contains a larger proportion of vitamin B_1 while home pounded rice, if raw, has considerably less of both vitamins A and B_1. Of the total production as high a proportion as 43 per cent is processed raw. Washing and cooking cause further losses in the preparation of the raw milled rice. About 60 per cent of the vitamin B_1 originally present in raw milled rice is removed by washing as compared to only 8 per cent in the case of parboiled milled rice. If the cooking water is removed from rice 25 per cent of the vitamin which remains after washing is lost further. A moderate degree of heating destroys vitamin C necessitating the inclusion of some raw fruit, which however is seldom the case. Ordinary heating may not destroy proteins, fats and carbohydrates in cereals, pulses and meat, but it is not so in the case of vegetables. Minerals, in particular, are washed away or destroyed in heating and even vitamin A and carotene which are not affected by ordinary cooking in most foods are rapidly destroyed at temperatures higher than 125° C. Possibly little vitamin A is left in butter, when it is converted into ghee and unfortunately Indians take ghee rather than butter. The loss of vitamins through cooking in the case of vegetables may well be illustrated from carrots, which have been subjected to scientific tests in America and found to be a good source of carotene or pro-vitamin A and certain other vitamins. Fresh carrots are a good source of vitamin C, which is however rapidly destroyed unless these are kept cool and moist. Perhaps half the vitamin C is lost before carrots reach the hands of consumers. The other vitamins too suffer equally and the loss is greater if they are kept in a warm place. Further losses of the water soluble vitamins occur during cooking and processing.

The total food production has become inadequate for the maintenance of life of all in India. Diet is normally both scanty ,and ill-balanced so as to cause high mortality, low expectation of life and poor standard of physique and health, Processing and cooking methods are responsible further for mineral and vitamin deficiencies even in the case of the few who can afford to get a square meal] Many in India die young and in infancy, and only a few survive after the age of fifty; those who live are poor

specimens of humanity, mostly ill-fed, emaciated and lean, falling easy victims to the many diseases that rage over the country. Not a few suffer from infirmities while the rest, leaving aside an insignificant minority, are ever in a state of unsound health and the incidence of malnutrition and deficiency diseases is very much higher than anywhere in the West or America. Indolence, morbidity and fatalism are as much a result of the scarcity of food as of the failure of the State to minimize man's helplessness against Nature. Only a lightning advance in the latter sphere can put us safely on the way to freedom from want and fear in India and then gradually create a demand on which large-scale industries will subsist. It is then that a new standard of health, physique and longevity will be reached, which will be much higher than that prevalent at present in a state of utter privation, malnutrition and high mortality.

CHAPTER IX

TARGETS, PLAN AND POLICY

Population Capacity

To meet the yawning gap between the requirements of a growing population in India and its total food supply, the foremost task in planning is to choose and determine with care the targets of production. This is of the utmost importance, as wrong decisions at this stage may vitiate the entire planned economy. It has been suggested that efforts should be made to check the growth of population as the available food supply in the country falls short for its teeming millions. To quote Major-General Sir John Megaw, the country would be heading straight for calamity Unless something was done to decrease the birth-rate. He is reported to have said: "As soon as more food has been provided and infectious diseases have been satisfactorily controlled there will be a further upsurge in the rate of increase in the population and the problem will be as far from solution as ever. The only difference will be that it will have become greater and more difficult to solve." There are some even among the eminent Indian economists, who hold that with forty crores, the country has already overstepped the limits of its population capacity.

The fundamental error involved in this way of thinking is that population capacity has been taken to be limited by the existing food supply. Actually it is not so: population capacity depends here, as in every other country, on the potentialities of economic resources of all types including agricultural and industrial. At any given time, food supply is limited by the way and extent of exploitation of these resources. In India, exploitation of industrial and commercial potentialities is still in infancy; and in agriculture, in spite of an extreme pressure of population on soil, antiquated technique and methods of production are still in use everywhere. We have already seen in an earlier chapter how with a rationalization of agricultural industry, output can be increased substantially even without changing its existing structure. In certain directions manifold increases can be obtained immediately. Hence, there is no call for the pessimism implied in the demand to consciously curtail and limit the country's population

by a wide-spread adoption of the so-called neo-Malthusianism. It would be applying the remedy at the wrong end, losing the battle against starvation, while yet there was ample scope for the maintenance of a high standard of living for a relatively larger population than at present in the country. The right course would be to husband economic resources in agriculture, industry and trade with the aid of science and modern inventions to realize optimum conditions of living for the growing population. Birth-control measures at this stage of general poverty and low standard of living in the country, apart from being unnecessary, have little chance of success in actual practice, except perhaps among the sophisticated few amongst the middle classes. But any large-scale adoption of these methods even among them is fraught with grave consequences and may tend towards racial suicide.

Population Policy

It does not, however, mean that nothing needs to be done to minimize the colossal wastage of life in India by way of a progressive population policy. A mere increase in food supply and improvement of public health measures may not go a long way in solving this obnoxious problem, unless such social reforms are simultaneously adopted and put into effect as will ensure a fair chance of living at birth both to the baby and the mother. In addition to malnutrition and lack of public health services, the most important contributory cause of high infant and maternal mortality in India is the frequency of births at short intervals, especially since maternity starts not unoften at an early age. This high incidence of child-bearing and premature maternity can and should be reduced without lowering the net reproductive rate. India's population policy has thus to be based not on neo-Malthusianism with its narrow and possibly dangerous objective of reducing population, but has to be evolved out of proper social attitudes towards marriage, sex relationship and family based on an elevation of social values. This should gradually and progressively raise the average age of marriage of Indian girls to years of full maturity and increase the interval between child-births to ensure fair living chance for each child. Much of its success will depend on the progress of education and higher standard of living in New India; but in the beginning it will

necessitate even measures of compulsion such as fixing the minimum age of marriage, say sixteen for girls, prohibition of polygamy, and even production of a certificate of fitness and age for marriage. The rites and institutions in ancient India ordained against indulgence and some such attitudes will have to be developed by education and mass propaganda on the one hand and provision of recreative activities of artistic and cultural value on the other. Provision of good houses with modern amenities will enable a widening and sublimation of the employment of leisure, while the radio can be utilized effectively to promote a healthy, vigorous social outlook and develop a proper family attitude. Finally, an improved standard of living will inculcate an aspiration to live better, which by itself will furnish the driving power against the existing high frequency of child-births without adequate spacing.

Production Targets

Granted an increasing population in India, our food production plans should aim at improving the average nutritional standards so that there should be plenty of food for all and of a better type. The aims should not be chimerical and abstract but capable of being attained within specified time through a process of evolution.

The following tentative targets are suggested, keeping in view the requirements of a balanced diet for the population of 1951:

TABLE LIX

Food Production Targets for 1951

(Figures in lakhs of tons)

	Requirements for human consumption	Target
1 Cereals	5362	723.8
2 Pulses	104.8	209.6
3 Sugar	69.8	78.5
4 Vegetables—		
(i) Leafy	69.8	78.5
(ii) Non-leafy	209.8	261.4
5 Fruits	69.8	76.8
6 Milk	209.8	209.8 net
7 Oils and ghee	69-8	69.8 ,,
8 Fish, meat and eggs	104-8	104.8 ,,

The target figures in the above table have been calculated by adding to the requirements for human consumption, 35 per cent and 100 per cent in the case of cereals and pulses respectively, 12 .5 per cent to that of sugar and leafy vegetables, 20 per cent for tuberous and root vegetables and 10 per cent for fruits. Net output figures are given for the remaining items. The additions have been made to make allowance for seed, cattle-feed and waste in storage and preparation, so that the requisite *net* quantities may be available for human consumption. Doubling of the pulses requirements for production targets has been found necessary to allow for a proper feeding of milch cattle in order to attain the target of milk production. Turning back to TABLE XLVI (p. 89) it is noticed that only 71 per cent of cereals and 46 per cent of pulses are available at present for human consumption; and thus an addition of 35 per cent and 100 per cent respectively to the corresponding requirements of 1951 for determining targets for production is the minimum necessary even when allowance is made for better storage facilities.

Cereals and Pulses

The increases envisaged for cereals is a little over the present production but quite considerable in the case of pulses. Partly this is due to the requirements for more milk production and partly to the need of including more pulses in an average diet which is deficient at present in protein content. An increased production of pulses would play a vital part in balancing the present diet directly by enabling a larger intake of the more nutritive *dais,* and indirectly by contributing to increased milk production. Besides, their cultivation will enrich the soil. The change in the emphasis of production from cereals to pulses is very urgently needed and the production target of 2 crore tons of pulses should not be considered too high to be realized within a short period. According to the information of the Nutrition Advisory Committee it was more immediately feasible to increase the production of cereals than that of other foods; and hence it concluded that emphasis must be laid on more cereals as part of short-term production policy. The conclusion was not inevitable for, obviously if, as is the case, cereal production can be increased immediately mostly by increasing the average yield per acre large areas can be released for the cultivation

of other food crops. The right policy would be to maintain adequate production of cereals, reducing at the same time its acreage by higher yield per acre and make a rational use of arable land by devoting it more to 'other food crop' and fodder cultivation. Production of pulses can be increased in the immediate future by increasing acreage as well as yields through better farm practices, manuring and irrigation. Moreover, there is considerable scope for improving the varieties and introducing those already evolved out.

Even as regards cereals the present trend of increase in the proportion of inferior types must be arrested. If requirements are assessed in terms of the present demand there appears to be a serious shortage of rice; but considering the low nutritional value of this cereal it may not be advisable to plan for its increased output. In fact, attempts should be made to meet this shortage with wheat, as far as practicable, since many rice producing tracts are unsuitable at present to produce anything else while the bulk of the rice eating population cannot be persuaded easily to include wheat in its food. Rice or wheat, effort should be concentrated on increasing the yield per acre and reducing the acreages, particularly in the case of the former. The same applies to other cereals and although it is not possible to give any figures, large areas can be released in this way for the cultivation of more pulses, vegetables and fodder crops.

Vegetables and Fruits

The present production of fruits and leafy vegetables has been estimated at 60 and 40 lakh tons respectively. An increase of only 28 per cent is contemplated for fruits because it is not feasible to increase the production of most of the fruits within a short period to any higher levels. A most important factor which will limit any larger intake of fruits by the bulk of the population in the villages will be their relative costliness and difficulties in distribution. Hence, even if it were practicable to put the target still higher from the production point of view the limited extent of the market does not warrant a higher demand in the immediate future.

A cent per cent increase in the production of leafy vegetables **is** required not as a substitute for cereals but for the supply of the much needed vitamins and mineral salts in which the cereal

diets are greatly lacking. Whereas in the vicinity of cities market-gardening is gradually extending, the cultivation of leafy vegetables is greatly neglected in the villages. It is there that the main vegetable front should be started as the needs of villagers in this respect are most acute, although they seldom realize that, and opportunities the greatest. Without the cultivation of leafy vegetables in the villages for local consumption it will not be easy to balance the cereal diets.

On the principle of getting food from sources which yield the highest calories per acre the necessity of increasing the output of tubers and other high-yielding crops cannot be over-emphasized. The cultivated area per capita is much less than one acre, that under food crops being only 0-663 acre. It is, therefore, of great importance that it should be utilized for the production of high energy and calorie yielding crops. From that point of view certain tubers and root vegetables like potato, sweet potato, tapioca and also plantains are superior to cereals as they definitely produce more calories per acre.

The present production of all types of non-leafy vegetables is estimated at 40 lakh tons and it is proposed to increase it to more than 250 lakh tons by 1951, i.e. by nearly 525 per cent. An increase even of this order would not give these high yielding crops the place they occupy as a source of food energy in Europe. They will still remain as supplementary foods of minor importance. A larger increase has not been envisaged as it may not be a practical proposition under the present circumstances of limited water and manuring facilities. Moreover, any transition from grain farming to cultivation of other food crops will be but gradual and howsoever desirable cannot be achieved suddenly. No community can break away altogether from its past even in an emergency. Nevertheless, cereal economy is destined to play a less and less important part in future as the growing population in the country will necessitate an increased cultivation of crops like potato, which have a higher calorie yield per acre. It has, however, to be remembered that tubers are poor nutrients, having a low protein content. Their protein yield per acre is much less than that of wheat or even rice. The Famine Inquiry Commission has very aptly remarked[1]: "These foods are deficient in protein and if they are taken as the main ingredient in the diet

[1] Final Report, p. 122.

protein intake is seriously reduced. It is not, of course, the custom in India to take potatoes, sweet potatoes, and plantains as a staple article of diet, though in certain areas at certain seasons sweet potatoes are widely consumed. The conclusion is that, provided supplies of protein from pulses and fish can be simultaneously increased, an increase in the production of these foods has much to recommend it from the standpoint of food and agricultural policy, with particular reference to economy in the use of land." This proviso is very important and any large-scale substitution of cereals by root crops will be nutritionally undesirable so long as the other constituents in the diet are not materially altered. It is true that in the West potatoes as sources of energy are almost as important as bread and flour but then the diet is greatly enriched by meat, milk, butter and eggs. In India it is not so and hence any radical departure from a cereal diet without the aid of these other complementary foods should be prevented by careful planning.

How diets in India differ widely from those in the West may be judged from the following comparison:

TABLE LX

Food Consumption per head[2] per annum

(Figures in pounds)

	India	Great Britain[3]
Cereals[4]	413	212
Potatoes	9	221
Meat	7	137
Fish		46
Vegetables	57	208
Fruit	41	
Sugar	36	103
Butter[5]	16	25
Cheese	--	9
Margarine	--	16
Eggs (number)	6	234
Fresh milk	53	186

Comparatively, Indian diets are very poor and if potatoes are to replace a portion of cereals and pulses they are likely

[2] Per adult man for India.

[3] Figures for 1937-8 from J. B. Orr: *Feeding the People in War Time.*

[4] Inclusive of Pulses for India.

[5] Oil and Ghee for India.

to be poorer still. These are greatly lacking in the 'protective' and the nutritionally complementary foods. A tremendous increase in all these directions is called for but that is not possible in certain spheres, on account of the high density of population, e.g. in the case of meat. But local production can be increased within a short period in many other directions. The supplies of fruits and vegetables can and should be raised to the target levels within a period of five years and same is the case with cereals and pulses. Even all these, however, will not by themselves give a balanced diet: they have to be supplemented by an adequate consumption of sugar, milk, fats and flesh foods.

Sugar

In the case of sugar it was generally believed before the outbreak of the War that self-sufficiency had been established at a comparatively low level of per capita consumption and in fact in 1939-40 the industry was faced with a very severe crisis due tO! over-prdduction. Actually consumption of sugar or *gur* had been very low in the pre-War years as people could not afford to buy them. During the last few years there has been an improvement in the earnings of the people and sugar is no longer regarded as a luxury food. Its demand has now outrun its supply and there are signs of scarcity. Crystal sugar has been the first of the commodities, to be rationed and the situation' appears to have deteriorated due to failure of winter rains in 1946, which may even necessitate imports from abroad. In the light of these fasts,,and with the memory of two recent crises caused by over-production, in 1936-7 and 1939-40, the target for sugar production has been, kept low at 78.5 lakh tons, i.e. 30 per cent above the present level.

Milk and Milk Products

'Milk is the most important key-food, whose supply is capable of being increased and which must be made available in adequate quantities for balancing the present diet, particularly of the 'vulnerable' groups. Out of the present production of some 230 lakh tons of milk only 76 lakh tons are available for consumption, as fresh milk and curd. The minimum quantities required for a balanced diet are about 210 lakh tons implying that the present output should be increased three-fold to make, enough

fluid milk available for human consumption without changing the existing ratio in which milk is utilized in the different ways. Such an increase although desirable may not be a practical proposition within a short period. Most of the milk is at present converted into ghee which is a most concentrated source of energy, but which unlike butter loses many of the vitamins in the process of manufacture. It would, therefore, be wasteful to convert large quantities of the additional supplies of milk into ghee. Hence, a doubling of the present milk output would be sufficient to obtain adequate quantities of milk for consumption provided production is organized on a village scale for the supply of liquid milk rather than ghee in each village. In other words, milk supply can be best achieved by a system of mixed farming as distinct from commercial dairying, which has a scope for meeting the requirements of the urban population only.

It has been doubted whether even the doubling of the present output can be attained in the immediate future. Thus, the recent Famine Inquiry Commission reported that, "looking at the problem realistically, we cannot visualize any immediate possibility of increasing the production of milk to such an extent that it can become a regular article of diet consumed in adequate quantities by the poorer classes in the greater part of India: very reluctantly we conclude that the ideal set by nutrition experts—half a pound of milk or more daily for every child in the country—is not a practical objective attainable within the next few decades."[6] Such a conclusion does not seem to be based on a proper realization of all the relevant facts in this connexion.

According to Dr Burns, it is possible to increase milk yield 'to the extent of 75 per cent' in the case of cows, 60 per cent for buffaloes and 50 per cent for goats. A larger part of it can be realized simply by improved feeding and better management, and therefore, without much loss of time. In fact, the milk yield of the village cattle can be improved to the extent of 50 to 60 per cent if fodder and concentrates are given in adequate quantities. If the average yield of cereals per acre is increased, as it ought to be, there will be considerable area for the cultivation of pulses, oil-seeds and fodder, in quantities sufficient for the production of enough food for men and feeding stuffs for the dairy cow and buffalo. Feeding can also be improved

[6] Final Report, p. 123.

by eliminating the unfit cows, bullocks "and buffaloes. With a proper organization of agriculture no less than half the present number of dry animals will become redundant and their elimination will help further in improving the feed and milching efficiency of dairy cows in India. In Europe including Russia five times as much milk is produced as in India with an equal number of milch cattle. It may be very ambitious to strive for a similar efficiency but an objective of doubling the present output in the near future should in no case be regarded as too high. Such a target should rather be regarded as within easy reach and one of the cardinal features of the country's agricultural and food policy.

Other Foods

A doubling of the present output of oil-seeds and a total ban on their exports, together with the development of an oil industry on modern lines will yield the minimum quantities required for human consumption and large quantities of cakes for an improvement of cattle-feed and soil fertility. There is no doubt that such a target is within practicability.

A six-fold increase is envisaged in the supply of flesh foods. It is not possible to look forward to an increased production of meat as it will be extravagant to feed bullocks, sheep, pigs, or goats for conversion into flesh. Pig is said to be the best transformer but it feeds on grain to do well. Obviously, when grain is short for human consumption, it cannot be wasted in feeding pigs. Likewise, fodder crops and concentrates will be required more for conversion into milk and can hardly be available for transformation into flesh. There is, however, some possibility of increased supply of lamb and mutton in the immediate future as a large number of sheep and goats should rightly speaking be eliminated. The main increase under this head has to come by manifold increase in the supplies of fish and a doubling of the present output of eggs.

Emergency Measures

The general food shortage which has arisen in the country and in particular the scarcity that is menacing lives of millions during the current year requires the immediate adoption of certain measures to tide over the situation. Large-scale imports of

grain, particularly rice, would have certainly eased the crisis but considering the present world food situation there is little hope of getting all that the country needs. Yet, there is no room for despondency provided every effort is made to utilize judiciously the supplies available within the country. It may be said at the outset that the present crisis is in no small degree due to panic and lack of co-operation between the several Provinces and States constituting India. Now that a National Government has been formed, it should enforce a common policy in the different parts of the country liquidating deficits with surpluses by a common scale. Without such pooling of the food resources of the country, there may be waste in certain parts while people may starve by millions in others. In other words, different parts of the country are so interdependent for food on each other that any tendency towards separation or independent action in the matter on the part of different units might cause serious bottlenecks resulting in wide-spread loss of human lives. Food administration may be left to the Provinces and States, which will only implement the food policy to be entirely decided by the Centre.

It is not possible to increase food supply overnight or within a few weeks, but it is quite practicable to conserve and distribute the present output more rationally and equitably to last longer and feed more people than it otherwise would. All possible wastes either in consumption, distribution, processing, or conservation must immediately be cut to the minimum. This can be achieved in the following ways:

(1) *Extension of Rationing.*—In spite of an acute shorta'ge of cereals only a minor fraction of the population has been rationed. Apart from the population of large cities, in most of the Provinces and States people are free to buy or use as much as they like—which privilege is often liable to be abused. There are notable exceptions to this which prove that it is possible to ration entire populations including the grower-consumers in the villages, e.g. in parts of Madras and Bombay. Recently, with a view to distributing evenly the burden of the present over-all deficiency of food-grains the cereal ration per adult per day has been reduced in many parts of the country to 12 oz. or 6 chhataks. It should be adopted universally in all States and Provinces and full urban rationing should be introduced in all towns with a population of

50,000 or more throughout the country. For the remaining population too, some form of general rationing on the same scale without unduly adding to the costs of administration should be adopted. To illustrate, people should not be free to purchase or keep more grain than is necessary for their consumption on a fixed scale. In small towns purchases should be regulated by permits issued to individual consumers to the extent of their requirements on this basis.

In towns with a population of a lakh or more it is practicable to include other food articles, particularly meat, fish and eggs besides pulses in the scheme of rationing. The quantities of these flesh foods will differ according to local conditions. In any case, it is extravagant and wasteful to allow the urban non-vegetarians who take meat and/or fish regularly, the same quantity of cereals which is allowed to the vegetarians. There is no room for such distinctions in the smaller towns or villages, but there is every reason to adopt it in the case of the larger cities. The cereal ration of the richer and the meat eating sections of the population in these cities should be reduced to about 8 oz., and the distribution of flesh foods must immediately be rationed.

Compulsory procurement may be found necessary to check hoarding and waste in villages, while a system of monopoly purchases and strict regulation of private trade would prevent smuggling in distribution. Growers, left to themselves, might not bring all their surpluses to the market and scarcity would be accentuated to a very much larger extent than a shortage in output. Provincial and State Governments should not hesitate over implementing measures of compulsory levy and equitable distribution covering all producers, in order to deal with the present emergency.

(2) *Curtailment of Wastes.*—Feasts and marriage dinners, especially among the rich and the middle classes, are associated with much loss of useful food which could otherwise save a large number of people from starvation. These should strictly be avoided during the present emergency. Mere persuasion will not be of much help and, therefore, there should be a legal prohibition for one year at least against feasts of any kind except, say, of 25 to 50 persons on ceremonial and religious occasions. The authorities should not be allowed any discretion in this respect as it is often exercised in favour of those who are in a position

to waste most on account of their wealth, status, or unhealthy influence. It would also be desirable from the same point of yiew to close most of the *bazar* confectionary shops in towns and cities.

Processing of cereals and pulses is sometimes associated with wastes both economically and nutritionally. To illustrate, the outer shell and husk which is removed in the preparation of refined our or pulses is an important food. There should be prohibition against grinding the whole grain either for flour or *dal* without *chunni, chapar, chokar* or *chilka.*

A large amount of food is lost in storage as well as in the fields through the depredations of rats, small birds, insects and fungus pests, pigeons, etc. Construction of improved storage facilities in important assembling markets and large producing and consuming centres must be regarded as an emergency measure to be financed by the respective administrations in the Provinces and States. The Central Government should expedite their construction by grant of subsidies and loans free of interest. Small birds •cause a large amount of loss, while wild animals in the vulnerable areas are a great source of trouble. There are rules practically everywhere for the preservation of game, which in these days of scarcity by causing damage to crops may imply the sacrifice of many human lives. Hence, while it may not be possible to minimize loss by shooting small birds, because they are so numerous and wide-spread, tne damage caused by wild animals can certainly be reduced by allowing farmers freedom and means to kill them wherever there are such restrictions.

(3) *Increased Production.*—In limited cases the present food supply can be supplemented within a few weeks by additional output' In agriculture this is possible by extending the area under double crops, particularly through the cultivation of quick maturing vegetables and grains. It is quite conceivable to have additional summer crops provided water, manure and seeds are available. A way of solving the water difficulties during an emergency is the construction of *kachcha* wells wherever possible which can very well irrigate a compact area of an acre or so. The upper and middle Ganges Valley offers a very good scope for such exploitation. A non-masonry well here can be easily dug within a week by three or four men, enabling the cultivation of an acre of vegetables or maize during the summer months. The supply

from the existing masonry wells can be increased immediately by borings of 4″ to 6′. By ordinary methods drilling of bores cannot be expedited but if a number of drilling machines of the percussion type are made to work, it is possible to finish borings in all the districts within a short time. Finally, the irrigation capacity of many wells during the summer remains limited due to the lack of lift power which at present is largely manual or animal. It is possible to have mechanical pumping sets fitted on lorries and trucks which may move from well to well and village to village according to requirements. Let each village having a sufficient number of masonry wells have a mobile set of this type used on co-operative lines by all the cultivators. The cost in the beginning should be met by the Provincial or State Government concerned and realized later on from the village society through a system of lease-lend. The United Provinces, Bihar, and the Punjab can set an example in this respect. Regarding borings in the existing wells, it should primarily be the responsibility of the Provincial Governments and the farmers should be charged the actual costs of pipes, while all sundry expenses should be met out of public funds. It is not possible to construct new wells on any large scale immediately, but Government should encourage their construction by individuals by grants of suitable subsidies. *Kachcha* wells which offer the largest scope for improving the water supply immediately should not be left to the initiative of an individual farmer. A subsidy will give little encouragement as out-of-pocket expenses for digging such wells are small and money is regarded cheap by the farmers. Voluntary squads should be organized on a mass scale to work in the villages and dig out such wells- on holdings of those cultivators who show interest in having catch crops. The army can play a great role in this respect and give a noble lead. All these efforts in improving water supply from the sub-soil will immediately add to the output of crops.

These should be supplemented by organizing supplies of all kinds of manures, so essential in the cultivation of vegetables and quick-maturing of crops. Besides, when applied to ordinary crops, the yield increases appreciably. Chemical fertilizers, oil-cakes, compost made from town refuse, should be made available to the farmers in as large quantities as practicable and at rates which can be easily borne by the farmers, the balance of cost being debited to public funds. It will be an indirect subsidy which

need not be for long, for as soon as the farmers learn the advantages of manuring they will willingly pay the full cost. Manure supply at concession rates will not in itself be a temptation to the farmers unless there are trained men to demonstrate their use to them. Arrangements should also be made for the supply of good seed in the case of vegetables and for large-scale demonstrations in the cultivators' plots.

The supply of flesh foods, particularly of fish, can also be increased immediately. It requires the use of better equipment as in the case of sea fisheries, as well as better organization and personnel. As in agriculture, here too, the Army can be of great assistance and no possibility should be left unexplored in this direction. Lastly, the present scarcity can well be utilized to transform the large number of decrepit and useless cattle and goats into good flesh through the establishment of controlled slaughterhouses and abattoirs with a complete prohibition of slaughter of useful and approved breeds.

Food Planning

The emergency measures should be followed up by a food programme to be drawn up cautiously and executed relentlessly. The essential features of such planned food economy would be as follows:

(i) A Planning Authority should be set up to draw up a plan up to the last holding or unit and to be responsible for its final execution. It may consist of an expert personnel at the Centre with a parallel organization in each Province and State. The Central body would produce the National Plan indicating the targets to be arrived at within a given period by the separate units in the general sphere of production. The Provincial and State Food Planning authorities would fill in the details of these outlines, making a blueprint for each village separately. Unless there are the village plans and an authority entrusted with the obligation and powers of their execution any planning on a national or provincial scale would not pass beyond the regions of academic discussions. In the villages some form of corporate authority will have to be established responsible to the regional and provincial authority for the execution of the Plan. It may be a *panchayat* or a co-operative society comprising all villagers on a compulsory basis but invariably armed with sufficient authority to compel

execution of its programme from the individuals whom it will represent. Planning cannot succeed with free scope for individual obstinacy or default and hence, willy nilly, has to be associated with compulsion. Propaganda and education have their utility but exclusive reliance cannot be placed on voluntary effort in a system of planned economy worth the name.

(ii) The topmost priority in public works ought to be assigned to irrigation works, because nothing will add so much to agricultural security and output as water supply. It is the most urgent need of Indian agriculture and should be regarded as a primary duty of the State. The execution of Protective Works, which from a narrow financial point of view cannot be paying, should not be postponed on that account. Loans might equally be utilized for the finance of such schemes together with productive works.

(iii) Efforts have to be made to supplement manures mostly by chemical fertilizers in addition to oil-cakes and compost. As soon as these are available, propaganda for their use should be supported by distribution at concessional rates or even free of cost in the first year on the one hand and guarantee of return, on the other. It has been estimated by the authors of *A Food Plan for India* that we could increase within 7 years our annual food production from 6 to 7 -5 crore tons by a resolute application of modern technology depending largely on a subsidized use of sulphate of ammonia to the extent of some 6,00,000 tons on irrigated areas and areas of good rainfall. The authors have recmmended subsidy on a graduated scale, beginning from no price to be charged in the first year in a new area, half for the second year, and so on. The subsidy would amount to Re. 1-8 per maund on an average, with a total of Rs. 13.5 crores on 9 crore acres at the rate of a maund of fertilizers per acre. This is likely to give quickest returns but it has to be remembered that chemical fertilizers have little use and may even damage crops without an assured and copious water supply. It will, therefore, not be wise or even practicable to use them outside the irrigated areas.

(iv) Little progress is possible with the present methods of farming. The cultivator with his spade seems to have walked in from ancient India standing clumsily in the way of the scientific farmers of the twentieth century. The bullock can no longer carry the burden of modern India. Power pumps, tractors, digging machines, harvesters, creameries, trucks and lorries,

elevators and the processing plants are all urgently required to revolutionize Indian agriculture to enable it to play its proper role in national economy. Villages must have their machinery pools for both agricultural and dairy production. These may be had by the farmers either on a co-operative or a collective basis, an advance being made in each case by the State. Individual small-scale farming is inconsistent with mechanization and even the much-talked of consolidation of holdings means little progress from this point of view. Farmers will have to be organized either on a co-operative or a collective basis, beginning perhaps with the former and gradually working up to the ideal. During the period of transition villages must be given the option of combining themselves into a co-operative unit within a specified time, at the expiry of which their holdings should be collectivized, if they fail to establish a co-operative farm consisting of the entire village area. It is wrong to believe that rice husbandry succeeds best under small-scale and peasant-proprietorship. All villages should be converted into economic cultivation units having a requisite set of machinery and implements. Mechanization would of course release a tremendous amount of leisure due to the high density of population and lack of alternative employment, creating new social problems. These can however be satisfactorily solved by utilizing leisure and surplus energy for the educational, moral and cultural advancement of the community.

As a pre-requisite to the farm organization visualized above, abolition of the rentier class and private money-lending would be imperative. Monopoly rights in land in favour of actual farmers only, without any reservation for the so-called home 'farm lands cultivated usually by hired labour, may be allowed; but even such rights might have to be nullified to secure collectivization where co-operation fails to develop. In brief, the rights of all intermediaries in land, be they Jagirdars, Taluqdars, Zamindars or Patris, must be taken up immediately by the State on payment of an adequate compensation, to which they are entitled so long as wholesale nationalization of industry without compensation is not effected. The State may well make the payment by instalments as it realizes income from these interests. Trusts would be organized to finance newly organized agricultural farms and the private money-lenders might contribute their funds into them. These must be largely under State control.

(v) For" quick results in improved breeding artificial insemination together with compulsory castration should be adopted on a wide scale to develop good milk-yielders. A dual-purpose cattle is often not the best for dairying.

(vi) Prices should be stabilized at a fair parity to safeguard against any restrictive influences. A proper balance between farm and industrial prices is absolutely essential in order that an all-round development may be sustained. This parity should be established at such a level that a worker is able to enjoy equal advantages as compared to another in a profession other than his own. In the case of farm products prices due to the diversity of conditions of production cannot be based entirely on expenses of production but must secure such parity with industrial prices as to safeguard a fair standard of living for the cultivators.

(vii) Planning should not be confined to the field of production but should be extended to distribution. Without an equitable system of the latter glut and scarcity often go together.

(viii) Also, a Central Food-grain Reserve of nearly 50 lakh tons would form a necessary feature of planning. The stocks in the Reserve would be distributed throughout the country and might be kept in thousands of seed stores for rural communities and in warehouses for urban population to meet requirements in years of drought or scarcity. Such a Reserve can be utilized with great advantage for stabilization of prices as well.

(ix) Finally, anti-malarial measures should be undertaken on an effective scale as part of a food programme. Malaria lowers efficiency of labour in large parts of the country and prevents at present an extension of the area under cultivation. Malariologists, anti-malaria engineers, entomologists, and malaria agronomists should co-operate in the seriously affected and the threatened areas to control and prevent malaria.

Food Policy

The last Famine Inquiry Commission emphasized that the State should recognize its ultimate responsibility to provide enough food for all. They point out that the Governments in India have within the last 100 years accepted the duty of preventing widespread death from famine but the further obligation of taking every possible step not only to prevent starvation, but to improve

nutrition and create a healthy and vigorous population, has not yet been fully recognized and accepted.

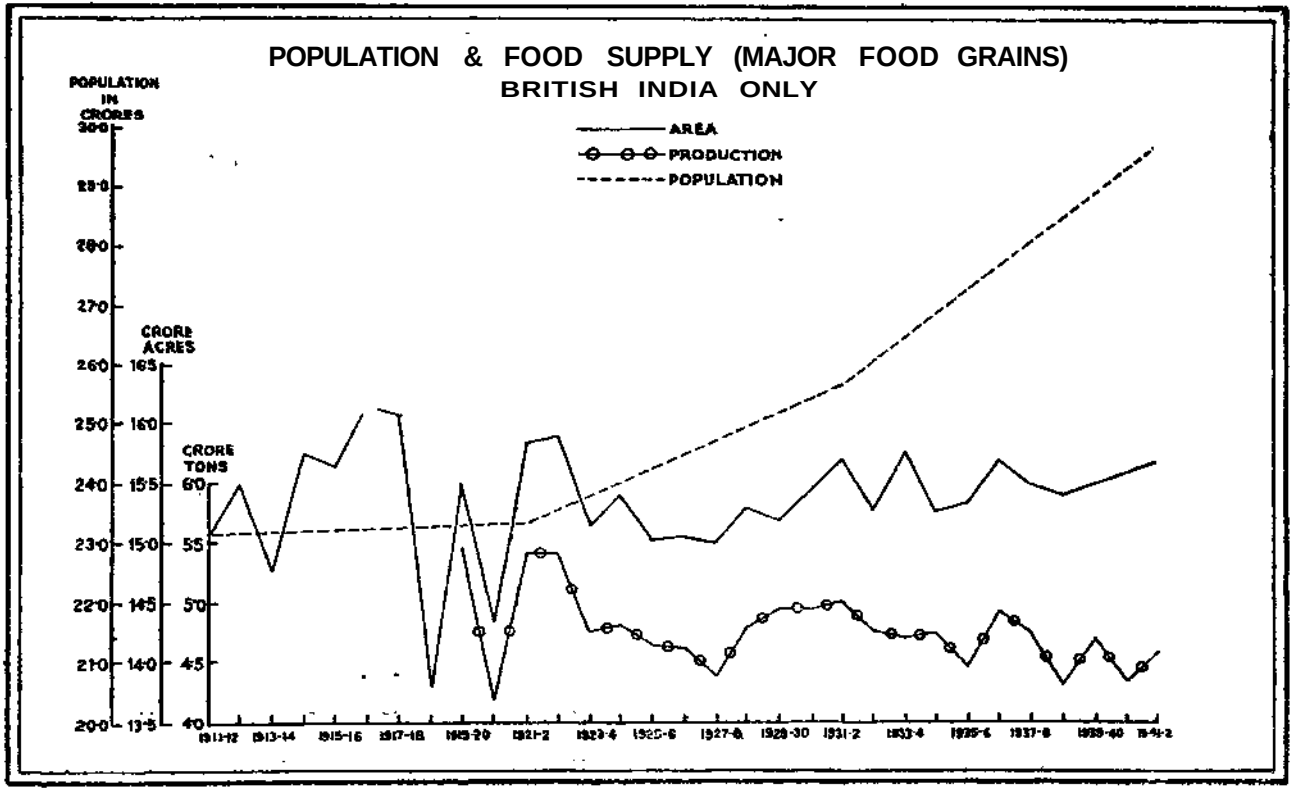
Self.sufficiency only in cereals would be a poor objective of a national food policy, which should be based on a recognition of the principle of State responsibility of providing enough for nutri. tion at a satisfactory level for all its subjects. Hence, equally with food.grains, self.sufficiency in other foods, which are so essential for a balanced diet, say milk, fats, vegetables, fruits and eggs, should be one of the cardinal aims of the food policy and an essential task to be undertaken by Governments.

To increase food resources, besides measures of increasing production directly, soil stabilization and anti.erosion schemes on a large scale must be adopted. There ought to be a permanent organization to save land, which is being snatched away from cultivation almost in front of our very eyes. Extensive measures against erosion and water logging would be required, while a Land Utilization Commission may proceed with the task of reclamation and improvement.

A food policy aimed at improving the diets of people cannot succeed without a clear recognition of the underlying economic unity of the country with a strong and responsible Government at the Centre. Any separation of units or weakening of the Central Government will render the parts more liable to famines and scarcity than at present. In fact, Burma and India should enter into a treaty rendering the recent separation of the former ineffective. India should strive for a closer co.operation among all the countries in the Pacific as an essential feature of her. food policy, offering her people as equal partners to settle on new .lands which have hitherto remained uninhabited and isolated due to the lack of man.power. Such a policy will add tremendously to the world food resources, although many Indians would be required to leave their homes permanently.

An improvement in food resources without a simultaneous effort for a proper distribution cannot succeed in raising nutri. tional standards or even in fighting out under.nutrition, starvation and famine. On the contrary it may end in a slump like that of the thirties. To guard against such grave eventualities a system of differential prices will be necessary. The food prices should remain fair but it does not inevitably follow that all classes of consumers must pay at the same rate at which supplies are

procured from the producers. The sellers' prices may be too high for the poor and the unemployed. The entire agricultural enterprise should not be made to suffer by a general reduction in farm prices to suit the pockets of the poorest in the country and the depressed by a restrictive economy, which will react very unfavourably on industry and commerce as well. On the other hand, none should be denied food because of the high prices. The best solution would be to subsidize distribution of foodstuffs for people not earning enough to be able to purchase adequate quantities at ordinary prices. They should get their supplies at specially reduced rates through Government stores meant for the purpose. The food policy should aim further at reducing their number by adopting a programme of employment for all and laying down minimum wages. Only a vigorous pursuit of such comprehensive food policy can raise the nutrition standards and save millions from actual hunger, starvation and death.


POPULATION & FOOD SUPPLY (MAJOR FOOD GRAINS)
BRITISH INDIA ONLY
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PRODUCTION
POPULATION
POPULATION IN CRORES
CRORE ACRES
CRORE TONS
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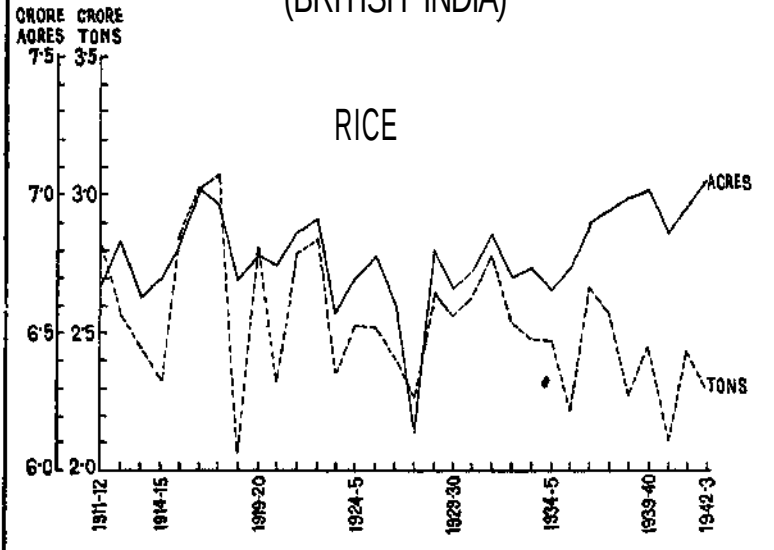
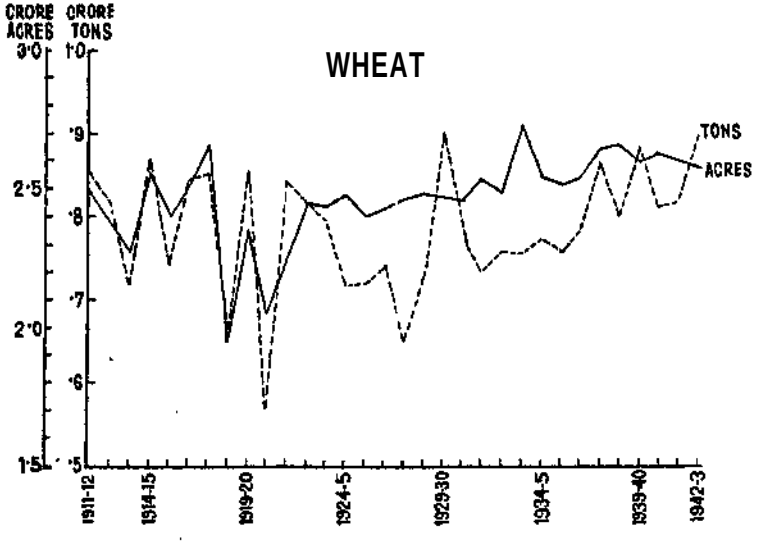
IRREGULARITY IN ACREAGE AND PRODUCTION (BRITISH INDIA)





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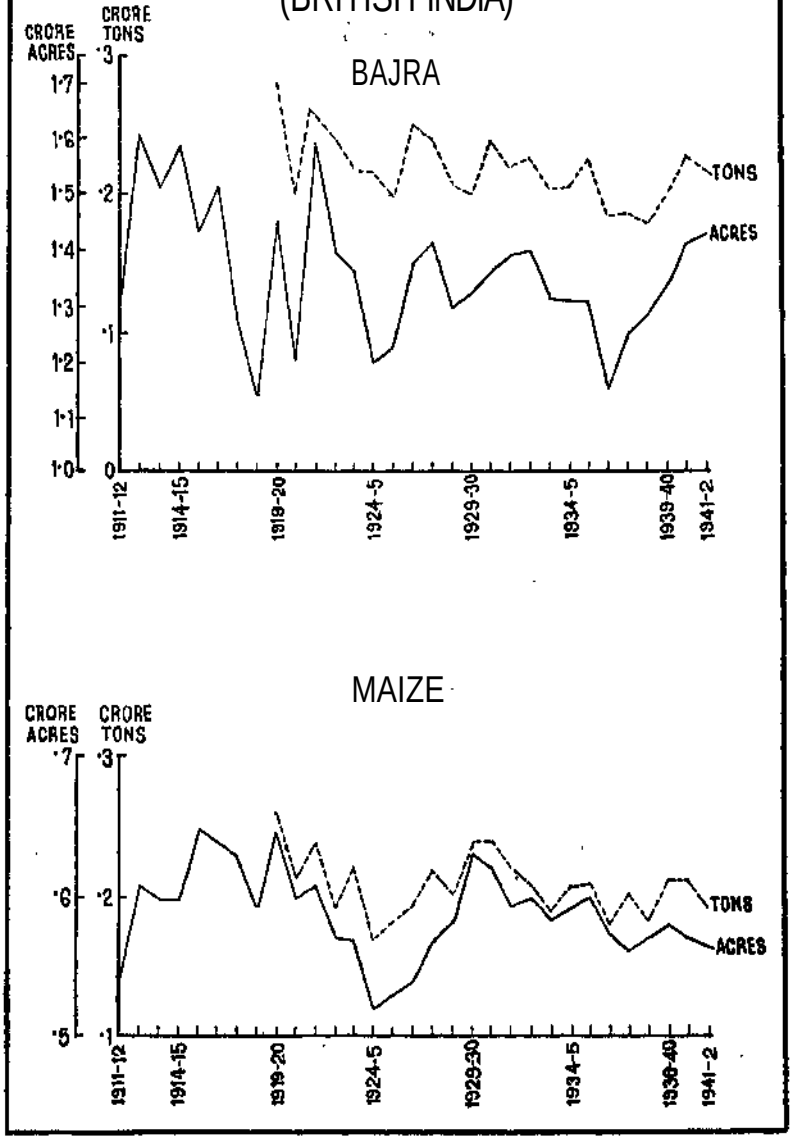

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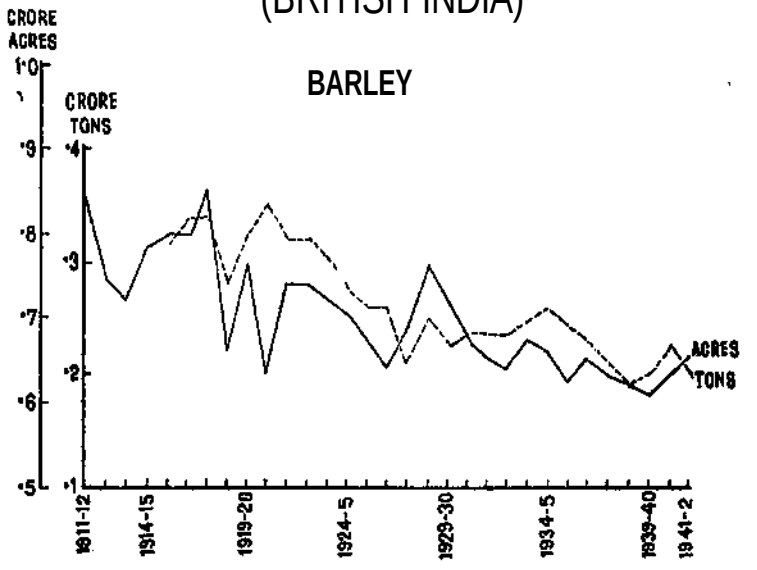

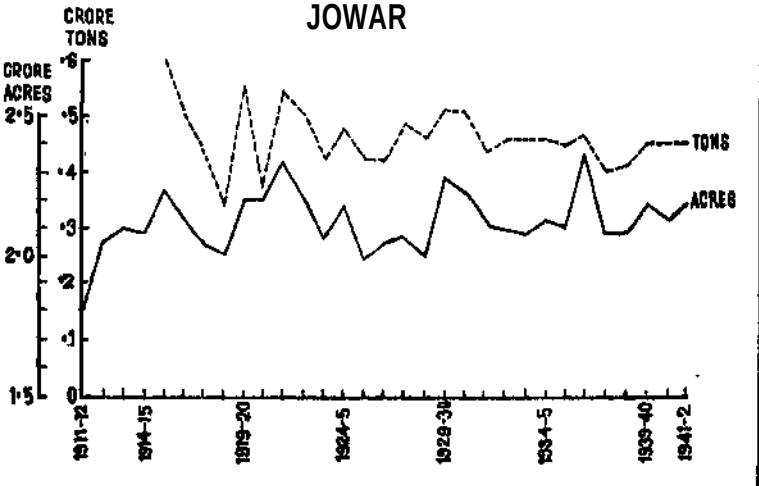

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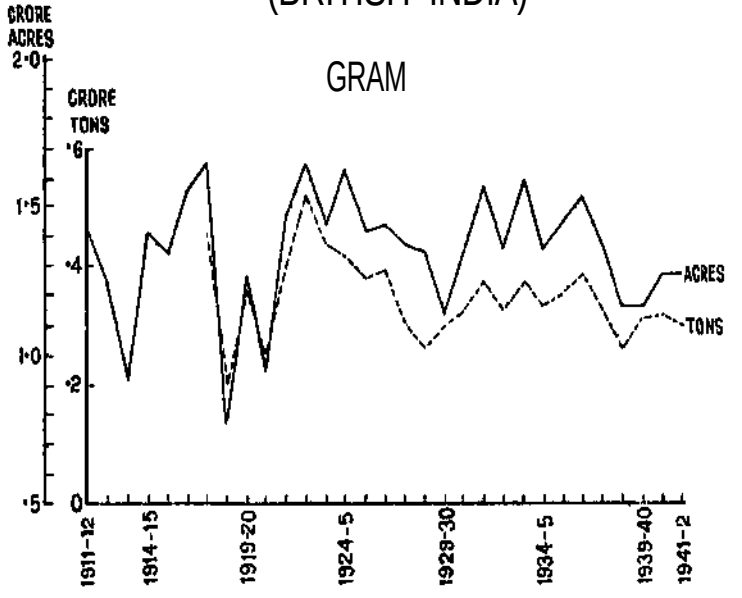

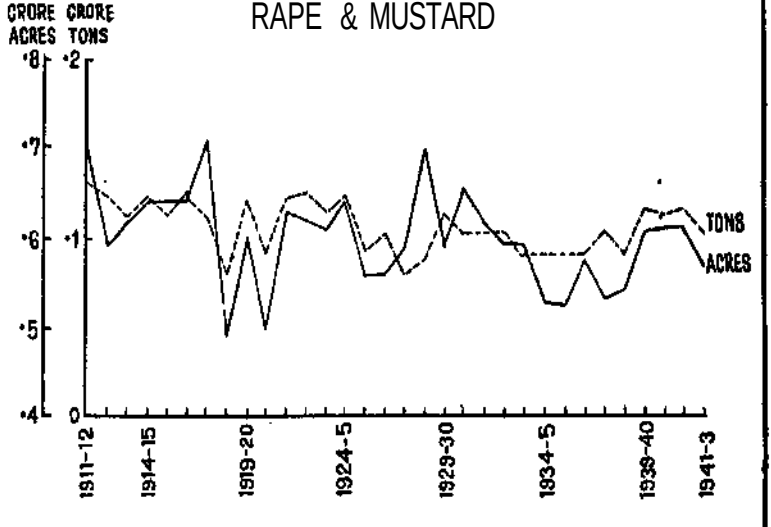

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