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## ***PUBLIC FOODGRAIN DISTRIBUTION AND POVERTY IN BANGLADESH***

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### **ABSTRACT**

The opportunity cost of food subsidy is high in Bangladesh; subsidy cost exceeded a billion taka mark in 1975-76. Although poverty is more widespread in rural than in urban areas, the country's 9 percent urban population shared 66 percent of the subsidized foodgrains in 1973-74. Levels of the foodgrain consumption of the urban poor would, however, have been lower by 15-24 percent without this subsidy. Rationing or open market sales of foodgrains for the rural landless households involves either a prohibitive cost or a disincentive to producers through low market prices. Input subsidy provides a policy option for resolution of this conflict. Increasing supply of ration foodgrains and/or lowering their prices will generate additional demand for other commodities at a faster rate than foodgrains. Therefore, rationing policies have implications for supply and prices of non-foodgrain commodities. For every dollar's worth of import, wheat offers a smaller disincentive to rice producers and a larger caloric gain to consumers than rice. A significant shift in policy reflecting this fact would require a reevaluation of the opportunity cost of the domestic programme for increasing wheat production.

### **I. INTRODUCTION**

Evidence indicates that rural poverty is appalling and gradually widening over time in Bangladesh (Khan, 1976). A. R. Khan measured rural poverty in Bangladesh at two levels: (1) extreme poverty-those consuming less than 1,720 calories per capita per day, and (2) absolute poverty-those with less than 1935 calories per capita per day. Khan's analysis of the 1963-64 household survey data shows that in that year 40 percent of the rural population was absolutely poor and five percent was extremely poor. Extending the analysis to the 1973-74 household survey data indicates that about 56 percent of the rural population was *absolutely* poor and 29 percent *extremely* poor, in that year. In such a situation, the extent of rural orientation of the public distribution system will provide a yardstick of the extent of the welfare orientation of the government. The question is legitimate because public subsidy on food took a share of about 21 to 36 percent of the net revenue collection of the government during 1972-73

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1975-76 ; in absolute terms, food subsidy accounted for a little more than a billion Taka in 1975-76 ( Ahmed, 1978 ).

In this paper we intend to focus our analysis on the following questions :

1. Who benefits from public distribution ?
2. What was the impact of rationing on nutrition ?
3. What redirection if any is necessary ?

## II. INCOME DISTRIBUTION AND RATION FOODGRAINS

First we make an attempt to work out the distribution of ration foodgrains by urban and rural income groups.

In the absence of the facility for a direct estimate ( based on a sample survey ) of the quantities of ration foodgrains received by people in various income groups we have resorted to an indirect procedure. The year 1973-74 is selected for this purpose for a number of considerations. First, we have data on household consumption survey for the year which would facilitate comparison of the ration foodgrains as a proportion of total foodgrains consumption. Second, the price situation in 1973-74 is considered ideal for the validity of assumptions made in the study. It is assumed that the available ration quotas were drawn by all cardholders. A large difference in the ration and market prices in this year would have provided a strong incentive to draw all ration foodgrains. Moreover, a large volume of ration supply would have tended to minimize the chance of refusal of rations to cardholders. The monthly incomes of poorer urban households as shown in the Household Survey of 1973-74 appear to accommodate the value of monthly ration quotas. One implicit assumption is that the incidence of false ration cards, if any, is in proportion to population in various income classes. Occasional house-to-house checks have established the existence of false ration cards. Aggregate data also vindicate this fact. The 1973-74 population in the statutory rationing area can account for a total quantity of 445,000 tons of foodgrains, assuming everybody lifted their quota, compared to 502,000 tons recorded as actual distribution in that year. It means that, given the census population statistic are correct, about 11.4% of the total statutory ration were lifted through false ration cards.

The income classifications and the percentages of population in various urban and rural income groups, as found in the 1973-74 Household Survey, were adopted as the basis of the analysis. The procedure involved two types of allocations : (1) allocation between rural and urban, and (2) allocations among income groups. Statutory rationing is limited within 5 cities, so is entirely allo-

cated to the urban group. Modified rationing is meant for both urban (outside statutory areas) and rural areas. The allocation of modified rationing between urban and rural areas is made on the basis of actual data in the Mymensingh district, the largest district in the country. This shows that about 30 percent is distributed in the urban and 70 percent in the rural areas in 1975-76. The statutory and the modified categories together constituted about 80 percent of the total foodgrains distributed through rationing in 1973-74. The third largest category, i. e. ration for government employees, was allocated between urban and rural in the proportion of 25 to 75, respectively. This is based on the proportion of government employees in the urban and rural areas within a district, as represented in the Agriculture and the Revenue Departments.

It should be noted that the primary school teachers and most of the private high school and college teachers, who are included in the definition of government employees are located in the rural areas. Moreover, a substantial part of the government employees, located in the 5 cities of statutory rationing, are excluded from this category. The quantities under the category—large industrial employers—are allocated in the same manner as government employees.

The distribution among various income groups is made, in the case of statutory rationing, according to the proportion of population in various income groups in the urban areas. This is based on the rule of a fixed quota of ration per card for all in the statutory areas. In allocating MR ration in urban areas, no taxation criterion to exclude taxpaying income groups was applied. While in Bangladesh for collection of data, it was observed in the Mymensingh town area that this rule was not being followed due to complexities of assessing income levels. In rural areas this criterion is easier to apply because of the land tax system. For the MR ration in the rural area, the upper income groups are excluded; the cut-off point is determined on the basis of income per earner in each income class as found in the household survey and the legal limit of taxable income. The quantities under government employees category are distributed among various income groups according to the proportion of government employees in various scales of pay was obtained from the Establishment Division of the Government and this distribution was linked with the income classifications of the household survey by assuming that the employees are at midpoints of their respective pay-scales. For large industrial employers, the wage range of skilled and unskilled labourers was linked with the main income classifications. The total quantities of foodgrains under this category were then allocated to these limited number of classes in equal proportions. The priority category is meant for jails,

hospitals, police, and army personnel. While most jails and hospitals would be located in urban areas, a substantial part of police and army personnel are located in the rural areas (including border forces). This category is split equally between urban and rural and distribution among various income groups is made on the basis of distribution of government employees in various income groups. The distribution of ration foodgrains among various income groups, thus estimated, is presented in Table 1. Before proceeding further to discuss the results, it may be pointed out that other evidences also support the pattern of ration distribution presented in the table.

The 1973-74 household survey shows some interesting facts which can be explained by the rationing system. The consumptions of foodgrains in the lowest 5 income classes in the urban areas are higher than those in the corresponding classes of rural areas. The opposite pattern is existing in the other upper income groups of rural and urban consumers. A graphic picture of this consumption pattern of foodgrains in the rural and urban areas is shown in Figure 1. For a given level of income, we would expect the per capita consumption of foodgrains in rural areas to be higher than those in urban areas for a number of reasons. First, urban people have to spend a larger share of their income on housing, clothing, services, etc., than the rural people. Second, foodgrain prices in urban markets are generally higher than the rural prices. Third, rural occupations are generally more energy exhausting than urban occupations, implying the need for a larger share of the income being spent on foodgrain. Of course, the distinction between the urban and rural living conditions in the low income categories is not so different in the context of Bangladesh where relatively developed business and commerce centers, at the periphery of rural areas, are counted as urban areas<sup>1</sup>. Nevertheless, we would expect the consumption of foodgrains in the low income groups in the urban areas to be at best equal, if not lower, to those in the corresponding income groups of rural areas. This does not appear to hold good in the consumption figures of the 1973-74 Survey. The fact that the supply of per capita ration foodgrains in the urban areas is substantially higher than the rural areas, would be attributed as a major causal factor for the above mentioned difference in the per capita consumption of foodgrains in the low income groups of the urban and rural households. To substantiate this point, an estimate of per capita consumption of foodgrains, excluding the income-effect of rationing, is made for the urban income classes.

The consumption function for foodgrains in the urban areas, thus estimated is shown in Figure 1 and Column (8) in Table 1. It comes quite close to the

TABLE 1 ESTIMATED DISTRIBUTION OF RATION FOODGRAINS AMONG VARIOUS INCOME CLASSES, 1973/74 ( CONSUMPTION / POUNDS / CAPITA )

Income Classes (Tk./month)	Rural			Urban			
	Total Actual Consumption <sup>1</sup> (2)	Ration Received (3)	(3)/(2) % (4)	Total Actual Consumption <sup>1</sup> (5)	Ration Received (6)	(6)/(5) % (7)	Estimated Excluding Income Effect of Ration <sup>2</sup> (8)
Under 100	168.18	24.14	14	263.11	235.80	90	198.90
100-149	221.99	21.94	10	277.11	261.50	95	231.00
150-199	269.70	29.08	11	299.85	317.60	106	243.80
200-249	307.02	32.59	11	526.80	337.80	103	281.60
250-299	325.32	36.33	11	338.17	343.50	102	300.50
300-399	357.95	31.72	9	358.44	323.70	90	328.50
400-499	375.00	30.13	8	359.43	281.73	78	339.60
500-749	402.94	27.49	6	380.69	249.00	65	370.22
750-999	429.63	24.83	6	391.81	251.80	64	384.91
1,000-1,499	452.38	...	...	406.15	246.60	61	402.09
1,500-1,999	436.80	...	...	417.52	250.70	60	415.93
2,000 & above	456.58	...	...	401.95	239.90	60	401.11

1. Actuals from 1973-74 Household Survey.  
 2. The income effect of rationing is calculated for each income class as per formulations presented in (Ahmed 1978). The appendix also provides some formulations.

rural foodgrain consumption function in the lower income range and to the urban foodgrain consumption function in the upper income range. This is approximately what we would hypothesize to be the true urban consumption function of foodgrains without the rationing system. Assuming that this contention is true, it would also indicate that the estimates of ration distribution by various income classes, presented earlier, are quite close to reality.

The estimates of ration foodgrains received by consumers in various household income groups show that low-income urban consumers cover from 90 to 100 percent of this foodgrain consumption by the ration foodgrains compared to only 9 to 14 percent in the rural low-income groups.

Due to the mechanisms of various categories of rationing oriented towards government employees, industrial workers, etc., the ration received by people in various income groups ranging from TK 150-300 per month per household appears to be higher than what their income consumption relations would support. This has of course supported the income of low paid government employees and workers in the urban areas.

These groups of urban consumers are net sellers of ration foodgrains. Resale of ration foodgrains in the open market have been observed quite frequently; this operation was witnessed in the Dacca market by the team members of the IFPRI/World Bank Food Policy Review Mission in March, 1977 (the World Bank, 1977).

The estimates of ration distribution for 1973-74 show that 52.3 percent of the total foodgrain distributed through the rationing system went to urban people and 47.7 percent went to the rural population. It implies that about 9.2 percent of the population who are urban received 52.3 percent of the total ration foodgrains and the remaining 90.8 percent of the population who are in rural areas received only 47.7 percent of the ration foodgrains. Excluding the rural based special categories like government employees, school teachers, men in the armed and police services, and industrial workers, the share of the rural consumer in the total ration foodgrains in 1973-74 was only about 33.7 percent. Some rural farmers are however not dependent on the market supply of foodgrains. Rural landless labourers, small farmers, and people in non-farm rural occupations (like fishermen, petty sales worker, etc.) are considered to be largely dependent on market for foodgrains. According to the Land Occupancy Survey (LOS) of 1977, 32 percent of the rural households were landless, i. e. they did not own any cultivated land in the survey year (Januzi, 1977). The landless households comprising 32 percent of all rural households cover about 26 percent of all rural

population. The 1973-74 household survey shows that about 26 percent of the rural population fall below the household income of less than TK 300 per month. Most of these people would fall in the category of landless rural people identified in the LOS of 1977 and also in a study by Abdullah *et al.* in 14 districts of Bangladesh in 1973-74 ( Abdullah *et al.* 1974 ). The absolute number of this low income rural poor is estimated to be about 2.6 times the total urban population, even though only about 34 percent of the ration foodgrains was allocated to the traditional rural people compared to about 66 percent going to urban and urban-like consumers in 1973-74.

The distribution of ration food-grains between urban and rural consumers is not likely to be substantially different in other years from 1973-74. Public foodgrains under the modified rationing (MR) is the main vehicle for serving partially the rural population. Distribution of foodgrains under this category in 1974-75 ( the famine year in Bangladesh ) was even lower, by about 26 percent from the previous year. The proportion of ration distribution under the MR category were however high during the 1969/70-1972/73 period compared to 1973/74 by about 5.15 percentage points. Consideration of a crucial election<sup>3</sup> in 1970 might have influenced decisions of the ruling political organization to allocate a relatively large quantity of foodgrains to rural people through the modified rationing in 1969/70 and 1970/71. But the higher proportions of foodgrains under the MR category in 1971/72 and 1972/73 would not imply that the share of the rural consumers went up accordingly. Because, 1971/72 was the war year and the physical and organizational infrastructures during 1971/72 and 1972/73, particularly in the rural areas, were such that an increased flow of foodgrains from government stock to rural areas would be incomprehensible.

### III. SOME POLICY MEASURES

From the previous discussions it would be concluded that the public food-grain rationing has an extremely limited coverage for the rural poor. Previous discussions have shown that rural poverty has been accentuated in Bangladesh. The next question is what can be done about this problem through foodgrain distribution policies. Two plausible options will be examined—a rural rationing scheme and open market sale operations.

#### An Extended Rural Rationing Scheme

This disaggregated analysis seeks to trace out the implications of rural



rationing covering the bottom 26 percent of the rural population. The selection of the bottom 26 percent of the rural population is based on two considerations. First, this segment of population covers what is termed to be "extremely poor". Second, for any rationing scheme for a target group to be operationally feasible, there should be a clear-cut criterion for inclusion of consumers in the scheme. It has been shown previously that about 26 percent of the rural population are landless wage earners. A land ownership criterion can therefore be employed to include this segment of the rural population in the rationing scheme. A ration quota of 6 ounces per capita per day is selected which is equivalent to the present urban ration quota. The analysis is based on 1973-74 household consumption survey data. The 26 percent of the rural population covers the 5 low income classes shown in table 1. The core of the analytical approach is based on behavioural assumptions for consumer households in various income groups in respect to their expenditure allocations for foodgrains as reflected in household surveys. A detailed note on method employed is presented in the appendix.

Two alternative levels of ration prices and compositions of ration foodgrains are considered.

#### Ration Price

1. A ration price that was prevailing in 1973-74 is termed  $P_1$ , and is TK. 0.55 per pound of rice and TK. 0.37 per pound of wheat.
2. A ration price that will allow the lowest income group to accommodate all ration foodgrains within the foodgrain budget is termed  $P_2$ . It is TK. 0.78 per pound of rice and TK. 0.49 per pound of wheat.

This process of selecting the ration prices shows that the 1975-76 levels of ration prices, with the 1973-74 levels of income, would impose serious constraint so that low income groups of rural people would be able to consume the entire ration entitlement.

#### Ration Composition

1. A composition consisting of 60 percent rice and 40 percent wheat is termed  $C_1$ .
2. A composition of 40 percent rice and 60 percent wheat is termed  $C_2$ .

The selection of the ration composition is based on the following considerations. First, a drastic change in consumption pattern is assumed to be difficult

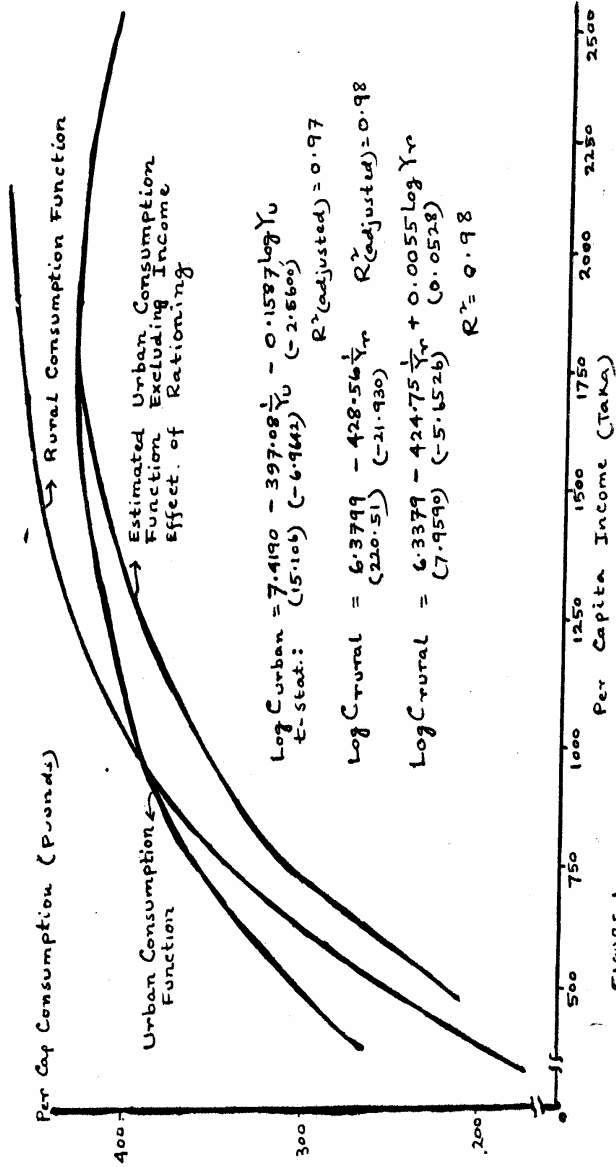


FIGURE 1

in the short run. Therefore, the selected composition is kept close to present patterns of consumption. Second, rural rationing will reduce market demand requiring a larger scale of domestic procurement for preventing market prices to fall. This procured grain will primarily be rice, which will have to be recycled through the rationing scheme.

Thus, there are four combinations of ration prices and ration compositions. These are  $C_1P_1$ ,  $C_1P_2$ ,  $C_2P_1$ ,  $C_2P_2$ . The results in respect of each of these combinations are presented in tables 2 and 3.

TABLE 2 IMPLICATIONS OF RATIONING FOR RURAL POOR (26 PERCENT OF RURAL POPULATION)

Items	$C_1P_1$	$C_1P_2$	$C_2P_1$	$C_2P_2$
1. Initial consumption (000 tons)	2301.8	2301.8	2301.8	2301.8
a) Proportion of wheat (%)	31.0	31.0	31.0	31.0
2. Consumption with rationing	2542.5	2458.6	2636.6	2559.9
a) Proportion of wheat (%)	28.2	29.2	33.2	34.2
3. Percentage increase in consumption	10.5	6.8	14.6	11.2
4. Ration (000 tons)	1459.1	1459.1	1459.1	1459.1
5. Import (000 tons) <sup>a</sup>	830.6	746.7	924.74	847.94
a) Rice	247.0	163.1	183.0	106.2
b) Wheat	583.6	583.6	741.74	741.74
6. Domestic procurement (000 tons) (Reduction in market demand)	628.5	712.4	534.4	611.1
a) Rice	628.5	712.4	400.7	477.4
b) Wheat	0	0	133.7	133.7
7. Subsidy cost (billion Tk)	4.19	3.58	3.92	3.38
8. Increase in non-foodgrain demand (% of foodgrain budget)	19.1	11.7	14.0	7.6

a Includes initial import

Note : Computed for 1973-74 population  
For meanings of  $C_1P_1$ ... $C_2P_2$ , see text.

TABLE 3 RATIONING FOR RURAL POOR : IMPLICATIONS BY INCOME CLASSES  
(26 PERCENT OF RURAL POPULATION)

Income Classes <sup>a</sup>	C <sub>1</sub> P <sub>1</sub>	C <sub>1</sub> P <sub>2</sub>	C <sub>2</sub> P <sub>1</sub>	C <sub>2</sub> P <sub>2</sub>
Increase in consumption (%)				
1	37.3	25.1	43.0	32.0
2	14.1	8.7	21.9	17.3
3	11.3	7.3	15.5	11.8
4	9.4	6.1	12.8	9.8
5	8.7	5.8	12.2	9.6
Increase in non-foodgrain demand (% of foodgrain budget)				
1	11.4	0	9.9	0
2	23.2	13.7	14.5	5.9
3	20.6	12.4	14.8	7.9
4	18.4	11.5	13.8	7.8
5	18.2	11.5	13.7	7.9

<sup>a</sup> Income classes are in the ascending order of income.

#### Discussion of Results

1. The rationing scheme for the rural poor increases the average consumption of the bottom 5 income classes by 6.8 to 14.6 percent. A combination of a lower ration price and a higher proportion of wheat in the ration composition causes the largest increase in consumption. In general, given a ration price, a higher proportion of wheat in the ration, increases consumption more than does a lower proportion of wheat in the ration. The consumption of the lowest income class increases faster (by 25 to 43 percent) than the top (fifth) income class (by about 6 to 12 percent).
2. Introduction (or extension) of foodgrain rationing increases demand for non-foodgrain commodities; the range of this increase in the present exercise spreads from about 8 to 19 percent of the foodgrain budgets. This increase in demand for non-foodgrain consumption goods appears to be larger than the increase in consumption of foodgrains. A large part of

this increased demand for non-foodgrain goods is likely to be spent on other foods<sup>3</sup>. This has important implications for energy intake of ration recipients. If there are no supply constraints in non-grain foods and no difference of calorie content between a dollar's worth of foodgrain and non-grain foods, rationing will increase calorie intake at a faster rate than the increase in foodgrain consumption. Supply constraint in non-grain foods may result in rises in price of such foods without any additional impact of rationing on calorie intake. Thus, it appears that the impact of foodgrain rationing on calorie intake will be larger in a place where non-grain foods are cheaper in terms of calorie per dollar and where there are fewer supply constraints in the increased availability of such foods than in a place where these conditions are otherwise.

A high level of ration price and a ration with a largest proportion of wheat appear to cause a smaller increase in demand for non-foodgrain goods than a lower level of ration price and a ration with a smaller proportion of wheat.

3. Ration subsidy for a rural rationing scheme covering the poorest 26 percent of the rural population appears to be very high. The subsidy cost ranges from 3.38 to 4.19 billion takas, depending on the ration prices and ration composition. Exclusion of the top two income classes (fifth and fourth groups) reduces the subsidy cost by 61.8 percent, and exclusion of the top income class (the fifth group only) reduces the subsidy cost by 32.8 percent. Such exclusion will be operationally difficult. Even if it is possible, the subsidy cost still appears to be out of the scope of the present budgetary resources of Bangladesh. However, such a scheme may be possible only if external aid, motivated by a global concern for "meeting the basic needs", is available on a massive scale. Even then, problems would still exist, because rural rationing based largely on foreign food aid will depress the domestic foodgrain price unless there are simultaneous efforts for increasing income of the poor.

4. If the quantities of rice and wheat, shown as reductions in market demand, in table 2 are not procured, it will reduce the market price of rice by 15 to 27 percent, depending on which alternative ( $C_1P_1, \dots, C_2P_2$ ) is in operation, and assuming a supply elasticity of zero and demand elasticity of 0.25. If supply elasticity is assumed to be 0.15, the fall in rice prices will range from 9.5 to 17.0 percent. Wheat prices will fall drastically, and the wheat market may collapse if the alternatives  $C_1P_1, C_2P_2$  are in operation.

However, the price fall can be prevented if income levels of the consumers could be raised, particularly among the low-income groups.

## Open Market Sale

Open market operations involve working through the market mechanism. A rise in foodgrain prices affects the consumption of the poor more adversely than that of the rich. On the basis of price elasticities of demand for foodgrains for various income groups, the effect on consumption of the poorer groups resulting from a certain open market operation has been worked out. In this exercise it is assumed that the objective of the operation is to increase the consumption of the lowest income rural group by about 17 percent. This will require a fall in prices by 25 percent. The increases in consumption by different income groups for this 25 percent fall in prices are shown in Table 4.

The results in the table show that low income groups improve their consumption of foodgrains at a higher rate than the higher income groups from a certain fall in foodgrain prices. But unlike target oriented programmes, the effect of prices

TABLE 4 INCREASE IN CONSUMPTION OF FOODGRAINS UNDER VARIOUS INCOME GROUPS FOR A 25 PERCENT FALL IN MARKET PRICE IN BANGLADESH

Income group (TK. / Month)	Present Per Capita Consumption Ounces/Capita/Day <sup>a</sup>	Increase in Consumption (%)	Consumption Improvement Per Capita / Day (Ounces)
Less than 100	7.52	17.0	8.80
100-149	9.72	13.0	10.98
150-199	11.81	11.0	13.11
200-249	13.45	9.0	14.66
250-299	14.21	8.0	15.35
300-399	15.59	6.75	16.64
400-499	16.30	5.5	17.20
500-749	17.50	4.25	18.24
750-999	18.60	3.25	19.20
1,000-1,499	19.48	2.50	19.97
1,500-1,999	20.48	1.25	20.74
2,000 and above	19.54	0.0	19.54
All groups	16.15	5.32	17.01

a 1973-74 Household Survey.

cannot be kept limited within any selected groups. As a result, generally a large quantity of foodgrains has to be pumped in the market to cause the desired fall in prices. The increase in consumption as presented in the Table will require total additional quantities of 0.667 million tons, on the basis of 1973-74 population and assuming a price elasticity of market supply to be zero. This additional quantity implies an increase of 5.32 percent from the initial level. The supply elasticity makes a substantial difference in the required quantity of additional supply through the open market operation to achieve the target. If we assume a supply elasticity of 0.2, the increase in the size of the open market operation will have to be 10.32 percent of the initial level of consumption, i. e. a quantity of 1.29 million tons instead of 0.667 million tons.

These quantities represent net additions to aggregate supply of foodgrains. In the case of rationing, an increase in consumption of the lowest income group by 25 to 43 percent can be achieved with a net addition to aggregate supply of foodgrains by only about 2 to 3 hundred thousand tons. To achieve the same increase in consumption through open market operations will require a fall in market price which may not at all be practicable<sup>4</sup>. Open market sale would therefore require a larger import or stock drawdown compared to rationing with a stable price.

The stock requirement for open market operation is quite sensitive to market supply elasticity. While some information on production response to price of foodgrains is available in the country, the knowledge of market supply response in any market period is virtually non-existent. If the open market operation changes the behaviour of private trade, the supply elasticity in any market period could be quite large<sup>5</sup>.

However, the open market operation has a number of desirable aspects. It can be put into effect selectively in any particular season of the year without maintaining an additional permanent organizational structure as is necessary in the case of a regular rural rationing system. It benefits the poor more than the rich. It involves the least subsidy cost, although some amount of subsidy will be unavoidable. Lastly, because of the rationing system in the urban areas, the urban demand for foodgrains is relatively insensitive to price changes (highly inelastic). This provides a scope for the rural consumers to gain proportionately more from the open market operation than the urban consumers.

The disadvantages of open market operation are that its principles are antagonistic to producers' incentives. It requires a large quantity of foodgrain to cause a desirable fall in prices. In the absence of some reliable estimate of

the market supply elasticity, the quantity required for the operation is indeterminate, and therefore advance planning becomes difficult. Moreover, the operation may be extended too far to result in harmful effects on private trade.

Considering the advantages and disadvantages, it seems that the open market operation could be employed in selective periods of a year, particularly in a year when the lean period prices tend to shoot above the normal peaks.

In those periods, open market sale from public foodgrain stock for a month or two will require only about a fraction of the estimated about 1.3 million tons for a year with supply elasticity of 0.2 and for a price fall of 25 percent. However, such operation will have to be of an experimental nature in the beginning to observe how normal market supply behaves in response to the government's open market sale operations in foodgrains.

#### IV. CONCLUSIONS

1. The analysis presented in this paper indicates that about two thirds of the public distribution of foodgrains goes to urbanized consumers, although only about 9.2 percent of the country's population are urban and the absolute number of the extremely poor (calorie intake level less than 1,720) category of rural population is about three times the total urban population.

However, the ration system has been very successful in supporting the consumption of the urban poor. Without rationing, the consumption level of the urban poor (lowest income 15% of the urban population) would have been 15 to 24 percent lower than their actual consumption of foodgrains in 1973-74.

2. An extremely low level of income of the rural poor is a serious constraint in improving their consumption levels and therefore nutritional status. Intervention policies like extended rural rationing and open market sales for the rural poor involve either a large subsidy cost or a low level of domestic prices for foodgrains. A low domestic price for foodgrains is considered undesirable from the point of growth in domestic foodgrain production. Emphasizing the need for improving the consumption level of the rural poor and acknowledging the difficulties in raising the income of the rural poor in a short run, a low domestic price for foodgrains in Bangladesh, along with a compensating policy of input subsidy to provide producers' incentive, would appear to be a logical course of policy\*. However, input subsidy does not provide much of a direct benefit to rural poor.

3. Because of a smaller effect of increased wheat supply on domestic rice prices than that of increased rice supply, and because of a proportionately higher



gain in calories from wheat than rice for every dollar's worth of import, it seems appropriate to encourage consumption of more wheat than rice among the rural poor. It will imply lower wheat prices than the present levels, and therefore wheat production will be severely affected unless government procures wheat. This policy option calls for a complete reevaluation of the government's policy to increase wheat production, particularly the opportunity cost of increased domestic production of wheat.

4. Increasing supply of ration foodgrains and/or lowering of ration prices generate additional demand for other commodities, including non-grain foods, at a faster rate than foodgrain consumption. Policies designed to increase supply of cheaper, non-grain foods, along with the public distribution of ration foodgrains, will improve overall nutritional status of the rural poor. Studies on supply functions of non-grain foods therefore deserve special attention.

5. The average level of calorie intake of the rural poor is low, but the calorie intake in a year with a large shortfall in production and in the lean period of every year, is even worse. Open market sale of foodgrains, in the rural markets under these situations may be quite effective in improving nutritional status of the rural poor with the least adverse impact on producers' incentive. However, in the absence of any knowledge as to how the private trade would react to such public market operations in foodgrains, such policies warrant caution and experimentation in the initial stage.

Although it is generally considered that the income of the rural poor cannot be improved in the short run, some specific activities like rural works programmes, food for works programmes, etc., can provide instantaneous income support to the rural poor. To expand such programmes to a size commensurate with the need for improvement of the nutritional level of the rural poor will require systematic and comprehensive study of such programmes. Answers to a number of questions have to be obtained before designing an expansion of such programmes for improving the nutritional status of the rural poor :

- i) What is the compatibility between the seasonal and regional nature of un-and-underemployment and the seasonal and regional scope for such programmes ?
- ii) Do these programmes create a net additional employment and income for the unemployed wage earners or reduce underemployment of farmers ?
- iii) What are the implications of these programmes for wage rates and prices and their indirect effect on long-run employment and income of the rural poor ?
- iv) What is the extent of productivity of such programmes. Do these programmes involve simple transfer of income or productive investment ?

v) What are the budgetary and organizational implications for an expanded programme commensurate with a certain degree of improvement in the nutritional status of the poor ?

vi) Is the system of wages in foodgrains necessarily better than the wages in cash ? What is the implication of the two systems for the composition of foodgrains, rural milling facilities, leakage, and storage ?

Unless answers to these questions are available, the basis for recommending further expansion of the income programmes in the rural area would remain weak.

#### FOOT NOTES

1. The definition of urban center in the population census includes all municipal areas. There were 108 such urban areas in the 1974 census including some Thana headquarters.
2. The 1970 election provided the platform demanding regional autonomy for the then East Pakistan.

3.	BUDGET SHARES	FOODGRAINS	OTHER FOODS
(i)	Average	43%	31%
(ii)	Low Income	51%	29%
(iii)	High Income	30%	39%

Based on 1973-74 Household Survey

4. The estimated price elasticities will not be applicable for such a large fall in prices. A fall in prices of more than 40 percent may shift consumers' from urban rationing to open market purchases, requiring an ever increasing supply to cause the prices to fall.
5. When the stock levels with the government are low the traders might anticipate the limited capacity of the government to influence market, and therefore, may withhold their stock, resulting in a sharper rise in prices.
6. Such a policy is necessary to prevent concentration of land in the hands of large farmers, because past experience indicates that small and marginal farmers sell their land to survive in a situation of high foodgrain prices. See also (Ahmed, 1978) for a comparison of price support and fertilizer subsidization policies.

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APPENDIX I  
FOODGRAIN CONSUMPTION ELASTICITIES BY INCOME GROUPS, 1973-74

Household Expenditure Gr. ups (TK/month)	Average Propensity to Consume	Marginal Propensity to Consume	Calorie Elasticity <sup>a</sup>	Expenditure Elasticity	Quantity Elasticity	Price Elasticity
0-99	0.49	0.69	1.37	1.41	1.38	-0.68
100-149	0.50	0.58	1.05	1.18	1.03	-0.52
150-199	0.52	0.55	0.87	1.05	0.84	-0.44
200-249	0.51	0.50	0.73	0.96	0.70	-0.36
250-299	0.51	0.47	0.66	0.90	0.63	-0.32
300-399	0.51	0.43	0.57	0.85	0.52	-0.27
400-499	0.49	0.40	0.50	0.79	0.44	-0.22
500-749	0.49	0.35	0.41	0.72	0.35	-0.17
750-999	0.47	0.32	0.34	0.67	0.28	-0.13
1,000-1,499	0.45	0.29	0.29	0.64	0.22	-0.10
1,500-1,999	0.39	0.23	0.20	0.57	0.13	-0.05
2,000 and above	0.27	0.12	0.05	0.46	0.0	3.0
All Bangladesh	0.47	0.37	0.51	0.75	0.41	0.19

a. Calorie elasticity refers to all food.

Based on double log Inverse consumption function, and taking price elasticity as equal to income elasticity multiplied by APC.

## APPENDIX 2

## A Note on Methods of Estimating Duplication of Rural Rationing

A household's foodgrain budget ( $BF_i$ ) is given so that :

$$BF_i = E_{ri} + E_{wi} \quad - \quad - \quad - \quad (1)$$

Where  $E_{ri}$  and  $E_{wi}$  are the total expenditures on rice and wheat respectively, by the representative household the  $i$ th income class—the income classes varying from 1, 2, ..., 5, in the ascending order of income. The Household Survey provides quantities of rice ( $Q_{ri}^0$ ) and wheat ( $Q_{wi}^0$ ) consumed by different income classes. Therefore, the price per unit rice ( $p_{ri}^m$ ) and wheat ( $p_{wi}^m$ ) consumed by different household groups can be estimated by dividing the  $E_{ri}$  and  $E_{wi}$  by the respective  $Q_{ri}^0$  and  $Q_{wi}^0$ . The budget equation (1) can be rewritten as:

$$BF_i = Q_{ri}^0 \cdot p_{ri}^m + Q_{wi}^0 \cdot p_{wi}^m$$

The initial budget equation is estimated for each representative household with the 1973-74 Household Survey data.

With access to rationing, the household allocates its foodgrain budget between ration foodgrains and market foodgrain, but finds a surplus in the foodgrain budget after satisfying the original level of consumption. This surplus ( $S_i$ ) can be estimated as follows :

$$S_i = BF_i - \{ (Q_{ri}^{rl} \cdot p_r^r + Q_{wi}^{rl} \cdot p_w^r) + (Q_{ri}^{ml} \cdot p_{ri}^m + Q_{wi}^{ml} \cdot p_{wi}^m) \} \dots (2)$$

Where :

$Q_{ri}^{rl}$  = Quantities of ration rice bought in the first installment by the  $i$ th representative household.

$Q_{wi}^{rl}$  = Quantities of ration wheat bought in the first installment by the  $i$ th household.

$P_r^r$  = Ration price per unit of rice.

$P_w^r$  = Ration price per unit of wheat.

$Q_{ri}^{ml} = (Q_{ri}^o - Q_{ri}^{rl})$  = Quantities of market rice bought by the *i*th household in the first installment.

$Q_{wi}^{ml} = (Q_{wi}^o - Q_{wi}^{rl})$  = Quantities of market wheat bought by the *i*th household in the first installment.

Because the representative household meets the original level of consumption up to this point,

$$Q_{ri}^{rl} \leq Q_{ri}^o \text{ and } Q_{wi}^{rl} \leq Q_{wi}^o$$

Solving the equation (2), it can be shown that :

$$S_i = (p_{ri}^m - p_{ri}^r) Q_{ri}^{rl} + (p_{wi}^m - p_{wi}^r) Q_{wi}^{rl}$$

i. e. the surplus is equivalent to ration income discussed in the text.

The proportion of this surplus spent on additional purchase of foodgrains is determined by the marginal propensity to consume (MPC). This is estimated from the Household Survey data using a double log inverse function :

$$\text{Ln}C = a + b \frac{1}{Y} + d \text{Ln}Y$$

Where C = expenditure per capita on foodgrain ( rice and wheat ),

Y = Total per capita household expenditure.

MPC is estimated :

$$\text{MPC}_i = \left( \frac{b}{\bar{Y}_i} + d \right) \frac{C_i}{\bar{Y}_i}$$

While using the  $\text{MPC}_i$ , it was adjusted to include ration income, i. e.

$$\text{MPC}_i = \left( \frac{b}{\bar{Y}_i} + d \right) \frac{C_i}{\bar{Y}_i} \text{ Where } \bar{Y}_i = Y_i + s_i$$

and  $s_i$  is the per capita ration income of the *i*th representative household.

Therefore :

$(\text{MPC}_i) (S_i)$  = Amount spent to purchase additional foodgrains.

$(1 - \text{MPC}_i) (S_i)$  = Amount spent on additional non-foodgrain commodities.

If ration availability of rice ( $Q_{ri}^r$ ) and wheat ( $Q_{wi}^r$ ) is greater than the first ration purchases ( $Q_{ri}^{rl}$ ) and ( $Q_{wi}^{rl}$ ), the household would undertake additional

purchases from the rationing so that :

$$Q_{ri}^{r2} = Q_{ri}^r - Q_{ri}^{r1} \text{ and}$$

$$Q_{wi}^{r2} = \bar{Q}_{wi}^r - Q_{wi}^{r1}$$

Where  $Q_{ri}^{r2}$  = additional ration rice purchases,

$Q_{wi}^{r2}$  = additional ration wheat purchases.

The remaining surplus i. e. the amount equal to  $(MPC_i) (S_i) - \{(Q_{ri}^{r2} \cdot P_r^r) + (Q_{wi}^{r2} \cdot P_w^r)\}$  is assumed to be spent on market rice only which is preferred to wheat.

If the above condition is not fulfilled (i. e.  $Q_{ri}^{r1} = \bar{Q}_{ri}^r$  and  $Q_{wi}^{r1} = \bar{Q}_{wi}^r$ ), then the surplus equal to  $(MPC_i) \cdot S_i$  is assumed to be entirely spent on purchase of market rice.

Given the composition of ration selected, this assumption appears consistent with the resulting composition of consumption after rationing. All resulting compositions of consumption show the proportion of wheat not below 28 percent—quite close to original compositions. The determinants of composition of foodgrain consumption could be numerous and complex and the Household Survey data for a single year could not yield any dependable relationship in this regard.

The quantity of additional rice purchased ( $Q_{ri}^{m2}$ ) using the amount  $(MPC_i) S_i$  is

$$Q_{ri}^{m2} = \frac{MPC_i \cdot S_i}{\bar{P}_r^m}$$

Where  $\bar{P}_{ri}^m$  is obtained from the estimated equation of

$$\bar{P}_{ri}^m = a + b Y_i \text{ for the value of } \bar{Y}_i = Y_i + S_i$$

This is required to account for observed quality differences in foodgrains among income classes (given at the end).

Thus :

$$\text{Total consumption of rice} = Q_{ri}^{r1} + Q_{ri}^{r2} + Q_{ri}^{m1} + Q_{ri}^{m2}$$

$$\text{Total consumption of wheat} = Q_{wi}^{r1} + Q_{wi}^{r2} + Q_{wi}^{m1}$$

$$\text{Domestic Procurement (DP)} = \text{MPO} - \text{MP}$$

MPO = initial market purchase

MP = Final market purchase

Import (x) = Ration quantities minus domestic procurement.

In case of wheat, the initial market purchase was about 133,000 tons and ration wheat was estimated to be about 250,000 tons. The remaining wheat consumption under the 5 income classes came mainly from works programme sources. All rice was assumed to be purchased from market in the initial position :

The estimated consumption function for calculation of MPC was

$$\ln C = 1.809 - 17.683 \frac{1}{Y} + 0.451 \ln Y$$

(6.033) (-6.243) (7.638)..... t statistics

$$R^2 = 0.986$$

Income Classes	MPC	Pri <sup>a</sup>	Pwi <sup>a</sup>
1	0.61	1.03	0.56
2	0.45	1.11	0.66
3	0.41	1.17	0.67
4	0.39	1.17	0.71
5	0.37	1.18	0.73

Notes : Consumption function was fitted with all income classes. Only 5 lowest income classes are shown here.

a. TK. per pound.