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INDONESIA



Food and Agricultural
Policy Research Institute

MEMORANDUM #1

**Impact Evaluation of Consumption Effects
of Food and Agricultural Policies
Indonesia Project**

December 1984

Project Staff

Prof. Stanley R. Johnson, Co-leader for Indonesia
Prof. William H. Meyers, Co-leader for Indonesia
Dr. Tesfaye Teklu, Senior Analyst
Mohammad Wardhani, Research Assistant

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This memoranda is designed to serve as background for a conferences to be held first by project staff and AID/Washington and later by project staff, AID/Indonesia and Indonesian collaborators for reviewing the policy issues selected for analysis and the research design. As indicated in the proposal, this memorandum will include the following information:

1. Develop the major policy issues proposed for investigation.
2. Establish the importance of these policy issues relative to nutrition.
3. Identify the proposed modeling approaches.
4. Indicate data requirements.
5. Suggest individuals or agencies in host countries that should be involved.

Each of these areas is addressed in this memorandum. The memorandum is by intent, relatively brief. Additional information will be provided to substantiate or elaborate on various issues and points identified in the memorandum. This memorandum provides the basis for discussions in Washington and Indonesia to finalize the project design in accordance with the interests of all parties. Points for discussion are included in each section to help resolve project design questions.

Major Policy Issue

The major policy issue for Indonesia is the evaluation of the President's policy announcement of January 1984 that there will no longer be a budget item for the "rice subsidy". This announcement is indicative of a general move of the government of Indonesia toward a phasing out of subsidies for major food commodities. Presently, subsidies are in place for wheat and rice. Fertilizer

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subsidies are also in place to offset the production disincentive effects of the rice subsidy. However, the agricultural sector in Indonesia can and does produce numerous other food commodities. These food commodities are potentially as important as rice in improving diets for the Indonesian population. In phasing out the subsidies on rice and wheat, the government is responding to the budget implications of these policies and, as well, the importance of moving to a more diversified agriculture and consumption base.

There are two important questions related to the decision for moving away from the subsidization of rice, wheat and fertilizer. First, it is important to identify the impacts of these changes in government policy on production and consumption behaviors in the country. Clearly, the method of implementing these policies will be important in conditioning these production and consumption impacts. In addition, it is important to anticipate the incidence of these policy effects on the agriculture of Indonesia and on consumption and nutrition status of the Indonesian population. Second, there is the question of government cost and alternative phase out policies. These government costs will be determined to a large extent by world market level prices for rice, wheat and other food items. Thus, in implementing the policies, it is important that the government of Indonesia evaluate their consequences conditioned on outcomes of world markets for these major agricultural commodities.

Patterns and Trends of Production and Consumption

The value added in Indonesian agriculture originates primarily from the production of crops. Food and non-food crops contributed not less than three-fourths of the value added in the 1970s. The other subsectors, i.e., forestry and livestock and fishery, each contributed, on average, 10 percent respectively.

The food crops include wetland and dryland rice, corn, cassava, sweet potatoes, soybeans and peanuts. Rice is the main single crop. Over 50 percent

Table 1
Distribution of Agricultural Value Added
at Constant 1973 Price, 1968-80

Commodity Group	1969	1979	1980
Food Crops	60.7	58.6	60.6
Rice	36.2	35.7	38.5
Secondary	24.5	22.9	22.1
Non-Food Crops	19.7	19.5	19.0
Forestry	7.4	10.4	9.0
Livestock & Fishery	12.2	11.6	11.5

Source: P. Sri-Bitang, "A Medium Multi-Sectoral Dynamic Simulation Model of the Indonesian Economy," Ph.D. dissertation, Iowa State University, 1984.

of the contribution of food crops to the value added in agriculture is from the production of rice (Table 1). Cassava and corn are two other food crops that have an important contribution to agricultural output. The non-food crops include coconuts, rubber, coffee, tobacco, spices and palm (oil and kernels). These crops contribute about 20 percent of the value added in agriculture. Based on 1977/80 production data (Statistical Yearbook), the nonfood crops in order of contribution to value added in agriculture are coconuts, rubber, coffee, and sugar cane.

Despite the multiplicity of these crops, rice remains the single dominant crop in Indonesian agriculture. Since 1968, rice production has progressed in three phases (Table 2). Between 1968 and 1971, the annual rate of growth in production was 5.5 percent. This period marks both the widespread adoption of chemical and biological technology and the beginning of a restructured BIMAS intensification program. The growth rate averaged 4.7 percent per annum in th

Table 2
Annual Average Rates of Growth of Food Crops:
Areas Harvested and Yield, by Region
1968-1981

Crop	Java		Off-Java		Indonesia	
	Area	Yield	Area	Yield	Area	Yield
Rice						
68/71	1.2	4.7	1.3	3.4	1.2	4.3
72/76	0.7	3.5	2.2	3.2	1.5	3.2
77/81	3.6	6.7	2.1	4.0	2.9	5.8
68/81	1.0	3.4	1.1	3.2	1.1	3.2
Corn						
68/71	-6.9	-0.3	-5.4	1.5	-6.5	0.3
72/76	-1.4	3.9	0.4	4.9	-0.7	4.3
77/81	4.1	6.1	2.5	4.7	3.6	5.9
68/81	-0.4	4.1	0.4	3.3	-0.2	3.9
Cassava						
68/71	-1.8	-1.1	-4.0	4.5	-2.0	0.2
72/76	-3.0	6.1	0.7	6.5	-2.1	6.3
77/81	0.0	1.9	2.0	-0.3	0.6	1.1
68/81	-1.2	2.8	1.9	1.5	-0.5	1.5
Sweet Potatoes						
68/71	-10.4	-0.6	4.0	2.8	-3.5	1.9
72/76	-3.4	9.0	-2.9	4.7	-3.1	6.8
77/81	-7.5	0.3	-1.5	0.0	-4.9	0.3
68/81	-5.1	3.1	-0.7	1.3	-2.7	2.2
Soybeans						
68/71	2.4	5.7	-8.4	11.4	0.0	7.0
72/76	-3.6	1.3	5.7	5.8	-1.8	3.3
77/81	5.7	2.4	5.3	-0.6	5.7	1.8
68/81	0.9	2.1	3.5	3.2	1.3	2.3
Peanuts						
68/71	-2.1	1.4	4.6	0.9	-1.7	1.4
72/76	3.4	0.0	9.3	3.7	4.0	0.9
77/81	0.0	3.8	1.7	3.4	0.0	3.5
68/81	1.9	2.2	6.2	1.5	2.9	2.0

Source: World Bank, "Policy Options and Strategies for Major Food Crops," Report 36865-IND, April 4, 1983.

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period of 1972 to 1976. The slow growth in this period has been associated with the occurrence of long droughts and the population explosion of brown hoppers. Since 1977, production has grown at an annual rate of 8.7 percent. The rapid increase in production in late 1970's and early 1980's is related to the effective realization of the Indonesian official motto for good cultivation: use of fertilizers, use of good seeds, better water management, better plant protection, and use of better cultivation methods.

The rising trend in rice production is related to the growth in both yield and area harvested. During the period between 1968 and 1981, the area harvested and yield grew at annual rates of 1.1 and 3.2 percent, respectively. That is, 75 percent of the growth in production is associated with an increase in yield and the remainder with the area harvested.

While the yield of other food crops has also increased in most periods, the areas harvested for several other important food crops have declined. The changing patterns of production have been much influenced by government programs on the production side. During the last five-year plan when emphasis was shifted from mainly rice production programs to broader food production programs, area planted to other food crops responded.

The average diet of an average Indonesian consists of rice, regardless of their residential locations. But, according to Table 3, the average diet in rural Indonesia is more diversified--rice is combined with other secondary food crops (corn, cassava, sweet potatoes). In contrast, the urban population's dietary habits are more centered on rice consumption; therefore, the secondary crops are less important to urbanites.

The consumption patterns are very similar in Java and off-Java. First, rice still dominates as the main staple crop even though the per capita rice consumption among the urban population is higher (albeit small) than the rural population in Java. The opposite is true for off-Java. Second, the secondary

Table 3

Annual Rural and Urban Consumption Per Capita,
by Crop, 1969/70, 1976, and 1978

Region/Crop	1969/70			1976			1978		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
(Kilograms)									
Indonesia									
Rice	103.2	101.3	113.8	111.2	110.5	114.3	109.2	109.2	109.2
Corn	22.0	25.4	3.2	9.9	11.9	0.7	11.4	14.0	1.0
Cassava, fresh	21.9	23.7	12.3	26.2	29.9	9.5	20.2	22.9	8.8
Cassava, gapek	7.7	8.9	1.4	6.4	7.9	0.2	7.3	8.8	0.0
Sweet potatoes	8.8	9.6	4.3	10.8	12.3	4.1	5.7	6.2	2.6
Java									
Rice	92.7	89.8	108.5	103.3	102.4	107.3	99.8	98.8	104.0
Corn	28.2	33.3	2.9	11.5	14.0	0.5	15.1	17.7	1.0
Cassava, fresh	21.4	23.3	11.5	21.6	24.9	6.7	20.3	22.9	7.8
Cassava, gapek	9.5	11.1	1.7	8.0	9.7	0.1	9.4	11.4	0.0
Sweet potatoes	7.9	8.6	4.2	7.5	8.4	3.4	3.6	4.2	2.6
Off-Java									
Rice	123.1	122.7	126.6	124.8	124.4	126.6	130.0	130.0	119.6
Corn	10.2	11.2	3.8	7.0	8.3	1.1	5.7	6.8	1.6
Cassava, fresh	22.9	24.3	14.0	34.2	36.5	14.4	20.2	22.4	10.4
Cassava, gapek	4.3	4.9	0.5	3.8	4.6	0.3	3.1	3.6	0.0
Sweet potatoes	10.5	11.3	4.7	16.4	18.8	5.3	8.8	10.4	2.6

Source: Taken from Dixon, John A., "Food Consumption Patterns and Related Demand Parameters in Indonesia: A Review of Available Evidence," June 1982. (The figures are based on Susenas Surveys.)

food crops constitute a significant share of the average diet in rural areas of both regions. It seems that these crops are, in fact, more important in some of off-Java islands (e.g., Sagu in Mollucca). Finally, the urban population in both regions are dependent on a mono-crop diet, i.e., rice.

Price Stabilization and Subsidy Policies

Rice is the first food crop commodity for which the government intervened in the market. Beginning in 1970, a policy was introduced to set floor and ceiling prices for rice. The floor price was to be set high enough to stimulate domestic production and improve farm income. The ceiling price, on the other hand, was to provide a price subsidy to the consumers, and, as evidenced in the late 1970s, to contain the rate of inflation.

The floor price is determined on the basis of an incremental benefit-cost ratio that results from participation in the BIMAS program. The government sets the floor price such that the magnitude of the benefit-cost ratio is sufficient to induce farmers to join the intensification program and increase rice production. The floor price is adjusted every year to take into account changes in the economic environment.

The concept of ceiling price has changed over the years. In the early 1970's, ceiling prices for deficit and surplus regions were set with a sufficient margin to attract private traders and millers. In the late 1970's, ceiling prices have been used as a means to control the rate of inflation. A bundle of rice varieties is singled out in the cost of living index and their ceiling prices are set within an upper bound of the annual inflation rate.

As can be learned from Table 4, the levels of floor and ceiling prices have increased over time. The floor price for milled rice has increased from Rp 37/kg in the early 1970's to Rp 195/kg in 1981/82--an average growth rate of 14.9 percent per annum. The ceiling price has also increased by a slower rate of 13.0 percent per annum. While the floor price was raised annually to stimulate the

participation of farmers in the BIMAS program, the ceiling price was raised more slowly. This is more evident in the patterns of the price margin over the years. The price spread has declined from a peak of 46 percent in 1974/75 to 15.4 percent in 1981/82. Between 1975 and 1982, the price spread was less than 20 percent in all the years except in 1975 and 1980/81.

A comparison of the Indonesian retail prices with import parity prices of rice (Table 5), shows that the latter were generally higher for most of the 1970's and early 1980's. The only years where the Indonesian prices exceeded the world prices were 1973, 1976, 1977, and 1982. Since the devaluation of the Rupiah in 1983, the domestic price has again been held below the border price. This suggests that rice in Indonesia has been priced below its opportunity cost as measured by its bordered prices. Also, the pricing policy has put a burden on the budget of government of Indonesia.

The village unit cooperatives (KUD) and the Agency of Logistics (BULOG) are charged with the implementation of the floor price policy. If the local free market of rice falls below the specified floor price, the KUDs should buy the rice sold by the farmers at the floor price less a quality discount. BULOG pays the floor price and commission to the KUDs as it procures the rice. The role of private traders and miller has diminished over time as the KUD units have expanded in the price support program and as the government has withdrawn subsidized credit and favorable commissions from the private sector.

To implement the ceiling price, BULOG is required to release supplies onto the market as long as the rice market price exceeds the ceiling price. The market operations (i.e., the injection of rice from the national stock into the market) are carried out through BULOG's distribution centers (DULOGS) throughout the country.

Based on the experience in the rice sector, a floor price on corn was implemented in 1978 in East Java, the main corn producing area in Indonesia. The

Table 4

**Floor and Ceiling Prices, Price Margin, Size of
Domestic Procurements and Market Operations
for Milled Rice**

Year	Floor Price (Rp/kg)	Ceiling Price (Rp/kg)	Price Margin (%)	Procurement ('000 tons)	Percent of Production	Market Operation ('000 tons)
1969/70	37	50	35.1	349	2.6	364
1970/71	37	50	35.1	349	2.6	364
1971/72	37	50	35.1	349	2.6	364
1972/73	37	50	35.1	349	2.6	364
1973/74	45	--	--	349	2.6	364
1974/75	68.50	100	46.0	536	3.5	342
1975/76	97	120	23.7	539	3.6	559
1976/77	108	125	15.7	410	2.6	979
1977/78	110	127.5	16.0	404	2.5	2,006
1978/79	119.50	140	17.2	881	5.0	1,032
1979/80	158.0	175	10.8	431	2.4	2,036
1980/81	175.0	220	25.7	1,650	8.1	1,630
1981/82	195.0	225	15.4	na	na	na

Source: Soegent Amnt, "Promoting National Food Security: The Indonesian Experience," In Food Security: Theory, Policy and Perspectives from Asia and the Pacific Rim, 1982.

Table 5

**Trends in Imported and Actual Rice Prices
per Ton (U.S. Dollars) in Jakarta**

Year	<u>Imported Price</u> Cost to Retail Jakarta	Actual Jakarta Retail
1970	148.64	112.4
1971	115.45	109.3
1972	127.45	119.0
1973	175.76	205.2
1974	558.69	242.2
1975	380.49	262.7
1976	263.37	309.6
1977	287.33	319.6
1978	382.22	318.8
1979	362.00	272.5
1980	466.40	319.0
1981	470.10	325.0
1982	320.90	348.0

Source: World Bank, "Policy Options and Strategies for Major Food Crops,"
Report 36865-IND, April 4, 1983.

level of the floor price was determined on the basis of an incremental benefit-cost ratio with the constraint that the price of corn should not exceed half the price of rice. Beginning in 1979, the floor price was implemented throughout the country, while at the same time a floor price for soybeans and peanuts was also issued. The floor prices of soybeans and peanuts are generally below the prevailing free market prices. The mechanisms for the implementation of these policies is the same as for rice.

Inputs whose prices are controlled by the government are fertilizers and pesticides. Various types of fertilizers are used, but urea and TSP account for about 90% of all fertilizers used. The domestic fertilizer prices were well below both the import parity prices and its own domestic cost of production and distribution. In 1982 for instance, the estimated domestic price for urea was Rp 90/kg compared to the import parity gatege price of Rp 160/kg. For TSP, the official price of Rp 90/kg was also lower than the import parity price of Rp 171/kg.

In response to such favorable relative prices, the use of fertilizers has increased steadily in the 1970's at an annual rate of 15 percent. The rise of urea, in particular, has increased at the annual rate of 14.4 percent in Java and 15 percent in Indonesia as a whole. Because of the regional concentration of the BIMAS program, most of the fertilizer consumption has been on wetland paddy fields in Java.

Pesticides were also heavily subsidized by the government for the same reason. As in the case of fertilizers, the farmers can buy various types of recommended pesticides at a relatively low fixed price which induces them to use sufficient amounts in their food crop production.

Points for Discussion

1. What options are being considered for changing rice, wheat and fertilizer subsidies?
2. What are the key variables the Government of Indonesia would evaluate in assessing the trade-offs of policy options?

Policy Decisions and Nutrition

As rice is important to the diets of Indonesians, the phasing out of the subsidy policy has broad potential implications for nutrition. The subsidized policies are, in fact, income transfers to low income consumers, especially those in urban areas. The fact that the low income population consumes a higher proportion of its total budget in rice and other staples, makes the proposed change in the income transfer policy more important. Rural poor are less dependent on rice (Table 6) and are more likely to benefit from higher prices as producers or rural wage earners.

Two types of information are needed for identifying the potential impacts of these changes in subsidization policy on the nutrition status of Indonesian households. First, survey data will be required. These survey data can identify consumption patterns of households with different socioeconomic characteristics and importantly, different income statuses. These baseline data will provide the possibility for identifying the nutrition status of different groups within the Indonesian population. Nutrition status in this instance should include more than caloric intake. That is, adaptation of a more sophisticated nutrient data bank can be contemplated as one of the methods for better analyzing the nutrition status. The second requirement will be information on how these households respond to changes in relative prices. Clearly, from a household viewpoint, the important aspect of the changed subsidy policy is the change in relative prices. Thus, elasticity measures will have to be calculated for the households as a basis for understanding how they will adjust to these changed relative prices.

The nutritional analysis is complicated by the fact that many of the low income households are also involved in the production of these agricultural commodities. Thus, the change in relative prices will affect their incomes as well as their consumption patterns. This is the reason for using a household decision model in the analysis. As well, it will be important to access to the extent possible survey data that indicate how the production process will be influenced by these changes in relative prices.

Points for Discussion

1. Are there specific nutrition policies that may be adopted by the Indonesian government?
2. To what extent do assessments of nutrition implications of the subsidy policies involve production responses of households?
3. What nutritional trade-off information would the government of Indonesia evaluate in assessing policy options?

Analytical Approach

Two modeling approaches will be utilized. These are the macro (agricultural sector) and micro household analyses identified in the proposal. Macro models will be used to analyze the consequences for the government of changes in the subsidization policies. These models will provide information on potential price levels in world markets for these major agricultural commodities. Simple linkages will be developed between already existing macro or international commodity market models maintained by FAPRI and the processes determining production and consumption levels in Indonesia. Based on these simple linkages, assessments will be made of government costs, imports, exports and projected relative prices for major agricultural commodities in the country.

The in-country macro or sector analysis will be an extension of previous work on supply and demand projections and price policies developed by Teken and Meyers. Specifically, trend level information will be identified on production

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and consumption for major agricultural commodities. These trend level data, on the consumption side, will be linked to population. Simple projections will be made initially, assuming that consumption will change only in relationship to changes in the composition of the population. Then, projections will be elaborated to take into consideration income and price effects. The same procedure will be used on the production side. In each case, however, it will be important to reflect a price determination process that does not occur in Indonesia but in the world market with appropriate linkages to Indonesia. The Indonesian model will be linked on a satellite basis with models and data bases maintained by FAPRI to support projections of world market equilibrium prices for basic agricultural commodities.

The proposed micro analysis will reside largely on the household survey data. This micro analysis will feature the household production approach. That is, households will be viewed as both producing and consuming units. The approach will be to analyze the decision processes within these households utilizing the available survey data. Outcomes of these decision processes that are particularly important include diet, nutrition status, income levels, production levels, and other resource utilization patterns. There is a problem with these models in that survey data bases have traditionally concentrated on the consumption side, not bringing into focus in an integrated way the production process for the surveyed households. Thus, the models will deal with the data as they are available but supplement these data with the structure from the household production theory and, if necessary, synthesized production information. The micro models will operate on a satellite basis with the in-country aggregate models of commodity markets.

Data Requirements

The proposed analyses will require substantial data. The aggregate data outside Indonesia are already available. The documentation for these data will

be included in subsequent memoranda. In addition, we need additional information on:

1. Household survey data bases, especially the survey Ganda Sasaran which includes both production and consumption data.
2. Aggregate production and consumption statistics within Indonesia.
3. Linkages between agriculture and the non-agricultural sectors.
4. Data and bibliography on results of previous modeling efforts for Indonesia (any additions to those listed in the bibliography attached).
5. Baseline level information on population growth and consumption.

Individuals or Agencies to be Involved

It will be important that appropriate contacts be made with the individuals and agencies to be involved in the project within Indonesia. This will permit specialization of the analysis and analytical techniques to policy analyses contemplated by these agencies and/or individuals. It is intended that after contacts are made with these individuals and agencies, that the research be oriented toward specific policy proposals. This will make it possible to command the interests of the individuals and agencies involved and, as well, to develop products which are of current value. The project plan includes the development and delivery of these products in a form that is appropriate for the collaborating agencies and individuals in Indonesia.

Proposed Contacts in GOI

1. Ministry of Agriculture
 - a. Nutrition Unit (probably the main collaborating agency)
 - b. Bureau of Planning
 - c. Center for Agricultural Economics Research
 - d. Directorate General of Food Crops
2. Central Bureau of Statistics (household data)

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