Institute of Economic Development and Research
SCHOOL OF ECONOMICS
University of the Philippines

Discussion Paper No. 70-23

23 March 1972
(Revised)

RICE CONSUMPTION CHARACTERISTICS INFLUENCING RICE MARKETING IN THE PHILIPPINES

by

Leon A. Mears, 1907-

TABLE OF CONTENTS

CHAPTER IV

Rice Consumption Characteristics Influencing Rice Marketing in the Philippines*

I. Introduction

Rice is the most important carbohydrate consumed in the Philippines. It provides a major portion of the calories in the average diet. The weight for rice in the Central Bank's Consumer Price Index for Manila is 10.95 percent.[1/] Given this importance to the average Filipino, demand/supply inequalities with their unstabilizing influence on prices can result in undesired social and political repercussions as well as constraints to general economic development activities.

As production is seasonal, marketing agencies must provide storage and distribution to match the relatively constant demand. They are also concerned with transportation from surplus to deficit areas. Buffer stocks can be provided to balance short run disequilibriums between market demand and supply to hold price fluctuations within tolerable limits. Longer run imbalances call for either imports or exports. Thus, in the short run, it is important both for private traders and for the government stabilization agency to have accurate information about expected consumption as well as of production. For longer run production

---

* The author is indebted to Aurora Galindo, Melisa Agabin, Teresa Andam, Carmencita Rucio, Rachel Cabato and Thelma Degamo for invaluable research assistance while preparing this paper. Amelita Mafibo and Rosalinda Cuila spent long hours in typing and carefully proofreading successive drafts.

1/ Rice accounts for 17.53 percent in the BCS Consumer Price Index for low income families in Manila.

and import/export policies, world market production and consumption expectancies also must be taken into account.

These parameters are discussed in this chapter under the following general groupings: 1) long-run consumption trends, 2) inter-temporal and inter-spacial consumption, and 3) determinants of domestic demand.

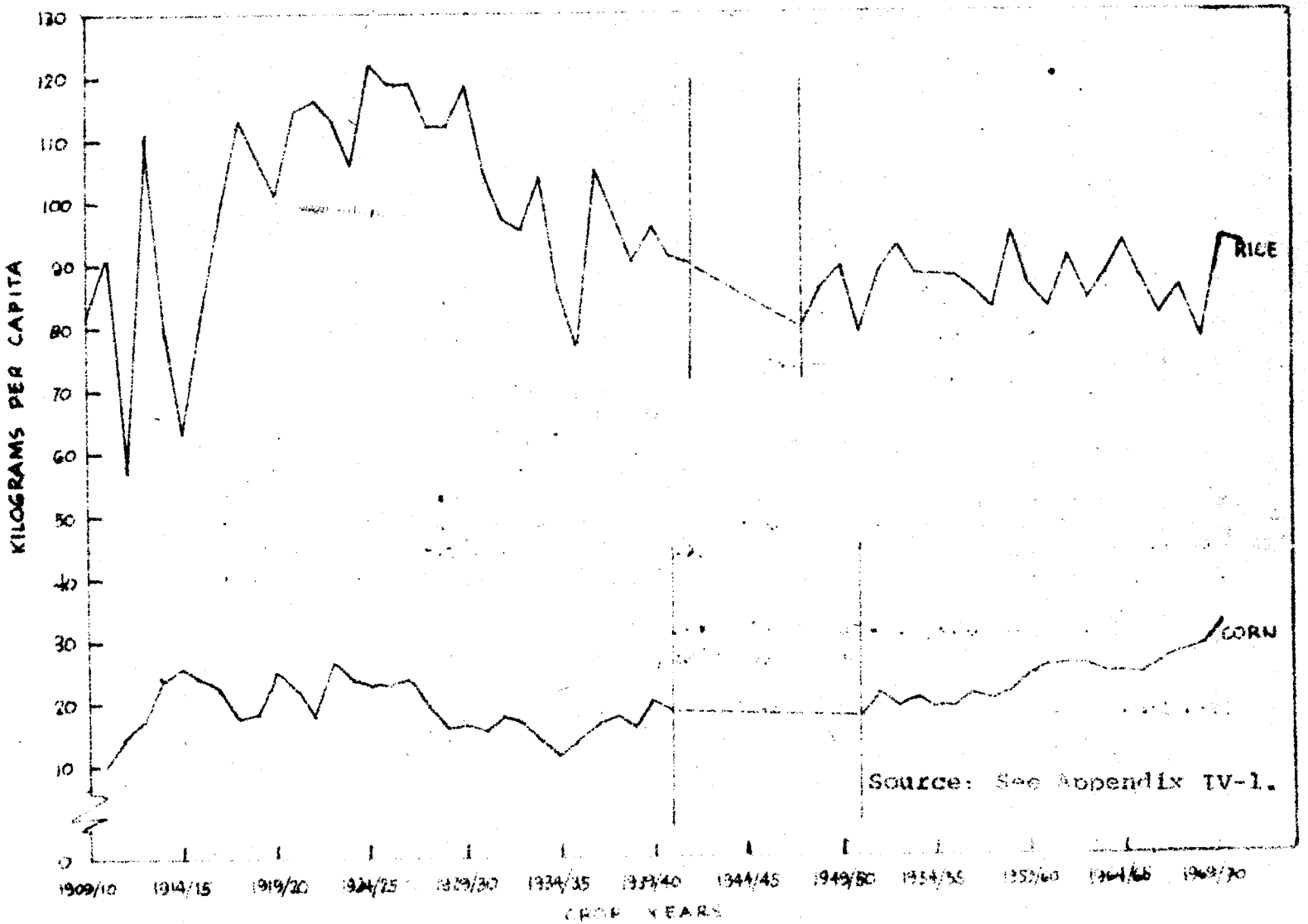
II. Long-Run Consumption Trends

Crude estimates of apparent per capita rice and corn consumption since 1909/10 are shown in Chart IV-1. These crude estimates include adjustments to production allowing for imports or exports, seed use, and animal feed. They do not allow for year-end changes in stocks, non-edible manufactures or waste, as data are not available for the complete period. To the extent that pre-World War II production estimates can be relied upon, it appears that per capita post-war apparent rice consumption has remained appreciably below pre-war levels while per capita post-war corn consumption has gradually risen, exceeding pre-war levels especially after 1967. On the basis of these crude estimates, pre-war apparent rice consumption generally exceeded 110 kg/capita from 1920 to 1931, while it averaged below 90 kg/cap. since 1950. In contrast, apparent per capita corn consumption in the 1950's exceeded that of the 1930's and rose continuously in the 1960's to a peak of over 29 kg/capita in 1969/70. Possible explanations to the contrasting consumption reactions are discussed in the section on determinants of domestic demand.

More precise consumption estimates are possible only after 1954/55 when it became possible to correct for non-edible manufactures and waste. Also, after 1957/58, at least partial corrections were available for stocks

CHART IV-1

CRUDE ESTIMATE OF APPARENT PER CAPITA AVAILABILITY OF RICE AND CORN, 1909/10 - 1970/71



Source: See Appendix IV-1.

carried over at the end of each year.[2/] Apparent per capita consumption of rice estimated on this refined disappearance basis is shown in Table IV-1. Similar consumption estimates for other cereals, starchy roots and tubers are shown in Table IV-2.[3/] For comparative purposes, all per capita estimates are expressed in terms of rice calorie equivalents.[4/]

As illustrated on Chart IV-2, it would appear that in spite of an average annual rate of income increase of approximately 2.3 percent since 1955, per capita rice consumption has shown only a slight tendency to increase over these years.[5/] On the other hand, per capita corn consumption appears to have increased at an average annual rate of 2.8 percent and

---

[2/] Beginning in 1957, BAE estimated stocks held in warehouses of private traders with Government stocks reported by NARIC and RCA. The surveys of private stocks were incomplete with totals undoubtedly underestimated. However, they are considered sufficiently comparable from year to year to provide an added degree of accurary to apparent consumption estimates. Since 1968, BAE has improved survey methods and expanded coverage in collecting country-wide stock estimates such that current estimates are considered much more reliable. Adjustment has not been made for stocks in farm and non-farm households although BAE has made surveys starting in 1967. These were found to vary by as much as 300,000 tons of milled rice equivalent between July 1968 and July 1969. If household stocks actually do vary to this extent, the year to year apparent consumption variation may be partially explainable.

[3/] These refined figures have also been corrected for seed, manufactures (of non-consumption products) and waste.

[4/] As calorie content of milled corn and wheat flour is approximately the same as for rice, their kg/capita consumption estimates represent approximate weights of the product as purchased. For all other items with lower per unit calorie content, actual product weights are considerably higher than shown on the equivalent calorie basis.

[5/] With the possible exception of 1969/70 and 1970/71.

TABLE IV-1

Annual Average Per Capita Production and Apparent Consumption of [illegible] in the Philippines
1954/55 - 1970/71
(in kg. per capita)

Crop Year	Production	Available for Human Consumption (disappearance)		Total Availability for Human and Animal Consumption, Seed, Manufacture and Waste 3/
		Crude Estimate 1/	Refined Estimate 2/	
1954/55	89.5	87.3	87.0	91.3
1955/56	88.8	87.6	87.4	91.6
1956/57	88.1	85.7	85.5	89.7
1957/58	81.8	82.4	82.2	86.6
1958/59	91.3	94.3	87.6	92.2
1959/60	89.9	85.4	84.0	88.8
1960/61	86.5	82.5	91.8	96.0
1961/62	88.6	91.6	84.8	88.6
1962/63	87.3	84.4	87.7	91.4
1963/64	82.1	88.7	88.4	91.9
1964/65	82.8	94.9	92.9	96.4
1965/66	82.0	89.0	89.3	92.6
1966/67	80.0	83.7	85.5	88.7
1967/68	88.2	88.0	81.1	84.5
1968/69	83.4	79.4	81.5	84.9
1969/70	97.2	94.2	97.0	100.3
1970/71	96.4	94.0	95.8	99.1

1/ Production adjusted only for imports, seed, and animal feed.

2/ Production adjusted for imports and commercial stocks less seed, animal feed, manufacture and waste (no correction for stocks prior to 1957/58).

3/ Production adjusted for imports and commercial stocks.

Source: See Appendix IV-1 and IV-2 for sources and methodology.

TABLE IV-2

Annual Average Per Capita Apparent Human Consumption (Availability) of [illegible] in the Philippines, 1954/55 - 1969/70

(in kg. per capita in terms of rice calorie equivalent)

Year	Corn 1/	Wheat and Products 2/	Sweet Potato (Camote) 2/	Cassava 2/	Others 2/	Total Including Milled Rice
1954/55	18.3	9.3	12.5	2.8	1.7	131.6
1955/56	20.9	9.6	12.8	3.0	1.5	135.2
1956/57	20.1	10.1	12.7	2.9	1.7	133.0
1957/58	19.0	11.5	12.7	2.8	1.7	130.0
1958/59	20.6	9.7	12.2	2.6	1.7	134.4
1959/60	23.2	8.3	11.6	4.2	1.3	132.6
1960/61	24.1	9.0	10.0	5.1	1.5	141.3
1961/62	24.0	9.0	9.2	4.4	1.3	132.7
1962/63	24.2	9.8	9.6	3.9	1.4	136.6
1963/64	23.1	10.4	9.7	4.9	1.5	138.0
1964/65	23.7	10.7	8.8	5.1	1.4	142.7
1965/66	24.2	11.3	8.2	4.4	1.3	138.8
1966/67	25.9	11.6	7.8	3.7	1.3	135.4
1967/68	26.5	12.4	7.4	3.2	1.2	131.7
1968/69	28.0	12.3	7.6	3.0	1.2	133.7
1969/70	29.7	11.0	7.6		1.1	

1/ Corrected for year end stocks starting in 1958/59.

2/ No correction for year end stocks.

Sources: See Appendices IV-2 and IV-3 for sources and methodology.

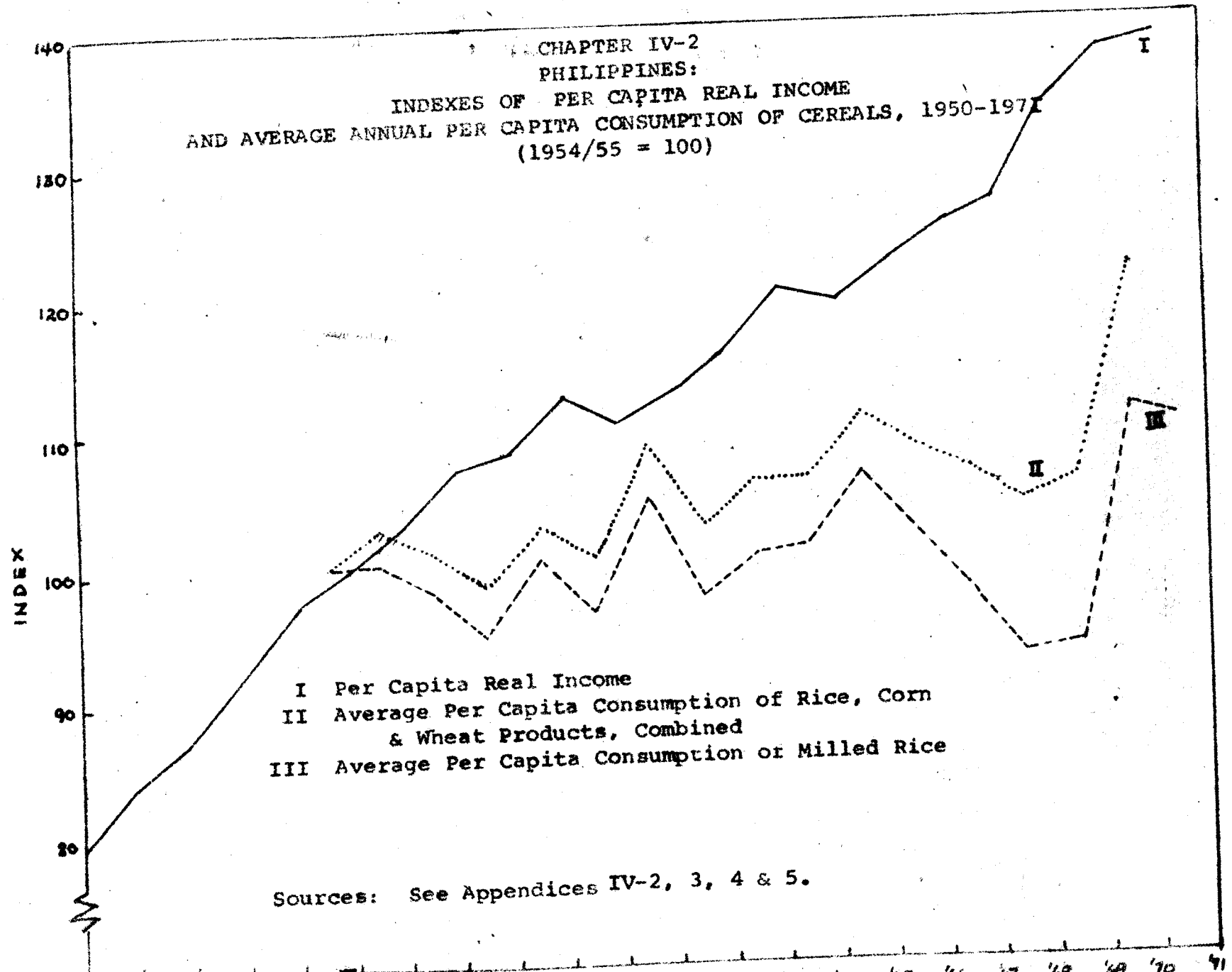
CHAPTER IV-2

PHILIPPINES:

INDEXES OF PER CAPITA REAL INCOME

AND AVERAGE ANNUAL PER CAPITA CONSUMPTION OF CEREALS, 1950-1971

(1954/55 = 100)



I Per Capita Real Income

II Average Per Capita Consumption of Rice, Corn & Wheat Products, Combined

III Average Per Capita Consumption or Milled Rice

Sources: See Appendices IV-2, 3, 4 & 5.

TABLE IV-3

Comparison of Recommended National Average Per Capita Cereal Consumption with Apparent Cereal Consumption
(in kg/capita/year)

Cereal	Recommended National Average Cereal Consumption	Apparent National Average Cereal Consumption 1965/66-1969/70
Rice	86.5	86.9
Corn	23.7	26.8
Wheat Products	8.4	11.7
TOTAL	118.6	125.4

Sources: Recommended Consumption, Food and Nutrition Research Center, Manila (unpublished).
Apparent Consumption, see Tables IV-1 and IV-2.

III. Inter-temporal and Inter-Social Consumption

Available statistical studies of regional rice consumption leave much to be desired but can provide a first approximation for marketing decisions.

FNRC is the only organization that has conducted scientifically designed household surveys on a national basis to determine the actual amount consumed of each carbohydrate food. Its survey used a sub-sample of the Philippines Statistical Survey of Households (PSSH) regional sample as used for the BCS Household Surveys. Regions were surveyed in different years between 1958 and 1969 with each sample recording the consumption during a one-week period sometime between March and June[8/], months that include religious fiestas. Thus, annual consumption estimates obtained from these surveys might be biased if the survey week was not representative. As each regional survey was conducted in a different year, consumption of specific foods also will have a bias when combined on a national basis where per capita consumption was increasing or decreasing over the decade. Despite these shortcomings, the fact remains that this study provides the only careful regional analysis available. Regional per capita consumption estimates from this survey are shown in Table IV-4.

Distinct differences in per capita rice consumption are indicated. Central Luzon, where over one-quarter of the country's rice is grown,

---

[8/] At this time, Central Luzon has been surveyed only on a pilot basis (1958) which is believed by FNRC to be less reliable than other surveys. In early 1972, FNRC and BAE were cooperating in making new pilot surveys which will form the basis for revisions of these original FNRC estimates.

TABLE IV-4

FNRC Estimates of Annual Per Capita Consumption of Carbohydrate Foods in the Philippines 1958 - 1969
(in kg/capita in terms of rice calories)

Region[1]	Year of Survey	Rice	Corn	Wheat and Products	Cassava	Sweet Potato (Camote)	Others[2]	Total
Metropolitan Manila	1958	87.8	0.2	20.6	0.1	0.7	0.6	110.0
Ilocos-Mt. Province	1960	143.0	2.0	4.2	0.3	5.0	0.2	154.7
Cagayan Valley	1961	97.6	25.9	3.4	0.1	2.6	3.0	132.6
Central Luzon[3]	1958	154.8	n.a.	n.a.	n.a.	n.a.	n.a.	
Southern Tagalog	1962	112.6	0.7	10.3	0.4	4.3	0.8	129.1
Bicol[4]	1969	91.6	11.4	7.7	4.5	5.3	0.6	121.1
Total Luzon[6]		120.5	n.a.	n.a.	n.a.	n.a.	n.a.	
Eastern Visayas	1965	55.0	53.9	4.7	4.3	9.0	1.9	128.8
Western Visayas	1964	94.1	28.1	4.0	1.4	1.6	0.5	129.7
N. & E. Mindanao	1967	91.2	30.5	6.1	0.9	2.9	0.8	132.4
S. & W. Mindanao	1966	84.5	36.8	4.6	1.4	1.7	0.5	129.5
Total Mindanao[6]		87.0	34.4[5]	5.2[5]	1.2[5]	2.2[5]	0.6[5]	129.7
Philippines[6]		100.6	24.0[5]	6.7[5]	1.8[5]	4.2[5]	1.0[5]	

1/ BCS (PSSH) regions.
2/ Includes taro, yam, white potatoes, and sago.
3/ Pilot study, degree of accuracy uncertain as sample size small.
4/ Preliminary.
5/ Does not include Central Luzon region.
6/ Weighting based on revised 1968 population figures as per May 1970 census.

Source: NSDB, NIST, Food and Nutrition Research Center, Manila (unpublished).

consumes most per capita, 156.8 kg. Close behind, with 143 kg/capita, is the Ilocos region, where only about 5 percent of the country's rice is produced. Lowest consumption, 55 kg/capita, is found in the Eastern Visayas where per capita consumption of corn is largest, 53.9 kg. All regions except Bicol, Eastern Visayas and Metropolitan Manila appear to have total cereal consumption in excess of the nutritional recommendation of 118.6 kg/capita. The lower consumption in Bicol and Eastern Visayas is compensated for to some extent by relatively heavy intake of both cassava and sweet potatoes. It is likely that the low consumption in Metropolitan Manila reflects its higher per capita income which implies that for the average resident rice has already become an inferior food and that more expensive non-carbohydrate foods are substituted in the diet.[9/]

Several possibilities are available to check accuracy of the FNRC survey results. The 1965 PSSH reported average weekly per capita rice expenditure for the different regions. By relating these expenditures on an annual per capita basis to the per capita rice consumption reported by the FNRC survey, an estimate can be made of the price paid per ganta of rice if that quantity had actually been consumed. If the prices so determined corresponded to actual market prices of 1965, there would be a confirmation of the per capita consumption reported. However, these calculations give no general confirmation. Prices inferred ranged from P1.32 per ganta in Cagayan Valley region to over P3.25 per ganta in the Eastern Visayas. This was a year when the average annual price of Macan

---

9/ The PSSH in 1965 reported an annual per capita income in Metropolitan Manila of almost P1,000, with the next highest in Southern Tagalog region of only P580, see BCS, PSSH, May 1966.

varieties in Manila was slightly under P1.50/ganta.

A second possible check involves estimating the disappearance for groups of regions. This was possible for four crop years for groups of regions separated by water where inter-island shipments are recorded by the BCS. Estimates of the disappearance (apparent consumption) of the four groups of regions that could be so isolated are shown in Table IV-5. Here, some degree of correlation with the FNRC survey estimates will be observed. In general, for rice, the FNRC estimates appear on the high side, a conclusion also evidenced by comparing the apparent national per capita consumption as shown on Table IV-1. The FNRC estimates are closest to the disappearance estimates for Luzon region but considerably higher for the Visayas and Mindanao.

Table IV-5 also shows estimates of apparent consumption for these four groups of regions for corn, sweet potato and cassava. While the two methods show a limited degree of correlation, it is sufficient only for first approximations in marketing decisions. For example, compared to the disappearance estimate, the FNRC estimate of corn consumption is high for the Visayas and low for Mindanao. This difference could be explained if large water shipments had been made from Mindanao to the Visayas but not recorded properly. However, this reasoning would not explain the relatively low FNRC consumption estimate of sweet potatoes in Eastern Visayas and Mindanao or of cassava in Mindanao. It is unlikely that large water shipments were made of these roots and tubers which are relatively heavy compared to their unit value.

TABLE IV-5

Average Annual Apparent Per Capita Consumption (disappearance) of Rice, Corn, Sweet Potato and Cassava in Terms of Rice Calorie Equivalent by Groups of Regions 1964/5-1968/9 1/
(in kg/capita)

Crop Year	Luzon Regions	Eastern Visayas	Western Visayas	Mindanao Regions	Total Philippines
			Rice		
1964/65	108.0	53.7	80.4	89.1	92.9
1965/66	118.4	46.7	66.2	58.5	89.3
1966/67	107.8	47.8	87.4	52.6	85.5
1967/68	105.1	41.8	64.4	56.5	81.1
FNRC Estimate 2/	120.5	55.0	94.1	87.0	100.6
			Corn		
1964/65	110.0	38.0	22.2	49.2	23.7
1965/66	9.0	48.5	22.4	46.9	24.2
1966/67	9.8	45.0	13.8	55.2	25.5
1967/68	12.0	66.1	19.7	40.2	26.4
FNRC Estimate 2/	n.a.	53.9	28.1	34.4	24.0
			Sweet Potato		
1964/65	9.4	18.7	1.9	5.0	8.8
1965/66	9.3	15.1	2.6	4.6	8.2
1966/67	8.6	15.0	2.6	4.3	7.8
1967/68	8.1	14.7	2.6	4.2	7.4
1968/69	8.5	14.5	2.6	4.0	7.6
FNRC Estimate 2/	n.a.	9.0	1.6	2.2	4.2
			Cassava		
1964/65	1.9	6.4	3.7	13.6	5.2
1965/66	1.8	4.9	2.8	12.0	4.5
1966/67	1.7	4.2	2.3	9.3	3.7
1967/68	1.5	4.0	2.2	7.7	3.2
1968/69	1.4	3.8	2.1	7.3	3.1
FNRC Estimate 2/	n.a.	4.3	1.4	1.2	1.8

1/ BAE Regions. These differ from PSSH regions by inclusion of Negros Oriental in Western Visayas by BAE rather than in Eastern Visayas as by PSSH.

2/ The Luzon surveys were made in various years between 1958 and 1969, Eastern Visayas in 1965, Western Visayas in 1964 and Mindanao in 1966 and 1967.

Source: See Appendix IV-6.

While it is evident that improvement in statistical reporting is definitely required to provide traders with more reliable information for their marketing decisions, rice consumption estimates by these two methods appear sufficiently in agreement to give some guidance. Discrepancies in the rice consumption estimates appear to involve either a systematic under-reporting of production in each region by BAE or over-reporting of household consumption by the FNRC. But, considering that estimates from BAE data approached much closer to those of FNRC after BAE fieldmen were provided an intensive re-training in 1969, there is reason to conclude that earlier BAE production estimates were on the low side.

Using these FNRC estimates of per capita consumption, corrected downwards to correspond with the average per capita Philippine consumption as determined by the disappearance method (see Table IV-1), it is possible to estimate regional rice surplus and deficit areas.

Some readers might be surprised to observe a national deficit in 1969/70 in spite of production gains with new high-yielding rice varieties. 1969/70 set a new record in production but in spite of this, prices rose compared to 1968/69 and traders' stocks declined over the year to supply the indicated deficit.[10/] There is thus a sound basis indicating that in spite of record production levels, the country was still slightly deficit in 1969/70, a year of exceptionally favorable weather and freedom from plant pests and diseases.

Five regions show relatively large deficits and four large surpluses. Location of the surplus and deficit areas gives guidance as to

---

[10/] The 1969/70 production increase may be only partially real with part resulting from improved statistical reporting, see discussion in Chapter II.

TABLE IV-6

Rice Surplus and (Deficit) Regions in the Philippines
1969/70
(in tons of milled rice)

Region[1/]	1969/70[2/]
Metropolitan Manila	(112,000)
Ilocos/Mt. Province	(75,000)
Cagayan Valley	172,600
Central Luzon	173,900
Southern Tagalog	(326,300)
Bicol	101,500
Total Luzon	(65,300)
Eastern Visayas	(85,000)
Western Visayas	28,700
N. & E. Mindanao	(80,500)
S. & W. Mindanao	90,500
Total Mindanao	10,000
Total Philippines	(111,600)

1/ PSSH regions. These differ from BAE regions by separation of Metropolitan Manila from Southern Tagalog and by including Negros Oriental in Eastern rather than Western Visayas.

2/ Regional estimates of per capita consumption from FNRC surveys adjusted proportionally to Philippine per capita consumption of 1969/70 as determined by disappearance method, i.e. by ratio of 97.0/100.8 x regional FNRC consumption estimates.

Source: See Appendix IV-7.

the direction of stock movements required to balance consumption demands. In the absence of imports, large movements become necessary from Central Luzon and Cagayan Valley to Ilocos and Southern Tagalog (including Manila) regions; also from Mindanao to the Visayas. If the environment was in fact exceptionally favorable in 1969/70, large total deficits can be expected in average and "unfavorable" years unless production continues to increase considerably more rapidly than population.

While existing studies indicate in general the requirement for transport between surplus and deficit regions and for storage of surpluses that will be consumed after harvest in surplus regions, much more detail is required for an efficient distribution system. If reliable production and consumption statistics could be provided for the provinces within the regions, then expected levels of production variability within provinces would give guidance as to the quantity of buffer reserves that must be stored to give protection during poor harvest years. At present, market rice prices must be heavily relied upon to indicate imbalance between supply and demand. When prices start rising, it is often too late to move stocks so as to prevent undesired price fluctuations.

Rice consumption is generally considered to be relatively uniform throughout the year with the possible exception of some increased consumption during fiesta time and some reduction before the harvest as farm stocks run out or become exhausted while market purchases must be made at higher seasonal levels. Unfortunately, little research has been carried out to test this assumption. The only reliable study for the Philippines was made in Nueva Ecija province in 1969/70. As this is a major surplus

area where a large percentage of the farms have at least two crops a year, these results are probably far from typical of the country as a whole. Monthly average per capita consumption, covering both farm and non-farm households, is shown in Table IV-7.

It will be observed that month to month variation is minimal with the highest monthly consumption only 6.5 percent above the lowest. Contrary to expectations, the fiesta months are among the lowest and there is no evidence of increased consumption after the wet season harvest in December and January[11/] or during the land preparation period around mid-year. In fact, the highest rate of consumption appears to be immediately preceeding harvest.

Strikingly different observations were reported in a study of rice producers' families (including hired help) in two small villages in West Java, Indonesia.[12/] In this study, farm families close to subsistence were recorded separately from those with somewhat larger holdings. Both groups of families showed a decided seasonal rice consumption pattern. Highest consumption was during the months when hard labor was required in land preparation. Consumption then declined in the pre-harvest period with

---

11/ These high consumption levels do give some confirmation of the high per capita consumption reported by FNRC for Central Luzon region (see Table IV-4) even though Nueva Ecija probably has a higher level of consumption than the rest of the region.

12/ E. Roekasah Adirathma, "Income and Expenditure Patterns of Rice Producers in Relation to Production and Rice Marketed," unpublished Ph.D. thesis, Institute Pertanian Bogor, West Java (1969) pp. 195-195a.

TABLE IV-7

Daily Per Capita Consumption of Rice Farm and Non-Farm Households in Nueva Ecija Province 1969/70[1/]

Year	Month	Kg/Capita/Year
1969	October	177
	November	172
	December	174
1970	January	173
	February	176
	March	175
	April	172
	May	170
	June	169
	July	177
	August	180
	September	180
Average		174

[1/] This survey appears likely to be less reliable than the FNRC consumption surveys. BAE survey utilized the recall method to estimate rice consumption during one day in each month; this estimate being blown up by the number of days in the month to give the monthly estimate. The FNRC survey covered a 3 day period during which beginning and ending rice stocks were carefully weighed. The 3 day estimate was then blown up to provide the yearly consumption estimate.

Source: DANR, BAE, Nueva Ecija Pilot Project.

considerable substitution of corn or cassava as prior year's stocks were exhausted. Consumption increased again shortly after harvest. A difference in consumption of 25 percent was observed between low and high consumption months even for the more prosperous farmers. For the subsistence group, rice consumption was 125 percent higher during months of land preparation compared to the pre-harvest period. While these extremes might not be expected in the Philippines where average farm size is much larger than in Java, it would be expected that a somewhat similar consumption pattern might be found in less affluent rural areas.[13/]

IV.. Determinants of Domestic Demand

The quantity of rice demanded for consumption is a function of many factors, the most important of which are: 1) population level and its structure, 2) income levels, 3) prices of rice and substitute products, and 4) consumer tastes and preferences.

1. Population and its structure. Population growth is a basic determinant of rice consumption over time. During the inter-census period from 1948 to 1960, the average annual population increase was almost 3.1 percent.[14/] During the 1960's, the generally accepted estimate of the average annual growth rate was approximately 3.2 percent although estimates

---

[13/] In India, seasonal consumption variation was observed in the areas where rice production was not large and where other foods constituted the staple diet. In these areas in Northern India, consumption was low during the monsoon, rather high in the winter, and greatest when the weather was hot and dry before the monsoons. Agricultural Marketing in India, Report on the Marketing of Rice in India, second edition, Government of India Press, Calcutta (1955) p. 93.

[14/] See Appendix II-6.

by demographic experts ranged both above and below this figure.[15/] However, final reports from the 1970 census indicated an average annual rate of growth since 1960 of 3.01 percent, suggesting that all earlier estimates were on the high side.

Rice consumption varies within the population depending upon age and sex. For example, according to the PSSH of May 1958 and 1959, from which 76.8 percent of the population was classified as "rice-eaters", the per capita consumption within this group was estimated to vary according to age and sex as follows:[16/]

Adult males (10 years old and older)
128.8 kg/capita/year (2.299 cavans)

Adult females (10 years old and older)
117.9 kg/capita/year (2.105 cavans)

Children (below 10 years)
63.7 kg/capita/year (1.138 cavans)

Because of the lack of precision in this concept of "rice-eaters" and considering that the structure of the population changes but gradually over time, projections of increased consumption from population growth

---

15/ Mercedes B. Concepcion stated in 1965 that the current rate of population growth was 3.2 percent, see "The Population of the Philippines," 1st Conference on Population 1965, University of the Philippines Press (1966) p. 185. The medium estimate of the population growth rate by the Bureau of the Census and Statistics indicated an average rate for the 1960's of 3.54 percent, see "Population Projection for the Philippines, 1960-1969," sixth reprint (October, 1965), mimeographed.

16/ Bureau of the Census and Statistics, PSSH, May, 1958 and May, 1959 (mimeographed) reports of December 7, 1959 and October 25, 1960.

generally now rely on an average per capita consumption rather than on detailed structural consumption estimates.[17/] Thus, if the population growth rate is 3.01 percent, it is generally assumed that the total consumption increases yearly by that percentage as a result of population growth alone. In recent years, population growth has undoubtedly been the major determinant of increased rice consumption in the Philippines.

2. Income levels. It has been difficult to pinpoint the exact nature of the consumption response to changes in income in the Philippines, lacking statistical surveys upon which to base precise calculations. Studies by FAO and others in developing countries show that the income elasticity of demand for rice (measuring the percentage increase in quantity consumed from a one percent increase in income) generally declines as the per capita income increases. However, the absolute level of the income elasticity is considered by some authorities as more closely related to the level of rice (or cereal) consumption than to income.[18/]

UN estimates of per capita income, rice and cereal consumption and income elasticities for the 1961-63 period are shown in Table IV-8. The predicted relationships are generally evident although there are exceptions. Burma, Cambodia and Taiwan with high levels of consumption appear to have low elasticities. Vietnam, on the other hand, is reported as having the highest consumption level along with a relatively high elasticity. This

---

[17/] See, for example, OSCAS, NEC, Inter-Agency Committee on Rice and Corn Production and Consumption (March, 1970) mimeographed.

[18/] M. J. Mittendorf, "Projecting Demand for Agricultural Products," in 1st National Seminar on Agricultural Marketing, DANR, Bureau of Plant Industry, Manila (September 7-27, 1965) pp. 216-218.

TABLE IV-8

Per Capita Income and Rice Consumption and Estimated Income Elasticity of Demand for Rice in Selected Countries: 1961 - 1963

Country	Per Capita National Income 1963 (US Dollars)	Per Capita Rice Consumption (Average 1961-63 in Kg/Year)	Income Elasticity of Demand for Rice 1961 - 63	Per Capita Cereal Consumption (Average 1960/62 in Kg/Year in Milled Rice Equivalent)
Burma	59	133	0.1	n.a.
Cambodia	104	149	0.0	n.a.
Ceylon	128	110	0.5	118
India	80	72	0.5	140
Indonesia	82	85	0.6	128 1/
Japan	559	116 2/	-0.1	150
Malaysia/Singapore	224	120	0.2	143 1/
Pakistan	82	94 4/	0.4	154
Philippines	218 3/	89 4/	0.4	118
Taiwan	157	132	0.1	161 5/
Thailand	98	123	0.2	150
Vietnam	82	168 6/	0.4	n.a.

1/ 1961/63 average.

2/ For 1963, Japan Ministry of Health and Welfare, Bureau of Public Health, Nutrition in Japan, Tokyo (1964) estimated per capita consumption for the country as a whole at 128 kg. with non-agricultural households at 120 kg. and agricultural households at 143 kg.

3/ Peso income converted by UN at 2.358/1.

4/ This rice consumption estimate is slightly higher and the cereal consumption estimate slightly lower than the ones estimated by the author, see Tables IV-1 and 2.

5/ 1963/65 average.

6/ Luw-Mau-Thanh, Rice Production and Marketing in Vietnam, Republic of Vietnam, Post War Planning Group (September, 1967) estimated per capita consumption at 165 kg/capita.

TABLE IV-8
(cont'd)

Source: Income Elasticity and Rice Consumption: UN, FAO, "Indicative World Plan: Rice Projections to 1975 and 1985," Study Group on Rice Consultative Sub-Committee on the Economic Aspects of Rice, Tenth Session, CCP: RI 66/2 (July 5, 1966), with revised elasticities for Ceylon, Philippines, and Thailand, from UN, FAO, Indicative World Plan for Agricultural Development to 1975 and 1985, Vol. II - Explanatory Notes and Statistical Tables, Rome (1968), pp. 15-19.
Per Capita Income: UN Statistical Yearbook 1968, New York (1969), pp. 585-591.
Per Capita Cereal Consumption: UN, FAO, The State of Food and Agriculture 1969, Rome (1969) p. 180.

could reflect the low per capita income plus a low level of other carbohydrate substitutes. Japan, with the highest per capita income along with a negative elasticity, has reached the stage where per capita rice consumption would be expected to decline with further income increases. The high Philippine income elasticity estimate might accord with its relatively low level of both rice and cereal consumption but not with its higher income level. In fact, as indicated in the following discussion, this high income elasticity estimate appears most unlikely from all other evidence.

As no reliable study of the income elasticity for rice in the Philippines had been made at the time, the UN estimate shown in Table IV-8 was based on income and consumption levels relative to other Asian countries where income elasticity estimates had been made. Since then, two related cross-sectional studies have been completed in the Philippines.

The first provides an estimate of the expenditure elasticity of demand for rice (measuring the percentage increase in expenditure for rice from a one percent increase in income). These elasticities were calculated in a 1969 study using income and expenditure statistics from the 1965 PSSH of the Bureau of Statistics,[19] as shown in Table IV-9. These will differ from the true income elasticities but they should at least set upper limits.[20] Positive expenditure elasticities are indicated for all

[19] Reynaldo En. de Sagun, "Regional Differences in the Income Elasticity of Demand for Rice in the Philippines," to be published by the International Rice Research Institute, Los Baños, Laguna. While these same statistics appeared biased as a check on regional per capita consumption, they could still be reliable for a cross-sectional study of income elasticity as long as the bias in each region was consistent throughout the income range.

[20] This assumes that consumers, except in the high income brackets, may spend more on rice as income rises but the percentage increase in quantity purchased will not exceed the percentage increase in expenditure. Rather, the consumer is more apt to shift to a higher quality of rice resulting in larger percentage increase in expenditure than in quantity. This consumer response has been reported in many Philippine studies, see for example, Gloria Vega-Yap and Remedios O. Alcantara, "Purchasing Patterns, Consumption Habits, and Preference for Rice and Corn," The Philippine Agriculturist (June-July, 1961) pp.19 ff

TABLE IV-9

Expenditure Elasticities of Demand for Rice by Producers and Non-Rice Producers in Regions of the Philippines, 1965

Region[1]	Rice Producers[2]	Non-Rice Producers
Metropolitan Manila	-	0.13[3]
Ilocos	0.059[3]	0.06[3]
Cagayan Valley	0.47	0.57
Central Luzon	0.39[3]	0.60
Southern Tagalog	0.40[3]	0.44[3]
Bicol	0.58[3]	0.12
Western Visayas	0.14	0.08
Eastern Visayas	0.17	0.17
N. & E. Mindanao	0.27	0.04[3]
S. & W. Mindanao	n.a.	0.11
Philippines	0.14(0.0149)[4]	0.087(0.0117)[4]

[1] PSSH Regions, see Appendix IV-8 for provinces included in each region.

[2] Rice producers refer to those who reported income from the production of rice; it can include both farm workers and landlords.

[3] Elasticity calculation not statistically significant at 5% or 1% levels.

[4] Figures in parenthesis are standard errors.

Source: Reynaldo Ea. de Sagun, "Regional Differences in the Income Elasticity of Demand for Rice in the Philippines," in Seminar on Consumption and Marketing of Rice in the Philippines, papers presented December 5-6, 1969 at a conference at the International Rice Research Institute, Los Baños, Laguna, pp. 6-1 ff.

regions. For the country as a whole, the elasticity appears to be largest for rice producers but this pattern cannot be generalized for the regions. For example, in Cagayan Valley the expenditure elasticity of non-rice producers is larger than for rice producers, 0.57 compared to 0.47.

The second study, from surveys conducted throughout the country in late 1970 and early 1971, provides specific income elasticity estimates for rice (considered as a homogeneous commodity) and for selected fancy, special and ordinary varieties.[21/] Income elasticities calculated from this survey are shown in Table IV-10. As expected, the overall income elasticity (0.05) for all varieties and all income groups is lower than the expenditure elasticity reported by de Sagun.[22/]

The relatively high elasticities for the more preferred varieties, Wagwag and BE-3, coupled with the low and negative elasticities for IR-5 and IR-8 confirm the hypothesis that the low level of the overall elasticity (all varieties) reflects considerable substitution as income rises from less to more preferred varieties. Also, as hypothesized, income elasticities are lower for high than low income groups (except with IR-5 variety). For the least preferred variety, IR-8, the elasticity is highly negative even for the highest income group.

Both studies indicate lower income elasticity of demand for rice than the UN study and that the overall income elasticity is only slightly positive. The observed changes in per capita consumption over time, as

---

[21/] See pp. 41ff for description of these varietal groups.

[22/] This study also provides reasonable confirmation of de Sagun's estimate of the expenditure elasticity, yielding an estimate of 0.16.

TABLE IV-10

Income Elasticities of Demand for Rice by Selected Varieties and Income Groups in the Philippines 1970/71

Variety \ Income Groups[1/]	Lowest to Second Group	Second to Third Group	Third to Highest Group	Lowest to Highest Group
Rice, all varieties	0.03	0.07	0.02	0.05
Wagwag	0.25	0.34	0.16	0.33
BE-3	0.56	-0.20	0.13	0.26
C-4	0.27	0.08	0.03	0.18
IR-5	-0.46	-0.12	0.18	-0.17
IR-8	-0.27	-0.50	-0.52	-0.57
All corn and corn products	-0.45	-0.79	-0.22	-0.60
Wheat flour	0.15	0.40	0.66	0.55

[1/] Average annual per capita income of each group:

Lowest - ₱229; Second - ₱564; Third - ₱1,163; Highest - ₱3,201

All Groups - ₱1,008.

Source: Calculations made by author from original price and quantity data from C. T. Aragon and L. B. Darrah, "Cereal Consumption Patterns," Staff Paper No. 115, Department of Agricultural Economics, University of the Philippines, College of Agriculture, Laguna (November, 1971).

illustrated in Charts IV-1 and IV-2 remain to be more fully explained. Post-war per capita consumption apparently has been lower than pre-war in spite of an appreciable growth of per capita income. Also, the small apparent rate of increases since 1952 in per capita rice consumption hides many contradictory influences on rice consumption levels.

In approaching the pre-war/post-war situation, two considerations must be taken into account. According to Hooley, the per capita income probably declined slightly over the period from 1918 to 1938, the rate of decline increasing after 1928.[23/] This is reflected in Chart IV-1 with the apparent decline in per capita rice consumption after 1928. However, the level of consumption during the pre-war period is undoubtedly biased on the high side in the earlier years and over the entire period in relation to post-war years. As observed by Golay and Goodstein:

> The decline in milled rice absorption in the post-war period as compared to earlier periods is more apparent than real. The use of commercial milling rates to adjust palay production for loss in milling, introduces an upward bias, the relative importance of which has shifted over the period examined. The proportion of palay production milled mechanically has increased over time and the share prepared by home 'pounding' has declined. Upward bias arises because the recovery rates for home pounding average some 15-25 percentages points lower than in mechanical milling.[24/]

According to Census reports, the number of mechanical mills in the country increased from 452 in 1918 to 3,580 in 1948.[25/] Moreover,

---

[23/] Richard W. Hooley, "Long-term Growth of the Philippine Economy, 1902-1961," The Philippine Economic Journal (First Semester 1968). He concludes from calculations of gross value added in agriculture and non-agriculture that the compounded percentage rates of growth were -0.1 percent from 1918 to 1928 and -0.5 percent from 1928 to 1939 (p. 9).

[24/] Rice and People in 1990, US-AID, Manila (August 31, 1967) p. 24.

[25/] Census of the Philippines 1918 (Vol. IV, p. 557) and 1948 (Vol. IV, pp. 618-620).

there remains a question as to the accuracy of crop reporting in the pre-war period. Based on Department of Agriculture production reports, the apparent per capita consumption in 1938/39 was 89.5 kg. while on the basis of the 1939 Census it was only 70.2 kg. Taking these considerations into account, there appears to be reasonable evidence that pre-war per capita rice consumption may not have been as high as post-war. With the higher income elasticity that would have been expected to accompany the lower pre-war income levels, per capita consumption decline after 1925 is consistent with the decline in per capita income.

The post-war consumption changes of rice, corn and wheat products involve some of the same reasoning but are more involved. With improved crop reporting methods, especially after 1954, more reliability can be given to absolute production levels. At the same time, the apparent near constancy of milled rice absorption evidences some degree of unreality. Twenty percent of the palay production was still hand pounded as late as 1954/55, the percentage dropping to only 4.5 by 1967/68.[26/] On this basis alone, there is reason to suspect that the rise in real per capita consumption would have been somewhat greater after 1955 than the disappearance statistics indicate.

On the other hand, there are other reasons to suggest that even though a positive income elasticity might be apparent from a one-period cross-section analysis, nevertheless related per capita consumption increases over time might have been dampened. First, the distribution

---

[26/] BAE, Crop and Livestock Surveys, 1954/5 and 1967/8. The conversion rate of palay to milled rice has been held constant at 51 percent in this study being increased only as Government agencies acknowledged a change, i.e., to 52 percent for 1967/8 and 1968/9 production and to 53 percent for 1969/70 production.

of income gains might favor those with higher incomes who have lower or even negative income elasticity. At least in Manila, there is some evidence to back this argument. The real wage rate indices of laborers in industrial establishments in Manila have declined since 1955 in spite of rising average per capita national income. The indices, using a 1955 base of 100, declined by December 1971 to 68.6 for skilled laborers and to 80.9 for unskilled laborers.[27] Another factor would be the downward shift in the age composition of the Philippine population; an increasing percentage being composed of those under 15 whose cereal (including rice) absorption level is lower. While such a change has been taking place, its effect is probably minor. Golay and Goodstein have estimated that the reduction in total cereal absorption called for by the declining age composition of the population in 1960 as compared to 1939 is in the order of magnitude of only 2.3 percent.[28] It has also been suggested that with status attached to the consumption of rice, poorer families might over-report their consumption.[29]

Even though the income elasticity might be positive, some of its effect on consumption could be offset if the price of rice increased relative to other goods. Comparing the Manila Consumer Price Index excluding rice with the Manila Consumer Rice Price Index (1955 = 100), there were some relative fluctuations but little average difference until

---

[27] Central Bank Statistical Bulletins.

[28] Op. cit., p. 28.

[29] This possibility was suggested by my colleague, Prof. Theodore Morgan.

1964, see Chart IV-4. Beginning in 1964, and except for a short period in 1970, the Rice Price Index has always been at least 13 percent above the Consumer Price Index excluding rice. It rose to 21 percent above in 1964, 44 percent in 1967 and 22 percent above in 1969 and 1971.

Finally, population migration could influence the average income elasticity over time. For example, large population shifts have been taking place from rural to urban areas where wheat products are substituted for rice as new arrivals adopt cereal consumption habits of the cities (see, for example, the consumption pattern in Manila, Table IV-4). The increase evidenced in per capita consumption of wheat is also influenced by its high income elasticity of demand (see Table IV-10).

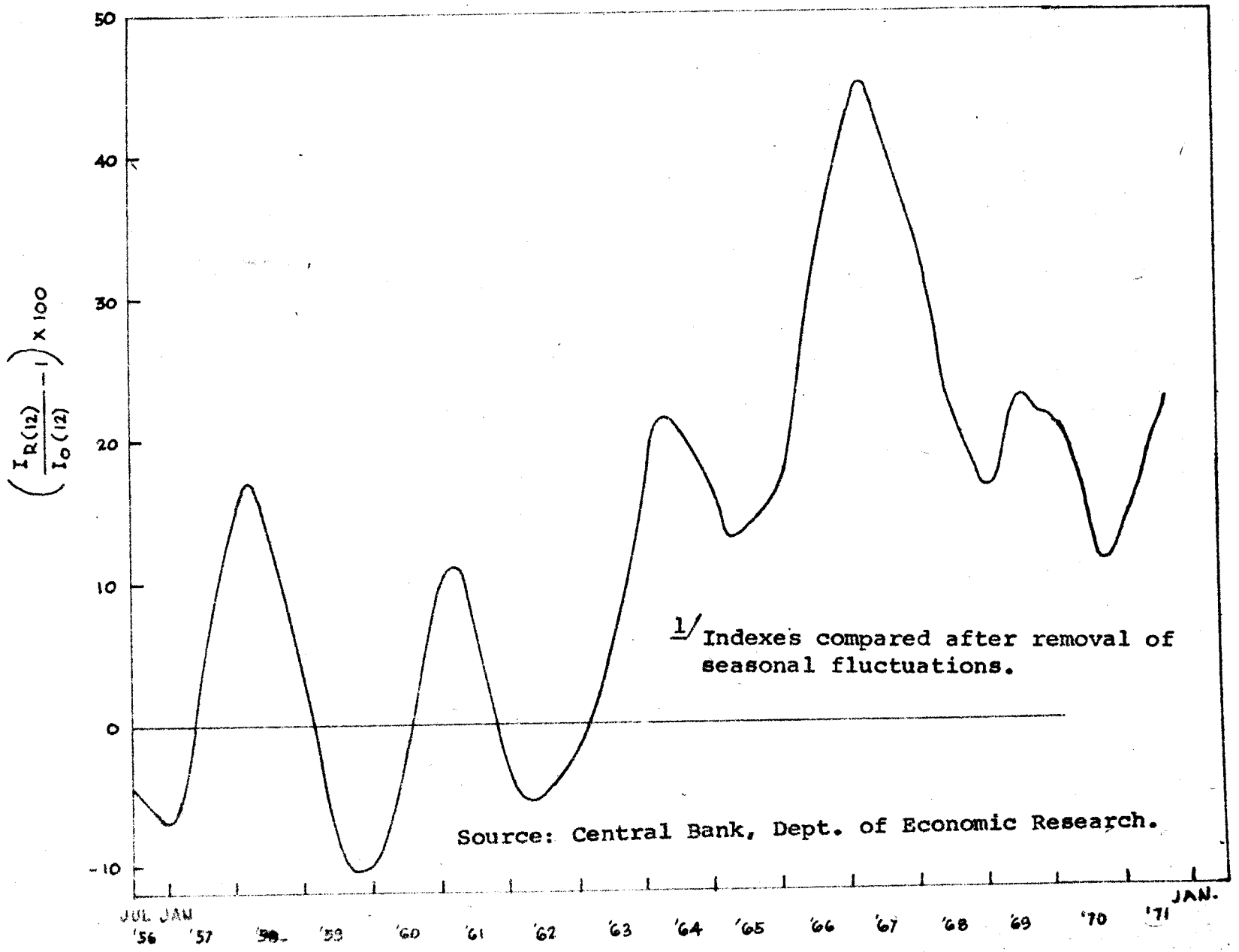
There remains the problem of explaining the increasing per capita consumption of corn since 1955. This is surprising in view of the highly negative income elasticities as disclosed by the Aragon Survey, see Table IV-10. As indicated by this same survey, the elasticity of substitution of rice for corn was approximately 0.35 between late 1970 and early 1971. If this relationship holds true in the reverse direction, corn might have been substituted for rice in the 1950's and 1960's if its price had declined relative to rice. However, by comparing the Manila Consumer Indexes for Rice and Corn, the opposite seems to have happened, at least for the Manila area, see Chart IV-5. Rice price declined relative to the corn price after 1956 and relative price relationships of pre-1956 were not restored until 1967.

Another explanation has been suggested by Golay.[30/] He concludes

---

30/ Op. cit., p. 30.

PERCENTAGE VARIATION OF ANNUAL CONSUMER PRICE INDEX ABOVE AND BELOW PRICE INDEX EXCLUDING RICE 1955-1971[1]
(1955=100)



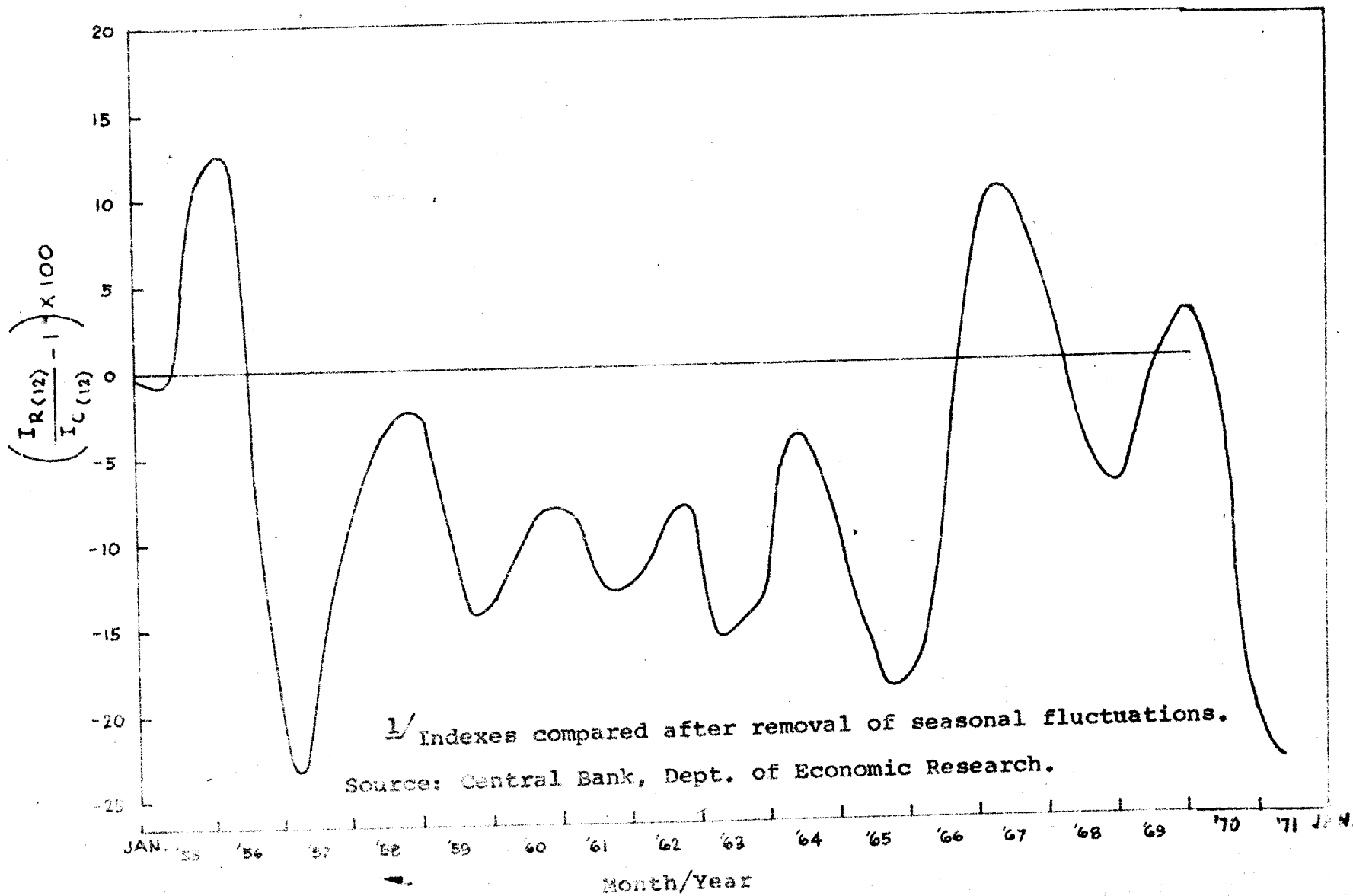
[1] Indexes compared after removal of seasonal fluctuations.

Source: Central Bank, Dept. of Economic Research.

CHART IV-5

PERCENTAGE VARIATION OF MANILA CONSUMER RICE PRICE INDEX ABOVE AND BELOW CORN PRICE INDEX, 1955-1971 1/

(1955=100)



1/ Indexes compared after removal of seasonal fluctuations.

Source: Central Bank, Dept. of Economic Research.

that the explanation of a shift from rice to corn lies in basic shifts in supply conditions. Corn supplies increased as the margin of cultivation was extended from alluvial valleys onto rougher land. And, as the rural population was redistributed to the frontier areas, corn consumption increased relative to rice because: 1) population increased relatively in the areas where corn was produced and 2) because lack of transport and marketing facilities necessitated direct, subsistence consumption.

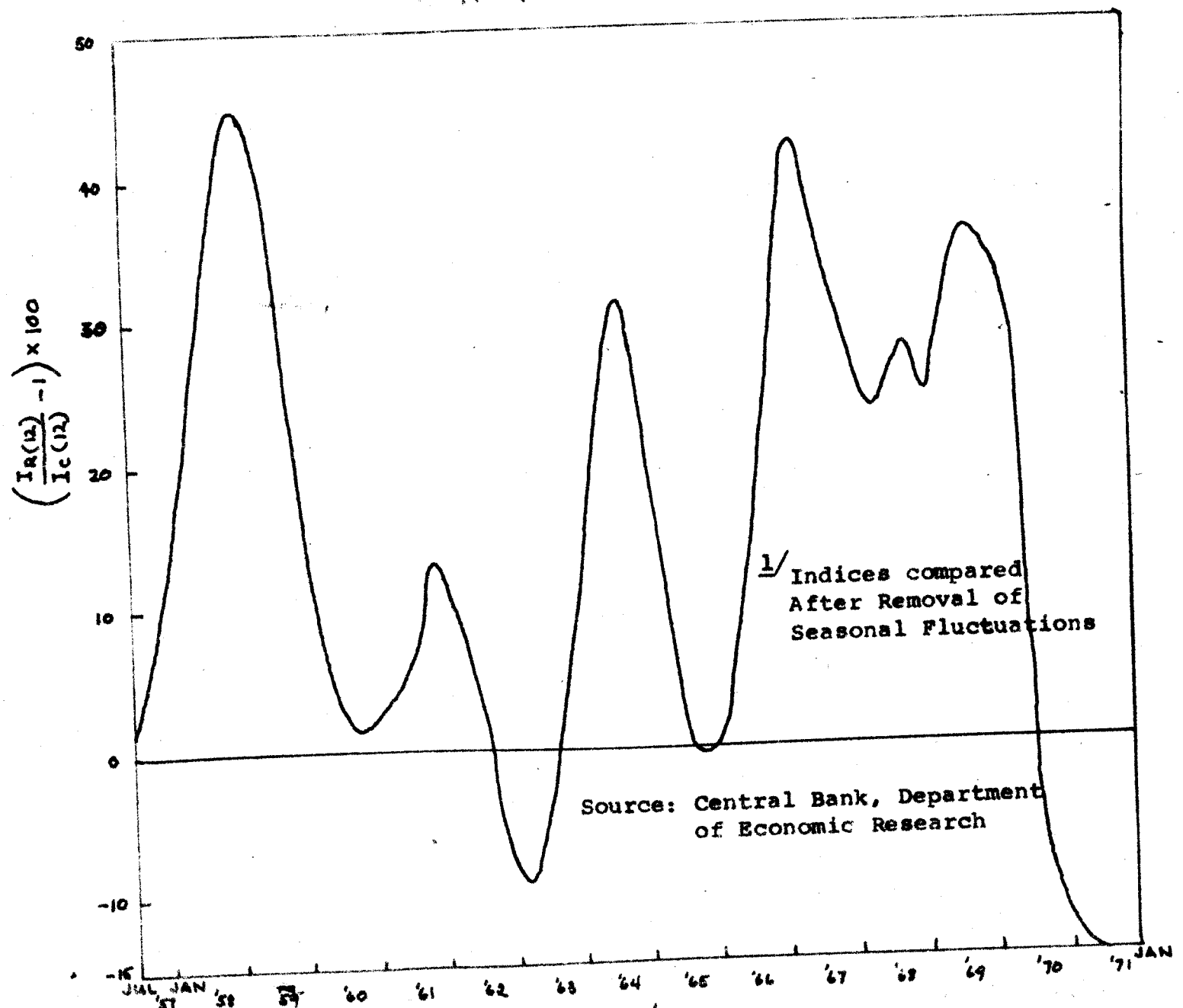
To illustrate, from 1948 to 1970, two of the heavy corn eating areas, Mindanao and Cagayan Valley, had relatively high population growth rates.[31/] Moreover, there is strong evidence to suggest that the lack of transport and marketing facilities could have affected consumption patterns as premised. This becomes apparent from the relative movement of rice and corn prices in the Eastern Visayas region where the corn/rice consumption ratio is the highest. Comparison of the Consumer Rice Price Index to the Corn Price Index for Eastern Visayas is shown on Chart IV-6. In 1959 the rice index was 45 percent (Base 1957 = 100) above the corn index. While the rice index dropped slightly below that of corn in 1962/63, the former has remained more than 23 percent above the corn index between mid-1966 and 1970, reaching a peak of 42 percent higher in 1967. Marketing and transport facilities have apparently prevented market price adjustments such as have been evidenced in Manila.

To summarize, the income elasticity of demand for rice appears to be slightly positive at approximately 0.05. Statistical imperfections may

---

31/ Between 1948 and 1970, the Philippine population increased only 91 percent, while the population in Mindanao grew 171 percent and Cagayan Valley 158 percent.

PERCENTAGE VARIATION OF EASTERN VISAYAS CONSUMER PRICE INDEX
ABOVE AND BELOW CORN PRICE INDEX, 1957-1971[1]
(1957 = 100)



have hidden higher elasticity values of the 1950's and before. Over the post-war period, its influence on per capita consumption of rice has been dampened over time because of large urban/rural population shifts, unequal distribution of increased incomes and relatively rapid increases of population in corn eating areas where there was lack of transport and marketing facilities. As marketing and transport facilities to these areas improve, relative price adjustments can be expected with the probability that rice may be increasingly substituted for corn.

3. Prices of rice and substitute products. Price elasticity of demand for rice indicates the percentage change of quantity that consumers will buy in response to a given percentage change in price. Knowledge of the price elasticity is especially important to a government price stabilization agency in order to estimate the effect on demand of different price changes (or the quantity of rice that must be injected into the market to offset a given price rise).

Unfortunately, the precise determination of the price elasticity is a difficult problem and studies in low income countries have generally been unsatisfactory. However, an estimate of the income elasticity does give some guide on the assumption that the sum of the price elasticity, the income elasticity and the cross elasticities is equal to zero.[32/] For the

---

[32/] Proofs have been provided for this assumption for the case of the individual consumer's demand for a commodity, see, for example, P. A. Samuelson, Foundations of Economic Analysis, Harvard University Press(1955), pp. 104-105. From this relationship, Frisch has derived similar relations for the total market by utilizing the concept of a "representative consumer", R. Frisch, "A Complete Scheme for Computing All Direct and Cross Demand Elasticities in a Model with Many Sectors," Econometrica (April, 1959) pp. 177-196.

majority of the population in the Philippines who are "rice eaters" there is more likelihood of substituting a lower quality of rice rather than another cereal when the price of rice rises, with a similar effect in the opposite direction if the price falls. For non-rice eaters (and to some extent even for rice eaters) some substitution with other carbohydrate foods is apt to take place if price changes but the cross elasticities (percentage change for example of the quantity of corn the consumer will buy in response to a given percentage change in the price of rice) will be positive. Thus, it follows that the price elasticity of demand for rice will be greater but of opposite sign than the income elasticity.

On this basis, one might expect the price elasticity of demand for rice in the Philippines to be somewhere from -0.3 to -0.5.[33/] In a recent study by Mangahas covering the period from 1956 to 1968, price and quantity relationships of rice in the Philippine market have been developed from which the price elasticity can be approximated.[34/] Applying his relationships to the year 1967/68 when the annual average rice price in Manila for Macan 2 variety was P1.72/ganta, a price elasticity of approximately -0.5 was indicated.[35/] A one percent increase in price would have meant a

---

[33/] This agrees with the conclusions reached by Mellor that the price elasticity would be slightly higher than the income elasticity for rice, J. W. Mellor, The Economics of Agricultural Development, Cornell University Press, Ithaca, New York (1966) p. 72.

[34/] Mahar Mangahas, "Efficient Forecasting and Philippine Rice Import/Export Policy," Discussion Paper No. 69-20, Institute of Economic Development and Research, University of the Philippines (December 4, 1969) pp. 25 ff.

[35/] Randolf Barker has also reported an initial estimate of price elasticity of demand of -0.35, see IRRI, Research Review, Agricultural Economics, Los Baños (January 31, 1969) p. 4 (mimeographed).

decrease in consumer purchases over the year of approximately 13,600 tons of rice. There will also be cross elasticities of demand for substitutes such as corn and wheat whose values will vary depending upon tastes in different regions and can be expected to be positive but smaller than the price elasticity. Their effect will be to increase purchases of other carbohydrates as the price of a given carbohydrate such as rice or corn rises.

4. Consumer tastes and preferences. Several studies of consumer rice preferences have been made in the Philippines but reliance must still be placed heavily on personal observations and induction from qualities, grades and prices observed in the market.

Observed preferences in the Philippines are based on standards of quality different from those used in world markets. In the Philippines, prices are generally associated with a particular variety and the percentage of broken grains.[36/] The higher quality types are generally whiter (more highly milled), more translucent (less chalky) and of longer grain (although Wagwag and Milagrosa, both considered quality varieties, are short grain).[37/] These are the same general quality differences most important to consumers in international markets but the standards in the

---

36/ Price variations are described in more detail in Chapter VIII.

37/ The chalkiness is often referred to as poor "eating quality". For example, in a 1967 survey in Laguna Province, 94 percent of the farmers cited poor "eating quality" as a major disadvantage of the new IR-8 variety which is chalky, see, David S. H. Liao, "Studies on Adoption of New Varieties," paper presented at IRRI (November 6, 1968) mimeographed.

latter are much more rigid and price differentials between high and low qualities much greater.[38/]

For example, a study by IRRI in early 1969 of samples of rice from miller-wholesalers in 10 regions in the Philippines found prices of fancy and special varieties averaging 10 to 15 percent higher than ordinary varieties. A slightly greater difference was found between IR-8 (highly chalky) and other ordinary varieties. For all varieties, price was higher the lower the level of broken grains, declining less than 10 percent when percentage of brokens increased from 25 to 40 percent.[39/] In contrast, the price spread between good and poor quality rice in international markets is likely to be between 25 and 40 percent. The IRRI study reported finding average content of broken grains at slightly over 30 percent[40/] while Efferson reported most of his samples in the 30 to 40 percent range with some higher than 50 percent.[41/]

Varietal differences in the Philippines are generally classified in three groups: fancy, special and ordinary, as illustrated in Table IV-11. There are certain fancy varieties such as Milagrosa with a special fragrance

---

[38/] These comments rely heavily on observations by J. Normal Efferson, "An Appraisal of Rice Drying, Storage, Processing and Marketing in the Philippines," The Ford Foundation, Manila (October, 1969) mimeographed.

[39/] Roger A. Aspiras, "The Relationship Between Quality and Price in the Philippine Wholesale Rice," Seminar on Consumption and Marketing of Rice in the Philippines, International Rice Research Institute, Los Baños, Laguna (December, 1969).

[40/] Ibid., p. 3-8.

[41/] Op. cit., p. 19.

TABLE IV-11

Selected Rice Varieties Categorized According to Grain Length and Recognized Varietal Groups of the Philippines

Grain Length	Group and Varieties		
	Fancy	Special	Ordinary
Long Grain		Bengawan Intan Macapagal C-4-63 C-18 IR-22	Peta Tjeremas IR-8
Medium Grain	Milflor	Elon-elon Raminad BE-3 BPI-76 IR-20	Macan Palawan IR-5
Short Grain	Milagrosa Wagwag		Binato

Source: NFAC, The Philippines Recommends for Rice-1970, Quezon City (1970).

which are used for special occasions. Glutinous (malagkit) varieties, which account for less than 1 percent of the national consumption, are preferred for certain Philippine "sweets". They are highly chalky and yet usually sell at an appreciable premium over fancy varieties. While red rice is often considered inferior in Luzon, the FNRC Survey disclosed high levels of consumption in the Western Visayas (34 percent of total rice consumption) and Northern and Eastern Mindanao (23 percent of consumption).[42/]

The Aragon Survey provides us with an approximation of the relative country-wide preferences for varieties of rice, see Table IV-12. The strong preference for Wagwag, a fancy variety is definitely evident. Ordinary varieties, such as IR-5 and IR-8 are consumed by relatively large numbers of the population but their selection is more on a basis of price than on taste or other preference. Variety IR-20 was a new introduction so its acceptability is not accurately reflected in this survey.

Other peculiarities in consumer rice preferences have been observed in a number of studies. Recto, found that a short grain variety was preferred in Batangas province while the medium grain varieties were preferred by households in Laguna province.[43/] Vega-Yap, in a nation-wide study observed that where milled rice was eaten, 40 percent of the home-makers preferred rice milled from "kiskisan" (small huller) mills, explaining that it was more palatable than rice milled on large cono mills.[44/]

[42/] NSDB, FNRC, Manila (unpublished reports).

[43/] A. E. Recto and R. A. Raymundo, "Consumer Preferences and Buying Habits for Rice in Batangas and Laguna," The Philippine Agriculturist (February, 1966) p. 745.

[44/] Op. cit., p. 20. Recto (op. cit., p. 751) found an even stronger declared response in Batangas although she noted that homemakers did not seem to recognize whether the rice they bought was milled from the kiskisan or the cono.

TABLE IV-12

Relative Consumption of Selected Rice Varieties in the Philippines 1970/1971

Variety	% of Total Rice Consumption
Wagwag	18.9
C-4	15.6
IR-8[1/]	8.5
BE-3	8.4
IR-5[1/]	6.9
Intan	5.6
Malagkit	1.3
IR-20	1.0
Tjeremas	0.8
BPI-76	0.6
Others	33.4

[1/] Consumption of these varieties may be underestimated because of the existing practice of traders to hide identity of IR-5 and IR-8 by mixing them with more preferred varieties.

Source: Calculations made by author from original price and quantity data from C. T. Aragon and L. B. Darrah, "Cereal Consumption Patterns," Staff Paper No. 115, Department of Agricultural Economics, University of the Philippines, College of Agriculture, Laguna (November, 1971) p. 10.

And finally, consumers often favor and will pay higher prices for "old crop" over "new crop" rice. The old crop, being drier, expands more in cooking.

As mentioned previously, corn is generally considered to be an inferior food to rice. This is confirmed in the study of Vega-Yap, who found that one-quarter of the households which ran short of rice would either borrow or buy rice on credit, rather than substitute other commodities. Those who substituted used corn, banana, bread and root crops. Many households reported mixing rice with corn (1 part of rice to anywhere from 1 part to 5 parts of corn) and other substitutes during periods of high prices or low rice supply.[45/]

V. Summary

The function of rice marketing is to bring the cereal from the producer to the consumer. Consumption characteristics must therefore be understood if the trader is to perform this function efficiently and the Government to frame and implement controls. The most important patterns and determinants of rice consumption are as follows:

1. Crude estimates of apparent per capita consumption of rice suggest high levels in the 1920's, gradually declining during the pre-war and then remaining relatively constant after the war at lower absolute levels.

2. Refined estimates indicate a very slight increase in per capita

---

45/ Op. cit., p. 19.

rice consumption associated with more rapidly rising per capita corn and wheat consumption. As consumption of corn and wheat was small relative to rice, total per capita cereal consumption rose but only gradually since 1955. Total cereal consumption in the late 1960's appears to have slightly exceeded the levels recommended by the Food and Nutrition Research Center.

3. Regional annual rice consumption varies from 55 kg/capita in Eastern Visayas to almost 3 times that level in Central Luzon. In spite of the wide variation between regions, total consumption of carbohydrate foods is approximately equal in all except Ilocos (15 percent higher) and Metropolital Manila (15 percent lower). Wheat, corn, root crops and tubers provide the equalization.

4. Rice production appears to exceed consumption in Cagayan Valley, Central Luzon, Bicol and South and Western Mindanao, with deficits elsewhere. For the country as a whole, there appeared to be a small deficit in 1969/70. The imbalance regionally gives a rough measure of the long distance transport functions of the trader.

5. While month to month consumption at regional levels might be expected to vary with lower harvest and higher pre-harvest prices as well as with fiesta times, the extremes were less than 7 percent apart for Nueva Ecija province. When information becomes available from other regions, some can be expected to show considerably more variation.

6. Population increase has been the major determinant of changing total demand. With evidence from research in 1970 of a small but positive income elasticity of demand (around 0.05), a rising per capita rice consumption was to have been expected as per capita income rose. Its rise appears to have

been dampened over time by such things as a large rural to urban population shift and a skewed income distribution. Its effect on consumption may have been delayed considering population migration to frontier areas suited more for corn and where transport constraints limited rice or corn shipments.

7. Price elasticity of demand for rice appears to be between -0.3 and -0.5. Traders and Government stabilization agencies must take this into account when estimating consumption or formulating price policy.

8. Tastes for rice follow the same general determinants as in international markets but follow a different pattern. Prices are higher with a lower percentages of "brokens" in the Philippines but standards are lower and the premium for head (full grain) rice considerably less. Translucency and long grained rice are also preferred but are of less importance than internationally.

APPENDIX IV-1

Crude Estimates of Apparent Consumption of Milled Rice & Corn, 1909/10 - 1970/71

Crop Year	(1) Production	(2) Net Imports 1/ (000 tons)	(3) Animal Feed & Seed	(4) Population January 1 (000)	(5) Crude Apparent Availability for Consumption (1+2-3)/(4) (kgs/cap.)
			I. Rice		
1909/10	539	167	37	8,157	82.0
1910/11	586	197	34	8,303	90.3
1911/12	332	184	32	8,481	57.0
1912/13	700	301	38	8,681	110.9
1913/14	649	87	40	8,901	78.2
1914/15	509	97	35	9,142	62.4
1915/16	596	218	37	9,405	82.7
1916/17	808	190	41	9,689	98.7
1917/18	1,022	147	48	9,994	112.2
1918/19	965	184	47	10,314	106.8
1919/20	1,038	51	51	10,385	100.0
1920/21	1,185	77	57	10,559	114.1
1921/22	1,241	57	58	10,791	114.9
1922/23	1,251	42	58	11,030	111.9
1923/24	1,187	66	60	11,279	105.8
1924/25	1,304	151	61	11,535	120.9
1925/26	1,365	101	62	11,900	118.0
1926/27	1,414	70	64	12,073	117.6
1927/28	1,426	12	63	12,354	111.2
1928/29	1,422	43	62	12,645	110.9
1929/30	1,473	105	64	12,943	117.0
1930/31	1,418	11	63	13,250	103.0
1931/32	1,351	12	62	13,564	95.8
1932/33	1,366	13	64	13,888	94.7
1933/34	1,514	20	34	14,219	102.9
1934/35	1,309	6	66	14,559	85.8
1935/36	1,206	5	67	14,908	76.7
1936/37	1,571	91	72	15,264	104.2
1937/38	1,495	72	67	15,629	96.0
1938/39	1,491	9	68	16,000	89.4
1939/40	1,534	85	72	16,306	94.8
1940/41	1,546	38	78	16,618	90.7
1941/42	1,585	12	79	16,934	89.6
1942/43	n.a.	n.a.	-	-	-

Crop Year	(1) Production	(2) Net Imports	(3) Animal Feed & Seed	(4) Population January 1	(5) Crude Apparent Availability for Consumption (1+2-3)/(4)
		(000 tons)		(000)	(kgs/cap.)
1943/44	n.a.	n.a.	-	-	-
1944/45	n.a.	n.a.	-	17,592	-
1945/46	1,054	n.a.	55	18,262	-
1946/47	1,355	n.a.	65	18,610	-
1947/48	1,454	125	70	18,965	79.6
1948/49	1,617	120	75	19,409	85.6
1949/50	1,692	146	77	19,974	88.1
1950/51	1,698	(5)	78	20,584	78.5
1951/52	1,837	109	86	21,214	87.7
1952/53	2,041	63	93	21,862	92.0
1953/54	2,066	(1)	93	22,530	87.5
1954/55	2,079	42	93	23,238	87.3
1955/56	2,125	68	96	23,928	87.6
1956/57	2,172	40	97	24,659	85.7
1957/58	2,079	121	106	25,413	82.4
1958/59	2,392	193	114	26,190	94.3
1959/60	2,427	-	121	26,986	85.4
1960/61	2,405	(2)	109	27,800	82.5
1961/62	2,538	186	102	28,637	91.6
1962/63	2,575	16	102	29,500	84.4
1963/64	2,494	302	99	30,388	88.7
1964/65	2,591	482	103	31,304	94.9
1965/66	2,644	327	101	32,246	89.0
1966/67	2,657	224	100	33,218	83.7
1967/68	3,018	105	111	34,218	88.0
1968/69	2,942	(32)	111	35,249	79.4
1969/70	3,530	3/	111	36,310	94.2
1970/71	3,604	24	113	37,404	94.0
		II. CORN			(1+2-3)/4 x 0.71 2/
1910/11	144	-	27	8,303	10.0
1911/12	213	-	37	8,481	14.6
1912/13	252	-	44	8,681	17.0
1913/14	363	-	61	8,901	24.1
1914/15	401	-	67	9,142	25.9
1915/16	384	-	65	9,405	24.1
1916/17	366	-	62	9,689	22.3
1917/18	307	-	53	9,994	18.1

APPENDIX IV-1
(page 3)

Crop Year	(1) Production	(2) Net Imports (000 tons)	(3) Animal Feed & Seed	(4) Population January 1 (000)	(5) Crude Apparent Availability for Consumption (1+2-3)/(4) (kgs/cap.)
1918/19	330	-	56	10,314	18.8
1919/20	428	-	73	10,385	25.2
1920/21	399	-	69	10,559	22.2
1921/22	327	-	58	10,791	17.7
1922/23	454	3/	77	10,030	26.7
1923/24	454	3/	77	11,279	23.8
1924/25	445	3/	75	11,535	22.8
1925/26	462	3/	78	11,900	22.9
1926/27	486	-	82	12,073	23.8
1927/28	418	1	71	12,355	20.0
1928/29	350	3/	61	12,645	16.2
1929/30	361	10	63	12,943	16.9
1930/31	339	10	59	13,250	15.5
1931/32	407	6	71	13,564	18.0
1932/33	412	3/	72	13,888	17.4
1933/34	339	7	60	14,219	14.3
1934/35	296	(1)	54	14,559	11.8
1935/36	363	3/	66	14,908	14.7
1936/37	438	3/	76	15,264	16.8
1937/38	501	3/	86	15,629	18.1
1938/39	459	3/	82	16,000	16.7
1939/40	572	1	101	16,306	20.6
1940/41	534	6	96	16,618	18.9
1941/42	583	-	104	-	-
1950/51	603	11	106	20,584	17.5
1951/52	762	9	131	21,214	21.4
1952/53	709	10	124	21,862	19.3
1953/54	781	6	135	22,530	20.5
1954/55	770	(1)	138	23,238	19.3
1955/56	907	(1)	163	23,928	19.1
1956/57	895	5	163	24,659	21.2
1957/58	852	15	146	25,413	20.1
1958/59	1,016	(27)	187	26,190	21.7
1959/60	1,165	(44)	205	26,986	24.1
1960/61	1,210	(9)	215	27,800	25.2
1961/62	1,266	(2)	223	28,637	26.1
1962/63	1,273	4	223	29,500	25.4
1963/64	1,293	12	225	30,388	25.1

Crop Year	(1) Production	(2) Net Imports (000 tons)	(3) Animal Feed & Seed	(4) Population January 1 (000)	(5) Crude Apparent Availability for Consumption (1+2-3)/(4) (kgs/cap.)
1964/65	1,313	4	228	31,304	24.7
1965/66	1,380	5	241	32,246	25.2
1966/67	1,490	41	259	33,218	27.2
1967/68	1,619	17	279	34,218	28.2
1968/69	1,733	21	295	35,249	29.4
1969/70	2,008	9	340	36,310	32.8

1/ Net Imports, Rice: From 1909/10 - 1953/54, calendar year imports (i.e., 1926 imports added to 1926/27 crop year's production). From 1954/55-1970/71, crop year net imports.
Corn: Calendar year imports from 1910/1949/50. Crop year net imports from 1950/51 & after.

2/ Per capita availability - shelled corn converted to corn grits at 71% conversion rate.

3/ Less than 1,000 tons.

Sources:

Production, rice: See Appendix II-3.
corn: 1910/11-1956/57, NEC, "The Raw Material Resource Survey," (Series No. 3, Manila: Bureau of Printing, 1959), Table 2, p. 32.
1957/58-1969/70, DANR, BAE (mimeographed).

Imports, rice : See Appendix II-1.
corn : 1910-1940, Philippine Islands, Annual Report to the Insular Collector of Customs.
1945-1970, BCS, Foreign Trade Statistics Divisio

Animal Feed, rice: Based upon "Disposition of Palay Output in the Philippines," DANR, BAE.
1902/03-1958/59, animal feed assumed as 1.2% of production.
1959/60, 1.5% of production.

1960/61, 1.1% of production.
1961/62 and after, 0.8% of production.

Animal Feed, corn: NEC, OSCAS, The Statistical Reporter "Food Balance Sheet,"(Oct/Dec 1963)p.5; (Jan/Mar 1966)p.6 Corn usage for animal feed prior to 1963 corrected from amounts shown in original Food Balance Sheet to correct for double counting in early years, as per conversion with J. O. Sumagui, Chief Statistical Coordinator, OSCAS, NEC. After 1963, animal feed assumed as 15% of production.

Seed Requirements, rice: 0.9 sack of palay (44 kg.)/hectare harvested.
corn: 7.0 gantas or 16.24 kg./hectare harvested.

Population: See Appendix II-6.

APPENDIX IV-2

Annual Average Per Capita Production and Apparent Consumption of Milled Rice and Corn in the Philippines 1954/55 - 1970/71

(in 000 tons)

Crop Year	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63
I. Rice									
1. Stocks start of year[1]	179	179	179	179	179	349[2]	381[3]	118	306
2. Production	2,079	2,125	2,172	2,079	2,392	2,427	2,405	2,538	2,575
3. Net imports	42	69	40	121	193	-	(2)	186	16
4. Stocks end of year[1]	179	179	179	179	349[2]	381[3]	118	306	201
5. Animal feed, seed, waste & others	98	101	103	111	120	127	115	108	108
6. Population, Jan. 1(000)	23,238	23,928	24,659	25,413	26,190	26,986	27,800	28,637	29,500
7. Apparent availability (kg/capita):									
a) For human consumption $\frac{(1+2+3-4-5)}{6}$	87.0	87.4	85.5	82.2	87.6	84.0	91.8	84.8	87.7
b) Total availability $\frac{(1+2+3-4)}{6}$	91.3	91.6	89.7	86.6	92.2	88.8	96.0	88.6	91.4
c) Production per capita 2/6	89.5	88.8	88.1	81.8	91.3	89.9	86.5	88.6	87.3
II. Corn									
8. Stocks start of year[1]	39	39	39	39	39	36[2]	19[3]	9	28
9. Production	770	907	895	852	1,016	1,165	1,210	1,266	1,273
10. Net imports	(1)	(1)	5	15	(27)	(44)	(9)	(2)	4
11. Stocks end of year[1]	39	39	39	39	36[2]	19[3]	9	28	21
12. Animal feed, seed, waste and others	165	195	194	180	222	245	256	266	267
13. Apparent availability (kg/capita) for human consumption[6] in terms of rice caloric equivalent (8+9+10-11-12) x 0.71 x 363/367	18.3	20.9	20.1	19.0	20.6	23.2	24.1	24.0	24.2

Crop Year	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71
I. Rice								
1. Stocks start of year	201	204	258	241	166 4/	410	333	220
2. Production	2,494	2,591	2,644	2,657	3,018	2,942	3,530	3,604
3. Net imports	302	482	327	215 4/	119	(27)		24
4. Stocks end of year	204	258	241	166 4/	410	333	220	142
5. Animal feed, seed, waste & others	106	109	108	107	118	118	120	122
6. Population, Jan. 1 (000)	30,388	31,304	32,246	33,218	34,218	35,249	36,310	37,404
7. Apparent availability (kg/cap.)								
a) For human consumption $\frac{(1+2+3-4-5)}{6}$	88.4	92.9	89.3	85.5	81.1	81.5	97.0	95.8
b) Total availability $\frac{(1+2+3-4)}{6}$	91.9	96.4	92.6	88.7	84.5	84.9	100.3	99.1
c) Production per capita 2/6	82.1	82.8	82.0	80.0	88.2	83.4	97.2	96.4
II. Corn								
8. Stocks start of year	21	55	42	27	42 5/	52	46	
9. Production	1,293	1,313	1,380	1,490	1,619	1,733	2,008	
10. Net imports	12	4	5	41 5/	17	21	9	
11. Stocks end of year	55	42	27	42 5/	52	46	120	
12. Animal feed, seed, waste and others	269	274	289	310	335	355	410	
13. Apparent availability (kg/cap.) for human consumption 6/ in terms of rice calorie equivalent $\frac{(8+9+10-11-12)}{6}$ x 0.71 x 363/367	23.1	23.7	24.2	25.5	26.5	28.0	29.7	

1/ Stock figures unavailable prior to 1957/58. 1958 stocks were assumed for crop years 1954/55-1957/58.
2/ Stocks as of May 31, 1959.
3/ Stocks as of May 31, 1960.
4/ Stocks for July 1, 1967 estimated from April 1, 1967 rice stock.
5/ Stocks as of April 1, 1967.
6/ Shelled corn converted to milled corn equivalent at 71% recovery and to rice calorie equivalent by factor 363/367.

Sources: Items (1, 4, 8 & 11): Stocks start and end of year, DANR, BAE.
Items (2, 3, 5, 6, 9, 10 & 12): See sources of Appendix IV-1.
Item (12), waste & others: Based on NEC, OSCAS, The Statistical Reporter, Jan./Mar., 1966, p. 6; assumed 0.25% and 3.46% of production for rice and corn respectively.

APPENDIX IV-3

Methodology in Estimating Average Annual Apparent Per Capita Consumption (Availability) of Wheat and Wheat Products, Starchy Roots and Tubers in the Philippines: 1954/55 - 1969/70
(all in kg. per capita in terms of rice calorie equivalent)

I. Wheat and Wheat Products

$$\text{Per capita availability} = \frac{\text{Imports}}{\text{Population(Jan.1)}} \times \beta^{1/}$$

Wheat grain imports converted to wheat flour at 74% recovery, and then added to other wheat products used for consumption.

II. Sweet Potato

$$\text{Per capita availability} = \frac{\text{Production - Animal Feed}}{\text{Population (Jan.1)}} \times \beta^{1/}$$

where animal feed assumed 5% of production.

III. Cassava

$$\text{Per capita availability} = \frac{\text{(Production-Animal Feed \& Manufactures)}\ \delta + \text{Cassa}}{\text{Flour and Starch-Other Non Food Usages}}{\text{Population (Jan. 1)}}$$

where percentage allowances for animal feed, manufactures, cassava flour and starch and other non-food usages are based on NEC, OSCAS, Statistical Reporter, "Food Balance Sheets," Oct./Dec. 1963, pp. 1-47; Jan./Mar. 1966, pp. 1-14; Oct./Dec. 1967, pp.1-10; Oct./Dec. 1969, pp.1-10; 1970 (unpublished).

No calorie adjustment made for cassava flour and starch as these have approximately same calorie count as rice (363/100 grams).

IV. Others

Includes per capita availabilities of Irish Potato, Gabi, Pao, Tugui, Ubi, Yautia and Arrow Root.

a) Irish Potato per capita = $\frac{\text{Production + Imports - Seed}}{\text{Population (Jan. 1)}} \times \beta$ [1/]

where Seed assumed 10% of production.

b) Per capita availability of Gabi, Pao, Tugui, and Ubi =

$$\frac{\text{Production - Animal Feed \& Seed}}{\text{Population (Jan. 1)}} \times \beta$$ [1/]

where Animal Feed and Seed assumed 15% of production.

c) Per capita availability for Yautia and Arrow Root is computed as 1.0% of sum of per capita consumption in rice equivalent of wheat and wheat products, irish potato, gabi, tugui and ubi (as per NEC, OSCAS, unpublished)

[1/] Value of Factor (β) to convert production or import weights into rice calorie equivalents :

	β
1. Wheat Flour	364/367 = .9918
2. Sweet Potato	146/367 = .3978
3. Cassava Tubers	106/367 = .2888
4. Irish Potato	59/367 = .1608
5. Gabi, Pao, Tugui & Ubi	100/367 = .2725
6. Corn Grits	363/367 = .9891

Sources: Imports: Irish Potato, Wheat and Wheat Products, BCS, Foreign Trade Statistics Division.

Production: All root crops, DANR, BAE.

Percentage allowances for non-consumption uses: All root crops, based on NEC, OSCAS, Statistical Reporter, Jan./March, 1966, pp. 5-14.

Population: See Appendix II-6.

APPENDIX IV-4

Index of National Income Per Capita: 1950/70
(at constant 1955 prices)

Calendar Year	Population July 1 (000)	National Income		
		Total (million ₱)	Per Capita (₱)	Index (1955=100)
1950	20,275	5,257	259	79.4
1951	20,894	5,727	274	84.0
1952	21,533	6,148	286	87.7
1953	22,191	6,679	301	92.3
1954	22,868	7,221	316	96.9
1955	23,568	7,687	326	100.0
1956	24,288	8,232	339	104.0
1957	25,030	8,746	349	107.1
1958	25,795	9,139	354	108.6
1959	26,584	9,765	367	112.6
1960	27,387	9,864	360	110.4
1961	28,212	10,433	370	113.5
1962	29,062	10,989	378	116.0
1963	29,937	11,812	394	120.9
1964	30,839	12,022	390	119.6
1965	31,768	12,634	398	122.1
1966	32,725	13,349	408	125.2
1967	33,711	13,965	414	127.0
1968	34,726	15,246	439	134.7
1969	35,772	16,161	452	138.6
1970	36,849	16,683	453	139.0

Sources: Population, see Appendix II-6.

National Income: 1950-1966, NEC, OSCAS, The Statistical Reporter Vol. 13, No. 2, April-June,1969, pp.52-53.
1967, NEC, OSCAS, The Statistical Reporter Vol. 14, No. 2, Apri-June 1970, pp.43-44.
1968-1970, NEC, OSCAS, The Statistical Reporter Vol. 15, No. 2, April-June 1971.

APPENDIX IV-6

Average Annual Apparent Per Capita Regional Consumption (Disappearance) of Rice, Corn, Sweet Potato and Cassava, 1964/65-1968/69
(in 000 tons)

	Luzon	Eastern Visayas	Western Visayas	Mindanao
		I. RICE		
1964/65				
1. Stocks start of year	178	7	10	9
2. Production	1,524	164	319	584
3. Net imports	369	65	20	28
4. Net inter-regional shipments	(17)	13	4	1/
5. Stocks end of year	228	8	6	16
6. Animal feed, seed, waste & others	60	9	13	26
7. Population, Jan. 1 (000)	16,362	4,309	4,134	6,498
8. Apparent availability for human consumption(kg/cap.) (1+2+3+4-5-6) / 7	108.0	53.7	80.4	89.1
1965/66				
1. Stocks start of year	228	8	6	16
2. Production	1,870	146	268	360
3. Net imports	212	53	20	42
4. Net inter-regional shipments	(24)	14	4	5
5. Stocks end of year	217	7	8	9
6. Animal feed, seed, waste & others	67	10	12	18
7. Population, Jan. 1(000)	16,912	4,381	4,201	6,752
8. Apparent availability for human consumption(kg/cap.)	118.4	46.7	66.2	58.5
1966/67				
1. Stocks start of year	217	7	8	9
2. Production	1,700	183	332	444
3. Net imports	186	23	0	5
4. Net inter-regional shipments	38	10	(7)	(41)
5. Stocks end of year	194	(1)	(53)	26
6. Animal feed, seed, waste & others	64	11	12	21
7. Population, Jan. 1(000)	17,482	4,454	4,269	7,014
8. Apparent availability for human consumption(kg/cap.)	107.8	47.8	87.4	52.6

	Luzon	Eastern Visayas	Western Visayas	Mindanao
1967/68				
1. Stocks start of year	194	(1)	(53)	(26)
2. Production	1,984	197	365	474
3. Net imports	113	(4)	5	(4)
4. Net inter-regional shipments	8	11	(15)	(4)
5. Stocks end of year	328	11	13	57
6. Animal feed, seed, waste & others	71	11	14	22
7. Population, Jan. 1(000)	18,068	4,526	4,338	7,286
8. Apparent availability for human consumption(kg/cap.)	105.1	41.8	64.4	56.5
1964/65		II. CORN		
1. Stocks start of year	4	18	1	31
2. Production 2/	276	150	158	729
3. Net imports 2/	-	-	-	-
4. Net inter-regional shipments	17	106	6	(129)
5. Stocks end of year	8	7	1/	26
6. Animal feed, seed, waste & others	57	34	34	150
7. Population, Jan. 1(000)	16,362	4,309	4,134	6,498
8. Apparent availability for human consumption(kg/cap.)	10.0	38.0	22.2	49.2
$\frac{(1+2+3+4-5-6)}{7} \times 0.71 \frac{3}{4} \beta$ 4/				
1965/66				
1. Stocks start of year	8	7	1/	26
2. Production 2/	228	191	122	839
3. Net imports 2/	-	-	-	-
4. Net inter-regional shipments	38	154	39	(231)
5. Stocks end of year	8	8	1	10
6. Animal feed, seed, waste & others	48	42	27	172
7. Population, Jan. 1(000)	16,912	4,381	4,201	6,752
8. Apparent availability for human consumption(kg/cap.)	9.0	48.5	22.4	46.9
1966/67				
1. Stocks start of year	8	8	1	10
2. Production 2/	228	199	108	955
3. Net imports 2/	-	-	-	-
4. Net inter-regional shipments	61	141	(1)	(202)
5. Stocks end of year	4	20	1	17
6. Animal feed, seed, waste & others	48	44	23	195
7. Population, Jan. 1(000)	17,482	4,454	4,269	7,014
8. Apparent availability for human consumption(kg/cap.)	9.8	45.0	13.8	55.2

	Luzon	Eastern Visayas	Western Visayas	Mindanao
1967/68				
1. Stocks start of year	4	20	1	17
2. Production 1/	306	204	156	953
3. Net imports	-	-	-	-
4. Net inter-regional shipments	64	278	(1)	(343)
5. Stocks end of year	4	31	1	16
6. Animal feed, seed, waste & Others	63	44	33	195
7. Population, Jan. 1(000)	18,068	4,526	4,338	7,286
8. Apparent availability for human consumption(kg/cap.)	12.0	66.1	19.7	40.2
1964/65		III. SWEET POTATO		
1. Production	405	213	21	86
2. Animal feed	20	11	1	4
3. Population, Jan. 1(000)	16,362	4,309	4,134	6,498
4. Apparent availability for human consumption(kg/cap.)	9.4	18.7	1.9	5.0
$\frac{(1 - 2)}{3} \times \beta$ 3/				
1965/66				
1. Production	415	176	29	82
2. Animal feed	21	9	1	4
3. Population, Jan. 1(000)	16,912	4,381	4,201	6,752
4. Apparent availability for human consumption(kg/cap.)	9.3	15.1	2.6	4.6
1966/67				
1. Production	400	177	30	80
2. Animal feed	20	9	1	4
3. Population, Jan. 1(000)	17,482	4,454	4,269	7,014
4. Apparent availability for human consumption(kg/cap.)	8.6	15.0	2.6	4.3
1967/68				
1. Production	386	176	30	81
2. Animal feed	19	9	1	4
3. Population, Jan. 1(000)	18,068	4,526	4,338	7,286
4. Apparent availability for human consumption(kg/cap.)	8.1	14.7	2.6	4.2
1968/69				
1. Production	419	176	30	81
2. Animal feed	21	9	1	4
3. Population, Jan. 1(000)	18,674	4,600	4,408	7,568
4. Apparent availability for human consumption(kg/cap.)	8.5	14.5	2.6	4.0

	Luzon	Eastern Visayas	Western Visayas	Mindanao
1964/65		**IV. CASSAVA**		
1. Production	122	111	60	353
2. Animal feed & manufactures [5/]	26	23	13	75
3. Cassava flour and starch [5/]	4	4	2	12
4. Other non-food usages [5/]	2	2	1	5
5. Population, Jan. 1(000)	16,362	4,309	4,134	6,498
6. Apparent availability for human consumption(kg/cap.) $\left[\frac{(1-2)\beta\ [3]}{5} + 3 - 4\right]$	1.9	6.4	3.7	13.6
1965/66				
1. Production	130	91	51	343
2. Animal feed & manufactures	33	23	13	86
3. Cassava flour and starch	6	3	2	12
4. Other non-food usages	2	2	1	6
5. Population, Jan. 1(000)	16,912	4,381	4,201	6,752
6. Apparent availability for human consumption(kg/cap.)	1.8	4.9	2.8	12.0
1966/67				
1. Production	126	80	43	280
2. Animal feed & manufactures	30	19	10	68
3. Cassava flour and starch	4	3	1	10
4. Other non-food usages	3	2	1	6
5. Population, Jan. 1(000)	17,482	4,454	4,269	7,014
6. Apparent availability for human consumption(kg/cap.)	1.7	4.2	2.3	9.3
1967/68				
1. Production	116	80	43	244
2. Animal feed & manufactures	32	22	12	66
3. Cassava flour and starch	5	3	2	10
4. Other non-food usages	2	2	1	5
5. Population, Jan. 1(000)	18,068	4,576	4,338	7,286
6. Apparent availability for human consumption(kg/cap.)	1.5	4.0	2.2	7.7
1968/69				
1. Production	116	79	42	250
2. Animal feed & manufactures	36	24	13	78
3. Cassava flour and starch	5	4	2	11
4. Other non-food usages	3	2	1	6
5. Population, Jan. 1(000)	18,674	4,600	4,408	7,568
6. Apparent availability for human consumption(kg/cap.)	1.4	3.8	2.1	7.3

Footnotes:

1/ Less than a thousand tons.

2/ Not available on regional basis.

3/ Shelled corn converted to corn grits at 71% conversion rate.

4/ Value of Factor (β) to convert production weights into rice calorie equivalent, see Appendix IV-3.

5/ From 1964/65-1968/69, regional production of manufacture, flour, starch and non-food obtained by multiplying national totals by the ratio: $\frac{\text{regional production}}{\text{country production}}$ with country source: NEC; OSCAS; Statistical Reporter, Oct./Dec., 1968 and 1969.

Sources:

Rice and Corn: All items except population and net inter-regional shipments, see Appendix IV-1.
Net inter-regional shipments, BCS.

Sweet Potato: Production, DANR, BAE.

Cassava: Production, DANR, BAE.
Percentage allowances, see Appendix IV-3

Regional Population; BCS.

APPENDIX IV-7

Rice Surplus and (Deficit) Regions in the Philippines 1969/1970, using Adjusted FNRC Consumption Estimates[1/]
(in tons of milled rice)

Regions (PSSH Regions)	(1) Per Capita Consumption (per year)	(2) Population January 1, 1970 (000)	(3) Seed, Animal Feed & Waste	(4) Total Requirements (1x2) + (3)	(5) Production	Quantity Surplus or (Deficit) (5-4)
Metropolitan Manila	.0845	1,326	-	112,050	-	(112,000)
Ilocos/Mt. Province	.1376	1,822	6,430	257,070	181,830	(75,200)
Cagayan Valley/Batanes	.0939	1,446	11,090	146,820	319,430	172,600
Central Luzon	.1490	5,044	26,950	778,430	952,290	173,900
Southern Tagalog	.1084	6,713	13,580	741,270	414,970	(326,300)
Bicol	.0881	2,946	13,490	273,030	374,530	101,500
Luzon	.1159	19,296	71,540	2,307,890	2,243,050	(64,800)
Eastern Visayas	.0529	5,389	9,610	294,690	209,720	(85,000)
Western Visayas	.0906	3,770	14,110	355,670	384,330	28,700
N. & E. Mindanao	.0878	2,980	7,170	268,770	188,310	(80,500)
S. & W. Mindanao	.0813	4,876	17,800	414,260	504,770	90,500
Mindanao	.0837	7,856	24,970	682,520	693,080	10,600
Philippines (all regions)	.0970	36,310	120,230	3,642,350	3,530,170	(112,200)

[1/] Totals may not add due to rounding.

Sources: Per capita consumption, see Table IV-4 adjusted by ratio of 97.0/100.8 x Regional FNRC Consumption.
Population, see Appendix II-6.
Production, see Appendix II-3.
Seed, Animal Feed & Waste, see sources of Appendices IV-1 and IV-2.

APPENDIX IV-8

Relationship of BAE to BCS or PSSH Regions in the Philippines as of Mid-1970

Region Number[1]	BAE Region	Included in BAE Region but not Included in BCS or PSSH Region	BCS or PSSH Region[1]	Included in BCS Provinces or PSSH Region but not Included in BAE Region	Included in Both Regions
0	BAE has no Region 0		Manila & Suburbs	Manila & Suburbs	
I	Ilocos	Batanes	I Ilocos-Mt. Province	Ifugao Kalinga-Apayao	Bontoc (Mt. Province) Ilocos Norte Ilocos Sur La Union Abra Benguet
II	Cagayan Valley	Apayao-Kalinga	II Cagayan Valley & Batanes	Batanes	Cagayan Isabela Nueva Vizcaya
III	Central Luzon		III Central Luzon		Bataan Bulacan Pampanga Pangasinan Tarlac Nueva Ecija Zambales
IV	Southern Luzon		IV Southern Luzon & Islands		Batangas Cavite Quezon Rizal Laguna Palawan Marinduque Occ. Mindoro Or. Mindoro
V	Bicol		V Bicol		Albay Masbate Camarines Norte Camarines Sur Catanduanes Sorsogon

APPENDIX IV-8
(page 2)

Region Number	BAE Region	Included in BAE Region but not Included in BCS or PSSH Region	BCS or PSSH Region	Included in BCS Provinces or PSSH Region but not Included in BAE Region	Included in Both Regions
VI	Eastern Visayas		VII Eastern Visayas	Negros Oriental	Bohol Cebu Leyte Southern Leyte Eastern Samar Northern Samar Western Samar
VII	Western Visayas	Negros Oriental	VI Western Visayas		Aklan Antique Capiz Iloilo Negros Occidental Romblon
VIII	Northern Mindanao		VIII Northern & Eastern Mindanao		Agusan 2/ Camiguin Lanao del Norte Lanao del Sur Misamis Occidental Misamis Oriental Surigao del Norte Surigao del Sur
IX	Southern & Western Mindanao		IX Southern Mindanao		North Cotabato South Cotabato Davao del Norte Davao del Sur Davao Oriental Sulu Zamboanga del Norte Zamboanga del Su

1/ At times, BCS regional numbers are shown as 1 to 10 (PSSH) instead of 0 to 9(Census).

2/ Agusan region is divided into Agusan del Norte and Agusan del Sur in the BCS classification.

Sources: BSC or PSSH Regions, Bureau of the Census and Statistics.
BAE Regions, Bureau of Agricultural Economics.