# Demand for Food in Pakistan in 1975

*by*

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## INTRODUCTION

The recent developments in the agricultural sector of Pakistan, especially in the West Wing, have created great optimism for increasing food supply. The significance of increasing food supply should, however, be judged in relation to the rising demand for food during the process of economic growth and foreign-trade opportunities for food. Therefore, when planning for agricultural development to raise food supply, it is vitally important that the future levels of demand for food are accurately predicted. Since priorities and investment targets have to be based on demand forecasts for different commodities, demand prediction is essential for development planning.

The purpose of this study is to project the future levels of demand for important food items in Pakistan and then analyse the significance of those demands for future agricultural development in Pakistan.

Demand projection requires, among other things, reliable estimates of income elasticities of demand for commodities. In the case of demand for food in developing countries, the problems of projection are compounded by many factors among which the most notable are: *i*) rapidly growing population; *ii*) rapid pace of industrialization and urbanization; *iii*) changing preferences regarding diets due to demonstration effects brought about by international and interregional movement of people as well as government policy of large price differential, for example, between rice and wheat to induce wheat consumption

in East Pakistan; *iv*) increasing monetization of the economy; and *v*) advances in nutritional science coupled with the world-wide concern for ensuring nutritionally adequate diets to all inhabitants of the world.

Under the conditions that now exist in Pakistan, it is reasonable to expect that fairly rapid increase in per capita incomes[1] and associated changes in food-consumption patterns will lead to significant improvements in nutrient-intake levels as well as in the economic satisfaction associated with qualitative improvement in diets as the desire and nutritional "requirements" for more expensive foods are translated into effective demand. We shall try to indicate the implications of such demand changes for production planning and throw some light on the reorganisation of Pakistan's agriculture that is likely to be optimal in order to exploit the new possibilities that are being opened up as supply functions are shifted rightward.

## II. THE DEMAND FOR FOOD

In this study, we are concerned with the demand for food at the given level of income and population. We believe that the estimation of food requirements based on dietary standards has limited significance in planning for food production and distribution in an individualistic economy. The reasons are: *i*) any procedure for estimating food needs is likely to be unsatisfactory because estimating requirements for nutrients is only a first step to establishing food needs since there are infinite combinations of food items that will satisfy a set of nutritional requirements; *ii*) this sort of target setting — in terms of nutrients or commodities — is not an interesting thing to emphasise; and *iii*) the consumers themselves take care of their nutritional needs within their given incomes. We shall, therefore, estimate the demand for food items in 1975 at the given level of income and population without any consideration of the nutritional needs of the population.

### a) The Projection Model

For projecting the demand for individual food items, we use a simple static model in which income is the only predictor[2]. Our model makes use of the Engel's curves estimated from cross-section data[3]. The aggregate demand

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[1]The growth rate in per capita income has risen steeply in 1967/68. Preliminary estimates for 1967/68 show that GNP grew at 7.0 per cent, thus giving a 4.2-per-cent rate of growth in per capita income in Pakistan during 1967/68 compared to 1.9 per cent in 1965/66 [10; 11, Pp. 2-3].

[2]The projected demand levels are modified by introducing factors other than per capita income and population at a later stage in the study.

[3]For the justification of the particular forms of the Engel's curves, and for the estimated Engel's curves, *see* [6].

for a commodity is estimated with the help of the following equation:

$$D_{it} = [f_i(y_t)] P_t$$

where

$D_{it}$ = aggregate demand for a food item "i" in year "t"

$f_i(y_t)$ = functional relationship between per capita consumption of a food item "i" and per capita income in year "t"

$P_t$ = total population in year "t".

Because of the uncertainties regarding future rates of growth, it is advisable to show the likely range of the levels of demand rather than one level of demand in 1975. For this reason, we shall project food demand under alternative projections of population and per capita income (high and low).

*i) Population:* The future course of population growth in Pakistan has been estimated under four alternative assumptions regarding birth and death rates by the Bureau of the Census, United States Department of Commerce [2]. We select the two projections based on declining mortality; the projections based on constant mortality were thought to be not very plausible. Of the two projections selected, one, which we will refer as "high", is based on the assumption of constant fertility while the other referred to as "low" is based on the assumption of declining fertility [2, p. 6]. The Bureau projected the urban population by "extrapolations of changes in the proportion urban" [1, p. 27]. The rural population is obtained as residual. The population projected for the two wings along with rural and urban breakdowns is shown in Table I.

*ii) Income:* The per capita income in East and West Pakistan was found to have grown at the annual rate of 2.7 and 2.4 per cent, respectively, during the second-five-year-plan period (1960-65) [10, p. 11]. The trend in growth rate during the first three years of the Third Five-Year Plan indicates that the annual growth rate during the decade 1965-75 is likely to be higher than the one realized during the period of the Second Plan[4]. And, since the Perspective Plan visualizes to equalise the per capita income in East Pakistan and West Pakistan, there is a conscious effort in the Perspective Plan to allocate higher investment funds in East Pakistan in comparison to West Pakistan [10, Pp. 35-36]. It is, therefore, likely that per capita income in East Pakistan will grow faster than in West Pakistan. Accordingly, we assumed minimum annual rate of growth of 3.7 and 2.6 per cent in East and West Pakistan during the decade 1965-75 and a maximum growth rate of 4.4 per cent for West Pakistan and 5.4 per cent for East Pakistan during the same decade.

On the basis of the rate of growth of regional per capita income and the expected direction of future investments in Pakistan, we determine, in each

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[4]The annual rate of growth of per capita income in Pakistan was 1.9 per cent in 1965/66, 2.4 per cent in 1966/67 and 4.2 per cent in 1967/68 [11, p. 3].

## TABLE I

**PROJECTED POPULATION OF DIFFERENT AREAS OF PAKISTAN (1965 and 1975)**

| Year | East Pakistan | | | West Pakistan | | |
|------|-------|-------|-------|-------|-------|-------|
| | Rural | Urban | Total | Rural | Urban | Total |
| **1965** | | | | | | |
| Population (000) | 60,018 | 3,382 | 63,400 | 39,803 | 12,397 | 52,200 |
| Percentage distribution | 94.7 | 5.3 | 100.0 | 76.3 | 23.7 | 100.0 |
| **1975** | | | | | | |
| Population | | | | | | |
| High (000) | 85,285 | 5,615 | 90,900 | 51,962 | 20,838 | 72,800 |
| Low (000) | 79,902 | 5,298 | 85,200 | 48,573 | 19,527 | 68,100 |
| Annual growth rate | | | | | | |
| (1965-75) | | | | | | |
| High (%) | 3.6 | 5.2 | 3.7 | 2.8 | 5.4 | 3.4 |
| Low (%) | 2.9 | 4.6 | 2.9 | 2.1 | 4.7 | 2.3 |
| Percentage distribution | | | | | | |
| High | 93.8 | 6.2 | 100.0 | 71.4 | 28.6 | 100.0 |
| Low | 93.8 | 6.2 | 100.0 | 71.3 | 28.7 | 100.0 |

*Source:* [2, Pp. 9 and 27].

region, the rate of growth of rural and urban per capita income on the principle that the weighted average of the rural and urban growth rates in a region must equal the growth rate for the region as a whole[5]. These rates of growth along with per capita income in 1965 and 1975 are presented in Table II.

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[5]We specified a higher growth rate in urban than in rural East Pakistan because of the government's commitment to equalize the per capita income in the two wings of Pakistan and the very strong political pressure on the government to industrialize East Pakistan as fast as possible in order to bring East Pakistan at West Pakistan's level of industrial development. As a matter of fact, the government is allocating larger share of its development expenditure to East Pakistan and providing incentives to private capitalists to locate their factories in East Pakistan. (For greater details, *see* [11].) Similarly, we specified a higher growth rate in rural than in urban West Pakistan because of recent dynamism in West Pakistan's agriculture.

## TABLE II-A

### ANNUAL RATES OF GROWTH OF PER CAPITA INCOME IN DIFFERENT AREAS OF PAKISTAN

|  | East Pakistan | | West Pakistan | |
|---|---|---|---|---|
|  | High | Low | High | Low |
| Realized growth rate (1960-65)* | — | 2.7 | — | 2.4 |
| Perspective Plan's growth rate (1965-70)* | 5.8 | — | 4.2 | — |
| Assumed growth rate (1965-75) | | | | |
| Overall | 5.4 | 3.7 | 4.4 | 2.6 |
| Rural | 5.2 | 3.4 | 4.9 | 3.0 |
| Urban | 8.0 | 4.2 | 2.7 | 1.8 |

*[10, Pp. 11 and 29].

## TABLE II-B

### PER CAPITA INCOME IN DIFFERENT AREAS OF PAKISTAN

*(in 1963/64 prices)*

| Year | EAST | | | WEST | | |
|---|---|---|---|---|---|---|
|  | Overall | Rural | Urban | Overall | Rural | Urban |
| 1965 | 347 | 340 | 464 | 450 | 438 | 491 |
| 1970 | | | | | | |
| High | 451 | 438 | 682 | 558 | 556 | 561 |
| Low | 416 | 402 | 570 | 512 | 508 | 537 |
| 1975 | | | | | | |
| High | 592 | 569 | 944 | 698 | 713 | 661 |
| Low | 495 | 471 | 687 | 576 | 583 | 585 |

It should be noted that the rates of growth of per capita income assumed in this study are not the same as assumed by the Planning Commission. As a result, the projected per capita incomes in this study are different from the ones estimated by the Planning Commission. For example, the Fourth Five-Year Plan (1970-75) benchmark figures (in current prices) for per capita income in East and West Pakistan are 492 and 787 rupees, respectively, whereas

our estimates show that the per capita income in 1970 (in 1963/64 prices) in East and West Pakistan shall be 451 and 512 rupees, respectively[6].

### b) Projected Demands in 1975

The demands predicted in 1975 on the basis of rural and urban parameters are presented in Tables III (for Pakistan) and IV (for East and West Pakistan). The predicted demand for wheat varies between 12.6 to 11.6 million tons; it varies between 792 to 687 thousand tons in East Pakistan and between 11.9 to 10.8 million tons in West Pakistan. The predicted demand for rice in 1975 varies from 18.1 million tons to 16.2 million tons. The tables show that the demand for rice varies significantly with respect to population as well as income growth while the demand for wheat varies largely because of the growth of population. This is simply because of the difference in elasticities for rice and wheat.

The future demand for other food items is significantly affected by the future rate of growth of per capita income as well as future levels of population. The minimum predicted demand for milk in 1975 is 5.59 million tons, the maximum being 6.86 million tons. The future demand for beef may rise up to 500 thousand tons (227 in East and 273 in West Pakistan). Similarly, the demand for sugar may not be less than 326 thousand tons (72 in East and 254 in West Pakistan).

## TABLE III

### PROJECTED DEMAND FOR FOOD ITEMS IN 1975 IN PAKISTAN

| Food items | Demand levels in 1965 | Population projection → | High | | Low | |
|---|---|---|---|---|---|---|
| | | Income growth rate → | High | Low | High | Low |
| | | ( . . . . . . . . . . . . . . . . . . . . . . . .*in thousand tons*. . . . . . . . . . . . . . . . . . . . . . ) | | | | |
| Wheat | 8,520 | | 12,611 | 12,350 | 11,797 | 11,553 |
| Rice | 10,481 | | 18,082 | 17,307 | 16,942 | 16,215 |
| Milk | 2,913 | | 6,863 | 5,968 | 6,423 | 5,586 |
| "Ghee" and butter | 203 | | 434 | 382 | 406 | 358 |
| Mutton | 133 | | 345 | 294 | 323 | 276 |
| Beef | 259 | | 500 | 441 | 468 | 413 |
| Fish | 741 | | 1,210 | 1,162 | 1,135 | 1,085 |
| Chicken | 94 | | 237 | 197 | 224 | 184 |
| Sugar | 153 | | 416 | 347 | 390 | 326 |
| Tea | 23 | | 59 | 55 | 54 | 51 |

[6]The benchmark figures for per capita income are obtained from the panel report on Fourth Five-Year Plan (1970-75).

TABLE IV

**PROJECTED DEMANDS FOR FOOD ITEMS IN 1975 IN EAST AND WEST PAKISTAN**

| Food items | | Demand levels in 1965 | Population projection → | | High | | Low | |
|---|---|---|---|---|---|---|---|---|
| | | | Income growth rate → | | High | Low | High | Low |
| | | (.................... *in thousand tons* ....................) | | | | | | |
| Wheat | East | 657 | | | 732 | 792 | 687 | 743 |
| | West | 7,863 | | | 11,879 | 11,558 | 11,110 | 10,810 |
| Rice | East | 9,676 | | | 16,568 | 15,912 | 15,526 | 14,910 |
| | West | 805 | | | 1,514 | 1,395 | 1,416 | 1,305 |
| Milk | East | 670 | | | 2,002 | 1,805 | 1,877 | 1,693 |
| | West | 2,243 | | | 4,861 | 4,163 | 4,546 | 3,893 |
| "Ghee" & butter | East | 7 | | | 16 | 14 | 16 | 14 |
| | West | 196 | | | 418 | 368 | 390 | 344 |
| Mutton | East | 35 | | | 94 | 85 | 89 | 80 |
| | West | 98 | | | 251 | 209 | 234 | 196 |
| Beef | East | 98 | | | 227 | 195 | 213 | 183 |
| | West | 161 | | | 273 | 246 | 255 | 230 |
| Fish | East | 706 | | | 1,099 | 1,059 | 1,031 | 988 |
| | West | 35 | | | 111 | 103 | 104 | 97 |
| Chicken | East | 77 | | | 190 | 156 | 179 | 146 |
| | West | 17 | | | 47 | 41 | 45 | 38 |
| Sugar | East | 21 | | | 105 | 76 | 99 | 72 |
| | West | 132 | | | 311 | 271 | 291 | 254 |
| Tea | East | 3 | | | 19 | 18 | 17 | 17 |
| | West | 20 | | | 40 | 37 | 37 | 34 |

**c) Adjustments for Other Factors**

*i) Rapid Urbanization:* There is a considerable differential in urban and rural diets and negative income elasticity of demand for wheat and beef has been found in urban West Pakistan [6]. The starch-staple ratio is higher in rural than in urban areas and income elasticities of demand for food items show considerable differentials between rural and urban areas [6]. The demand pattern is, therefore, likely to change as the weight of the urban population increases rapidly with the pace of industrialization and urbanization. We shall examine this when we consider the impact of rural monetization on the predicted demand patterns.

*ii) Monetization:* Since total consumption of rural families consists mostly of self-produced goods, their consumption behaviour with respect to income may not be the same as it is for those who receive cash income and who

fulfil their consumption requirements from a much wider range of available goods and services. Given the limited range of choice presently available to the rural consumers, it is likely that rise in the proportion of cash income in the course of economic development will have a significant impact on the consumption patterns.

To study the impact of monetization on the future demand patterns, we assume that a rural resident behaves like his urban counterpart when he receives "income in cash" and spends a part of his cash income to fulfil his food requirements. In other words, he will have the same income elasticity of demand for food items as his counterpart in urban areas when he receives "income in cash". The plausibility of the above assumption is based on the following theoretical and empirical considerations. If the same range of goods and services is available in both rural and urban areas, and if the rural people receive their income in cash like the urban people, urban and rural consumers in the same income brackets must be alike with respect to their consumption behaviour unless their preference functions are different from each other and relative prices differ between urban and rural areas. It has been shown elsewhere that the rural consumers have a tendency to shift their preference function closer to the preference function of urban consumers with regard to the consumption of food items because of increasing contact of rural population with urban population [6]. It is, therefore, quite likely that the preference function of the monetized section of the rural population is very much like the preference function of the urban consumers with respect to the consumption of food items. This is also supported by the comparison of the consumption patterns of urban residents getting average urban income and rural residents getting incomes higher than average per capita income in rural areas. Table V shows that in West Pakistan the allocation of total food expenditure on different food items by rural residents receiving more than average rural per capita income is quite similar to the allocation made by urban residents receiving average urban income. In East Pakistan, however, there is significant difference with respect to the consumption of rice; the rural residents in high income groups spend significantly greater proportion of their food expenditure on rice in comparison to the urban residents with average income levels. This may be an indication of lesser rural monetization in East in comparison to West Pakistan.

As regards the relative prices, significant differences are likely to be observed because of underdeveloped transport system. But the gap in relative prices is likely to be narrowed down with the pace of economic development. Moreover, the underdeveloped transport system creates a gap between relative prices of food and nonfood items in urban and rural areas but not so much between food items themselves, because rural areas consume food items most of which are locally produced whereas urban areas consume food items all produced and transported from outside. There may, however, be a large difference in

## TABLE V

**PERCENTAGE DISTRIBUTION OF MONTHLY FOOD EXPENDITURE ON SELECTED FOOD ITEMS IN 1963/64**

| Food items | East Pakistan | | West Pakistan | |
|---|---|---|---|---|
| | Rural (above average income groups) | Urban (average income groups) | Rural (above average income groups) | Urban (average income groups) |
| Wheat | 1.8 | 4.7 | 28.3 | 25.5 |
| Rice | 52.1 | 40.9 | 4.3 | 5.5 |
| Milk | 6.4 | 5.1 | 13.2 | 12.0 |
| "Ghee" and butter | 1.5 | 1.3 | 14.3 | 7.2 |
| Mutton | 2.5 | 1.5 | 3.7 | 5.3 |
| Beef | 1.6 | 2.2 | 1.2 | 2.5 |
| Fish | 6.0 | 8.5 | 0.1 | 1.0 |
| Chicken | 1.4 | 1.3 | 1.5 | 0.4 |
| Sugar | 0.3 | 1.6 | 1.6 | 5.2 |
| Tea | 0.5 | 1.7 | 2.0 | 2.7 |

*Source:* [8].

the range of goods and services available to rural and urban consumers. The range of available goods and services is partly dependent on effective demand for goods and services. It is not uncommon for a small rural producer to take his vegetables, fruits, livestock products, poultry and eggs to nearby town to sell because of the lack of effective demand for these food items in his village[7]. Monetization of the rural sector is likely to create effective demand for the products of such small producers and make it profitable for them to sell their produce in the village itself. The indications are, therefore, that the monetized rural population is likely to behave like its urban counterpart as far as food consumption is concerned.

Since the monetized section of the rural population is assumed to have the same income elasticities as the urban population, monetization may be taken as equivalent to urbanization in regard to demand changes. Hence, the likely extent of rural monetization can be added to expected urbanization and the combined effect may be incorporated in the basic-demand projections. Since,

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[7]It is often observed that a rural person receiving significant cash income sends someone to a nearby town to buy meat if meat is not available in the village.

however, we do not know the precise extent of rapid urbanization and rural monetization, we can make qualifications for unexpected high rates of urbanization and rural monetization in the following way.

Let

$c$ = per capita consumption of a food item "i"

$r$ = rural at the 1965 level of monetization

$m$ = rural at the 1975 level of monetization

$u$ = urban

$t$ = terminal year

$o$ = initial year

$\emptyset$ = weight of the rural population monetized between 1965 and 1975 in the total rural population

$\theta$ = weight of the urban population in the total population.

Then, if rural monetization and urbanization are considered together[8]

$$c_t = \theta_t c_{ut} + (1 - \theta_t) c_{mt}.$$

But
$$c_{mt} = c_{ro} + \emptyset_t (c_{ut} - c_{ro}) + (1 - \emptyset_t)(c_{rt} - c_{ro})$$
$$= \emptyset_t (c_{ut} - c_{rt}) + c_{rt}.$$

Therefore, $c_t$
$$= \theta_t (c_{ut} - c_{rt}) + \emptyset_t (c_{ut} - c_{rt}) - \theta_t \emptyset_t (c_{ut} - c_{rt})$$
$$= (c_{ut} - c_{rt})(\theta_t + \emptyset_t - \theta_t \emptyset_t).$$

The above equation shows that the extent of the influence of $\theta_t$ and $\emptyset_t$ on $c_t$ is determined by the sign and the magnitude of the differential $(c_{ut} - c_{rt})$. But the differential $(c_{ut} - c_{rt})$ in our projection model is governed by the differentials in the initial consumption levels $(c_{uo} - c_{ro})$, in income growth rates $(g_u - g_r)$ and in income elasticities of demand at the level of income in year "t" $(c_{ut} - c_{rt})$. It is, therefore, very important that all the three differentials are known before one makes an assessment of the impact of rapid urbanization on the future demand patterns. These differentials in the initial-year consumption levels and in income elasticities of demand are shown in Table VI.

It seems that the neglect of rural monetization/rapid urbanization in East Pakistan results in the underestimation of demand for all food items except rice, while the neglect of rural monetization/rapid urbanization in West Pakistan results in overestimation of demand for wheat, rice, milk, beef and tea; it also results in underestimation of the demand for other food items in West Pakistan and overestimation of the demand for rice in East Pakistan. Thus, rural monetization/rapid urbanization in East Pakistan will decrease the demand for rice and increase the demand for all other food items from the levels predicted in subsection c) above. Similarly, rural monetization/rapid urbanization in West Pakistan will increase the demand for mutton, fish, chicken and sugar, while decreasing

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[8]This is based on the suggestion of an unknown referee of *The Pakistan Development Review.*

the demand for wheat, rice, milk, beef and tea from the levels predicted in subsection c) above. Mutton, chicken and sugar are highly sensitive to rural monetization/rapid urbanization in both wings of Pakistan, while *ghee* and butter, wheat and tea are also highly sensitive to rural monetization/rapid urbanization in East Pakistan.

TABLE VI

CONSUMPTION AND ELASTICITY DIFFERENTIALS BETWEEN URBAN
AND RURAL AREAS

| Food items | East Pakistan | | | West Pakistan | | |
|---|---|---|---|---|---|---|
| | $c_{uo}-c_{ro}$ | $e_{ut}-e_{rt}$ | | $c_{uo}-c_{ro}$ | $e_{ut}-e_{rt}$ | |
| | Seers per month* | High-income growth rate | Low-income growth rate | Seers per month* | High-income growth rate | Low-income growth rate |
| Wheat | 1.10 | 0.49 | 0.51 | —3.31 | —0.22 | —0.21 |
| Rice | —2.40 | —0.15 | —0.17 | —0.12 | —0.03 | —0.07 |
| Milk | 0.34 | 0.15 | 0.19 | —0.85 | —0.07 | —0.25 |
| "Ghee" and butter | 0.02 | 0.90 | 0.95 | —0.04 | 0.53 | 0.44 |
| Mutton | 0.06 | 0.14 | 0.29 | 0.23 | 0.37 | 0.52 |
| Beef | 0.09 | —0.41 | —0.41 | 0.10 | —1.67 | —0.88 |
| Fish | —0.01 | —0.06 | —0.04 | 0.14 | 0.08 | 0.11 |
| Chicken | 0.01 | 0.12 | 0.37 | —0.01 | 0.22 | 0.17 |
| Sugar | 0.14 | 0.16 | 0.00 | 0.53 | —0.86 | —0.96 |
| Tea | 0.03 | —0.52 | —0.54 | 0.03 | 0.19 | —0.06 |

*One seer = 2.2 lbs. approximately.

*Note:*
c = per capita consumption (seers per month)
e = income elasticity of demand
u = urban
r = rural
t = year (1975)

*iii) Income Redistribution:* In a poor but developing country, the impact of improvement in the distribution of income on demand for food is likely to be strong. In Pakistan, the pattern of income distribution is very skewed in favour of the rich[9]. However, as the economy grows, the degree of inequality in income

    [9]Mrs. Khadija Haq has shown that "the degree of inequality in personal income distribution in Pakistan is quite high, compared not only with developed countries like the United Kingdom and the United States of America, but also with some of the developing countries with similar socio-economic set up" [4, p. 624].

distribution is likely to be reduced[10]. But even if the distribution of income and wealth remains unchanged in poor countries, a rising per capita income itself contributes to an increase in demand for food as if income distribution has changed in favour of low-income groups. Thus, the improvement in income distribution coupled with a general rise in per capita income in Pakistan is likely to raise the future demand levels, albeit at different rates for different food items.

To see the effect of income redistribution, we divide the data between above-average and below-average income classes and estimate the per capita consumption of all income groups from the following identity[11].

$$c_t = w_t c_{bt} + (1 - w_t) c_{at}$$
$$= w_t (c_{bt} - c_{at}) + c_{at}$$

where

c = per capita consumption of a food item "i"
w = weight of the population receiving below average income
b = below-average income groups
a = above-average income groups
t = subscript indicating the year.

Now, a reduction in $w_t$ (improvement in income distribution) will affect $c_t$ depending on what happens to $(c_{bt} - c_{at})$. The differential $(c_{bt} - c_{at})$ is determined by the differences in initial consumption levels $(c_{bo} - c_{ao})$ and in income elasticities of demand in year "t" $(e_{bt} - e_{at})$. We know $(c_{bo} - c_{ao})$ but the estimates of $(e_{bt} - e_{at})$ are dependent on the knowledge about the per capita income of the population receiving below- and above- average level of per capita income in year "t". Since the terminal-year income distribution is unknown, we cannot show the change in demand as a result of redistribution of income. We can, however, show the direction of the change expected from a given redistribution of income.

Assuming that the difference in the initial-year income elasticities reflects the direction of the differences in income elasticities of year "t", we show the likely changes in demand patterns as a result of income redistribution by relying on the differentials $(e_{bo} - e_{ao})$ and $(c_{bo} - c_{ao})$. If both the differentials are negative, the demand will decrease with a given improvement in income distribution. The reverse will follow if both the differentials are positive. However, when

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[10]In Pakistan, "there is an overall trend towards a reduction of disparities within the high income brackets" [4, p. 624].

[11]The indentity looks similar to one used for analysing the effect of rapid urbanization. But the procedure followed here is different from the one followed in analysing the effect of rapid urbanization. Here, we estimate elasticities and consumption levels from a single Engle's curve whereas in the analysis of the effect of rapid urbanization, we used two separate Engel's curves for urban and rural areas.

one is positive and the other negative, we do not know what will happen to the demand in our terminal year. But a negative $(e_{bo} - e_{ao})$ will eventually bring a decline in demand with income improvements even if $(c_{bo} - c_{ao})$ is positive, although demand may not decline in the terminal year which is the focus of our attention.

It seems that the demand for all food items is likely to increase with improvement in income distribution in rural East Pakistan. In urban East Pakistan, however, the demand for wheat will decrease with improvement in income distribution. The demand for beef in rural West Pakistan and for tea in urban West Pakistan shall decline with improvement in income distribution; the demand for all other food items is likely to increase when income transfer takes place in favour of low-income groups in urban and rural areas of West Pakistan.

*iv) Shifts in Preference Functions:* There are some evidences suggesting changes in the composition of consumption demand for food items which are attributable partly to change in prices and partly to change in preference functions of the consumers [6]. The increasing contact of rural people with urban consumers may bring considerable shifts in the rural consumption preferences due to demonstration effect. Moreover, increasing interwing as well as international mobility of people is likely to influence the consumption habits in urban areas. Thus, the likelihood of significant shifts in consumption functions in both urban and rural areas is fairly large.

We have already dealt with a portion of the shifts in rural consumption functions by pointing out the needed adjustments for rural monetization. We may further point out the probable direction of changes in demand as a result of shifts in consumer's preferences. The preference of rural consumers is likely to shift towards milk, meats, chicken, sugar and tea as a result of increasing contacts with urban people while the urban consumers are likely to shift towards processed foods. The shifts in rural consumer preferences will result in a net increase of demand for animal products, sugar and tea and in a net reduction of demand for grains like wheat and rice. The shifts in the urban consumer preference may not, however, increase or decrease the demand for a food item but will considerably change the form of the commodity being consumed. For example, shifts from *chapatis* to bread may not change the demand for wheat but will considerably increase the amount of processing being done to wheat before it is finally consumed.

### III. SELF-SUFFICIENCY IN SELECTED FOOD ITEMS

Food self-sufficiency has been the explicit aim of agricultural development in Second and Third Five-Year Plans of Pakistan. It is, however, not clear

whether serious thought was given to food self-sufficiency as an economic pro-position. Moreover, there seems to be a confusion over the meaning of self-sufficiency. Is the satisfaction of effective demand for food from domestic sources at the existing relative prices the goal of food self-sufficiency? Or, is the provision of minimum required calories from domestic sources the aim of food self-sufficiency? Neither of these two seems to be the goal, as set in the plan documents. For example, the Second Five-Year Plan of Pakistan aimed at "self-sufficiency in basic food production maintaining, as a minimum, the present levels of foodgrain consumption for the rapidly growing population" [9, p. 127] and, the Third Five-Year Plan of Pakistan aims at moving "towards self-sufficiency in food requirements to the extent compatible with the other needs of the economy, including foreign trade, aiming at the same time at improved nutritional standards in food consumption" [10, p. 396]. But food self-sufficiency must aim at increasing food output in year "t" which matches effective demand for food in year "t". It is in this sense that the projected demand for food items has a message for planners concerned with agricultural development in Pakistan.

### a) Estimates of Deficit and Surplus in Food Items

The levels of consumption, production, import and export in 1964/65 for five selected food items are shown in Table VII. Apparently, it seems that Pakistan has a huge deficit in wheat and fish but a sizable surplus in rice, sugar and tea. But, since Pakistan is net exporter of fish and net importer of sugar, the apparent deficit in fish and surplus in sugar is not true. On the contrary, Pakistan has a real surplus in fish and deficit in sugar. This means that fish production in Pakistan is underestimated while sugar production is overestimated. Underestimation in fish production is quite possible because most of the local catch of fish in East Pakistan is for self-consumption which gets reported in consumption but is neglected in production. But there is no reason to expect over-estimation in sugar production. On the contrary, sugar production is likely to be underreported by sugar mills because of the requirement to sell sugar at prices fixed by the government. The excess of production over consumption plus the import of sugar must, therefore, be taken as the industrial demand for sugar[12].

Pakistan has, however, a real deficit in wheat and surplus in fine rice and tea. But the gap between the availability and consumption of wheat and rice suggests that wheat production is underestimated while rice production is over-estimated. It is known that acreage figures for wheat and rice are quite authentic but the yield figures are not reliable [3, Pp. 3-9]. It is quite likely that wheat yield for estimating production of wheat is lower than the actual yield, while the rice yield for estimating rice production is higher than the actual rice yield. On

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[12]Sugar is used in sweets, beverages, fruit juice, canned fruit, "sherbets", *etc.*

## TABLE VII

### ESTIMATES OF DEFICIT OR SURPLUS PRODUCTION (IN 1964/65)

| | | Wheat | Rice | Fish | Sugar | Tea |
|---|---|---|---|---|---|---|
| Consumption (000 tons) | .. | 8,520 | 10,481 | 741 | 153 | 23 |
| Production (000 tons) | .. | 4,552 | 11,666 | 352 | 273 | 28 |
| Imports (000 tons) | .. | 1,601 | 57 | — | 97 | — |
| Exports (000 tons) | .. | — | 177 | 324 | — | 3 |
| Net availability (000 tons)a | .. | 6,153 | 11,546 | 28 | 370 | 25 |
| Consumption as a per cent of availability | .. | 138.5 | 90.8 | 2,646.4 | 41.4 | 92.0 |
| Adjusted production (000 tons)b | .. | 6,919 | 10,601 | 1,065 | 273 | 26 |
| Deficit (—) or surplus (+) production (000 tons)c | .. | 1,601 | +120 | +324 | —40 | +3 |
| Percentage underestimationd | .. | 34.2 | — | 66.9 | 0.0 | — |
| Percentage overestimationd | | — | 10.0 | — | — | — |
| Consumption from domestic source (000 tons)e | .. | 6,919 | 10,424 | 741 | 115 | 23 |

aProduction + Imports — Exports

bConsumption + Exports — Imports

cExports — Imports

d(Adjusted Production—Reported Production)100 / Adjusted Production

eConsumption — Imports

the basis of a comparison of official wheat estimates and objective wheat production estimates, G.C. Hufbauer found the wheat production in West Pakistan in 1964/65 to be underestimated by 40 per cent[13]. Although he agrees that the consumption and production of wheat point out the possibility of a very high underestimation in wheat production, he discounted the possibility of 40-percent underestimation of wheat on the plea that it is a "fantastic figure" [5, p. 294]. Accordingly, he made some adjustments in his objective estimate of wheat production for moisture content and for yields in border areas which had little chance of being included in his sample, and showed that wheat production in West Pakistan in 1964/65 was underestimated by 26.3 per cent [5, p. 305]. On the basis of the information presented in Table VII, we find wheat production in Pakistan to be underestimated by 34.2 per cent. There may be some overestimation in consumption of wheat as well because of overestimated population or per capita consumption in West Pakistan. In that case, underestimation in wheat production may be lower than what is shown in Table VII. It is, however, quite probable that wheat crop is underestimated by 20 to 30 per cent. Similarly, rice crop seems to be overestimated by 10 per cent (Table VII). The underestimation in fish production is quite high (67 per cent). Since local catch of fish from innumerable ponds, rivulets and rivers in East Pakistan is quite high, as judged from the daily diet which contains a significant amount of fish, and since the reported production of fish in East Pakistan does not include the local catch, the gap between reported production and consumption of fish is likely to be quite large.

### b) Required Rates of Growth of Production for Achieving Self-sufficiency

Since some of the food items are exported and/or have industrial uses, we take the consumption from domestic source as the base for estimating the required rates of production to achieve self-sufficiency in important food items. In doing so, we are allowing for complete import substitution by 1975 as well as expansion of exports and industrial demands at least as fast as domestic demand for consumption. The estimated consumption from domestic source is given at the bottom of Table VII.

The required rates of production to achieve self-sufficiency in important food items are shown in Table VIII along with the growth rates planned during the third-plan period (1965-70). If these rates are maintained during 1965-75, Pakistan will be able to meet the projected demand (*see*, Table III) entirely from domestic source in 1975. The clear evidence of self-sufficiency can be seen only in case of fish. Assuming that the rate of growth of production of rice planned

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[13]The official estimates are derived from the acreage figures reported by village *patwaris* early in the growing season, and harvest yields are determined from sample cuttings by the Department of Agriculture, while the objective estimates are based on "a carefully controlled sample of harvest yields" and acreage in a number of villages selected from all of West Pakistan [5, Pp. 292-294].

during the third-plan period is slightly exceeded, self-sufficiency in rice may be achieved even if Pakistan experiences high population and high income growth. And, if wheat production rises as fast as planned in the Third Plan, there is a hope to achieve self-sufficiency in wheat production by 1975. But it has been officially announced that Pakistan will not import wheat in 1969 and may have a surplus to export in 1970. This means that the realized growth rate for wheat production is considerably higher than the planned one. We shall analyse the realized growth rates in the following section.

TABLE VIII

**REQUIRED COMPOUND RATES OF GROWTH OF PRODUCTION FOR ATTAINING SELF-SUFFICIENCY IN IMPORTANT FOOD ITEMS BY 1975\***

| Food items | Third-Plan growth rate[a] | Population projection → | High | | Low | |
|---|---|---|---|---|---|---|
| | | Income growth rate → | High | Low | High | Low |
| Wheat | (6.2) | | 6.2 | 6.0 | 5.5 | 5.3 |
| Rice | (5.4) | | 5.7 | 5.2 | 5.0 | 4.5 |
| Milk | | | 8.9 | 7.4 | 8.3 | 6.8 |
| "Ghee" and butter | | | 9.1 | 6.5 | 7.2 | 5.8 |
| Mutton | | | 10.0 | 8.3 | 9.3 | 7.6 |
| Beef | | | 6.8 | 5.5 | 6.1 | 4.8 |
| Fish | (7.0) | | 5.1 | 4.6 | 4.4 | 3.9 |
| Chicken | | | 9.7 | 7.7 | 9.1 | 7.0 |
| Sugar | (8.0) | | 13.9 | 11.9 | 13.2 | 11.1 |
| Tea | (6.5) | | 9.9 | 9.1 | 8.9 | 8.3 |

\*Taking the levels of consumption from domestic source given in Table VII as the base, we computed the annual compound rate of growth in production to meet the projected demands shown in Table III entirely from domestic source in 1975. Thus, we allow exports and industrial demands to grow at least as fast as the demand for domestic consumption.

[a]These figures are expected annual growth rates for production during the third-plan period (1965-70) [10, Pp. 393-461].

The required rate of growth of production of protective foods (milk, *ghee* and butter, mutton, beef and chicken) is quite remarkable. This is largely because of the high-income elasticities of demand in these foods. The same is true of sugar and tea.

### c) The Prospects for Self-sufficiency

Comparing the realized growth rates in Table IX with the required growth rates in Table VIII, we find that self-sufficiency (in the sense of matching effective demand with supply) in wheat and sugar will be achieved earlier than 1975[14]. Pakistan is already self-sufficient in fish.  But self-sufficiency in rice is doubtful. There needs to be considerable acceleration in rice production to achieve self-sufficiency in rice even in 1975.  And, Pakistan may have to import tea before 1975 if the observed rate of growth of tea production is maintained during 1965-75.

## TABLE IX

**PRODUCTION OF SELECTED ITEMS IN PAKISTAN (IN 1964/65 and 1967/68)**

| Food items | Production in 1964/65 | Production in 1967/68 | Annual compound rate of growth during 1964/65 to 1967/68* |
|---|---|---|---|
| | (........*000 tons*........) | | (*per cent*) |
| Wheat | 4,552 | 6,257 | 11.1 |
| Rice | 11,666 | 12,348 | 2.0 |
| Fish | 360 | 489 | 17.9 |
| Sugar | 243 | 416*a* | 30.8*a* |
| Tea | 27 | 30*a* | 5.4*a* |

*Source*: [11].

*These rates are based on constant rate of underestimation or overestimation in production between the two periods (*see* footnote 14).

*a*Production refers to 1966/67 and growth rate is for the period 1964/65 to 1966/67.

### d) Beyond Self-sufficiency

The acceleration in wheat production has enabled Pakistan to eliminate huge wheat imports.  There still remains the question whether West Pakistan can obtain maximum benefit from the new yield potential for wheat by going from import substitution to exports of wheat.  It would perhaps be more advantageous to divert substantial acreage from wheat to fodder crops for expanded production of livestock products for which the income elasticity of demand is high.  In the near future, it may, however, be profitable to expand the production of oil seeds and fibre crops by diverting land from wheat to these  crops. The essential point to  be noted is that production pattern should reflect demand conditions at home and abroad.

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[14]It may be pointed out that underestimation of wheat production in 1964/65, as shown earlier, does not overestimate the realized growth rate; for, since there has not been any change in the method of estimation of production between 1964/65 and 1967/68, the wheat production in 1967/68 is also underestimated by the same margin as in 1964/65.

Self-sufficiency in every food item is not, however, an economic pro-
position. For example, the goal of self-sufficiency is sugar in not economically
justified; for, the cost condition in sugar-processing industry in Pakistan is not
competitive to world's sugar industry. The domestic production of sugar
results in a loss of foreign exchange. Each acre of cotton diverted to sugar
reduces the foreign-exchange earnings since the foreign exchange earned from
one acre of cotton is more than the foreign exchange saved from one acre of
sugarcane [7, p. 511].

Similar trade-offs may be found in case of other crops. It is, therefore,
very important that the possibilities of exports and imports of various agricultural
crops which compete with each other for land, labour and other inputs are
explored before fixing targets for achieving self-sufficiency in production of
a particular food item.

## IV. COMPARISON WITH OTHER PROJECTIONS

There is a significant difference between our projections and the projec-
tions made by S. A. Abbas. It can be seen in Table X that the projections
made by Abbas give a low demand for wheat and a high demand for rice, milk,
fish and sugar in comparison to our projections[15]. We must, therefore, examine
the factors responsible for the big differentials in the two projections.

The high projection of population used in our study is lower than the
projection of population made by Abbas[16]. The perspective plan's postulated
rate of growth of GNP formed the basis of projecting income in both the studies
but, because of the high rate of growth of population and his pessimism regard-
ing the attainment of the perspective plan's targets, Abbas obtained a low growth
rate for per capita income[17].

The differentials in the elasticity coefficients used in the two studies are
not likely to counteract the influence of low income on the projection made by

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[15]Wheat, rice, milk, fish and sugar are the only comparable items of food in the two studies.

[16]S. A. Abbas projected the population of Pakistan to be 184 million in 1976 [1, p. 88].
The projection used in our study shows that the population of Pakistan shall be 170 million
in 1976 (Table I).

[17]The annual rate of growth of per capita income projected by S.A. Abbas is 3.1 per
cent in East Pakistan and 1.1 per cent in West Pakistan during 1965-75; the low rate of growth
used by Abbas for West Pakistan gives a negative rate of growth of per capita income in urban
West Pakistan [1, Pp. 65-67]. In view of the recent acceleration in the economy, we feel that the
low rate of growth in per capita income would rather understate the per capita income in 1975.
Accordingly, we assumed growth rates of 3.9 and 2.9 per cent in East and West Pakistan, res-
pectively, during the same period (Table II).

Abbas[18]. On the contrary, he gets a low demand for wheat and a high demand for rice although he uses a high-elasticity coefficient for projecting wheat demand and a low-elasticity coefficient for projecting rice demand[19].

## TABLE X

### COMPARISON OF PROJECTED DEMAND FOR SELECTED FOOD ITEMS IN PAKISTAN IN 1975

| Food items | Projections made by Abbas | Projections made in study |
|---|---|---|
| (1) | (2) | (3) |
| Wheat | 8,942 | 12,350 |
| Rice | 17,470 | 17,307 |
| Milk | 11,582 | 5,968 |
| Fish | 2,059 | 1,162 |
| Sugar | 403 | 347 |

*Source*: [1, p. 126].
Col. (3), from Table III. It is based on the assumption of high population growth in order to make it comparable with the projections made by S. A. Abbas.

S. A. Abbas did not make correction for the underestimation in the production of wheat and fish and for the overestimation in the production of rice. Because of his failure to correct underestimation in wheat production,

[18]COMPARISON OF ELASTICITIES IN THE TWO STUDIES

| Food items | East Pakistan | | West Pakistan | |
|---|---|---|---|---|
| | Ours | Abbas | Ours | Abbas |
| (1) | (2) | (3) | (4) | (5) |
| Wheat | —0.40 | 0.38 | 0.09 | 0.64 |
| Rice | 0.35 | 0.08 | 0.90 | 1.24 |
| Milk | 1.34 | 1.54 | 0.85 | 1.04 |
| Fish | 0.34 | 0.32 | 0.79 | 1.14 |
| Sugar | 2.61 | 2.27 | 0.50 | 1.41 |

*Source*: Cols. (3) and (5), from [1, p. 122]; Cols. (2) and (4), from Table I.
[19]For estimating the elasticities used in his projection, he combined the elasticities estimated for rural areas in 1961 and for urban areas in 1963/64 to arrive at a combined elasticity for East or West Pakistan, using the existing rural and urban population as weights.

his projections yielded low demand for wheat in spite of the fact that he made high population projection and used a high elasticity coefficient for projecting wheat demand. Similarly, his failure to correct overestimation in rice production results in high projected demand for rice even though he used a low-elasticity coefficient in his projection of rice demand. The high demand for milk projected by him is explained partly by high population and high-elasticity coefficient for milk in his projection and partly by his lumping together the demands for milk for consumption and milk for the manufacture of *ghee* and butter. His projections showed a high demand for fish largely because he assumed a high population and income growth in East Pakistan, the main fish-consuming region. The demand for sugar projected by him is high largely because he used a high-elasticity coefficient for sugar in West Pakistan along with the high population projection in estimating the future demand for sugar.

On the basis of demand and supply projections, S. A. Abbas has "worked out export potential and import demand for the period 1965-85" [1, p. 180]. Since his demand projections are high and supply projections, as noted elsewhere [6], are low, he shows increasing import requirements for rice, wheat, milk and sugar. According to his estimates, Pakistan will have to import wheat to the tune of 1.8 million tons in 1974/75 and 4.4 million tons in 1984/85 [1, Pp. 181-182] whereas Pakistan is hopeful of exporting wheat in 1970 and, according to our estimates, Pakistan will be self-sufficient in wheat production before 1975[20]. Similarly, he shows rice import requirement of 0.7 million tons in 1974/75 and 4.8 million tons in 1984/85 [1, Pp. 181-182]. Our estimates also show that Pakistan will continue to import rice unless there is an acceleration in rice production. The import requirement for sugar, as estimated by him, jumps to 326 thousand tons in 1984/85 from a level of 34 thousand tons estimated for 1974/75 [1, Pp. 181-182] whereas our estimates show that Pakistan will be self-sufficient in sugar by 1975. And, according to him, Pakistan will have to import 4.1 and 14.8 million tons of milk in 1974/75 and 1984/85, respectively [1, Pp. 181-182].

## V. CONCLUSIONS

Because of high income elasticity of demand for nutritious foods like milk, *ghee*, mutton, fish and chicken, the expected future demand for these food items is quite big. The production in agriculture must be directed towards increasing the supply of these foods. The product-mix in the agricultural sector will be governed by the relative prices and cost of production for different agricultural commodities. The increasing demand for nutritious foods may itself create a phenomenon for diversion of resources from foodgrains to feedgrains and animal husbandry. The production of nutritious foods may, however, be subjected to increasing cost if the necessary inputs to facilitate the shift from

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[20]*See* Subsection III (c) of this article.

foodgrain to animal husbandry and to vegetable and fruit culture have not been planned in advance. Moreover, the gestation period in animal husbandry and fruit growing is higher than that in foodgrain growing. To avoid frustration of desire to be translated into effective demand, the production targets should be planned in the current period to meet the level of demand expected in a period five to fifteen years from now.

Since the rates of growth of population and income differ from urban and rural areas and since the consumption behaviour of the urban population is different from that of the rural population, our disaggregative projection (based on urban and rural parameters) would naturally show demand pattern different from the one emerging from aggregative projection (based on East and West Pakistan parameters) [9]. Rapid urbanization, rural monetization and changing preference functions will further modify the demand patterns by reducing the incremental demand for grains and beef and raising the incremental demand for milk, *ghee*, butter, mutton, fish, chicken and sugar. As a result, the total demand for grains in 1975 is likely to be less than what is predicted in this study. On the other hand, the total demand for animal products (except beef) and sugar in 1975 is likely to be more than what is predicted in this study. But, although total demand for grains in East Pakistan in 1975 may be lower than that predicted by us, the demand for wheat in East Pakistan in 1975 is likely to be higher than that predicted by us because of rapid urbanization and rural monetization in East Pakistan.

The projections of future demand for important food items on various assumptions regarding population growth and improvement in per capita income give the evidence of great responsibility placed on the agricultural sector to produce food for domestic consumption. The shifting agricultural production functions due to dynamism introduced in West Pakistan's agriculture and the efforts to improve East Pakistan's agriculture have raised the yields of foodgrains. As a result, there is considerable expansion in food supply. On the demand side, the shifts in demand from foodgrains to animal products will ease the grain shortage further but will intensify the problems of cattle raising and allocation of scarce resources. Foodgrains and feedgrains or pasture shall be competing for land and other inputs over and above the competition between nonfood and food crops.

Pakistan has been attentive to the needs of agricultural sector. The introduction of modern inputs — chemical fertilizers, pesticides, and improved seeds and the provision of irrigation facilities both through private and public efforts — has brought Pakistan on the verge of an agricultural revolution. If the pace of agricultural development continues to grow at least as rapidly as it is now, Pakistan can hope to solve her food problem in the near future. In fact, Pakistan is optimistic not only to attain self-sufficiency in wheat by 1970 but to

enter the export market for wheat. The optimism is cushioned by the recent phenomenal rise in wheat production in West Pakistan.

The planners in Pakistan must now seriously think of the direction of agriculture in the stage beyond self-sufficiency in staple foodgrains. The allocation of resources in Pakistan's agriculture must be in conformation with the internal demand pattern for food items. The reliance on foreign export markets for surplus grains may be disappointing in the long run; for, most of the grain-shortage countries are striving for self-sufficiency in foodgrains and the demand for foodgrains is strictly subject to Engel's law. The future pattern of internal demand for food is oriented towards animal products, fruits, vegetables, sugar and tea. The long-run planning for agricultural development in Pakistan must be undertaken with a view to increasing the production of these food items.

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