

## FOOD CONSUMPTION SURVEYS IN THE PHILIPPINES<sup>1</sup>

by

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### Introduction

The Food and Nutrition Research Center, NIST, NSDB. has completed its baseline nutrition survey in the ten regions of the country over the past decade starting in 1957. Two regions (Bicol and Central Luzon) were first done as pilot studies, on the basis of which the results the necessary improvements were incorporated in the succeeding eight regional surveys. These regions, in order of their succession were: Metropolitan Manila, Ilocos-Mountain Province, Cagayan Valley-Batanes, Southern Tagalog, Western Visayas, Eastern Visayas, Eastern Visayas, Southwestern Mindanao, and Northeastern Mindanao.

The objectives for which these surveys were conducted were:

- 1) To establish a nutritional status baseline of the population in the different regions of the country. This baseline will serve as basis for determining the nutritional needs of the population and for evaluating the progress of nutrition programs over the years;
- 2) To provide sound scientific bases for local, national, and international agencies in the planning of nutrition, health, education, and agriculture programs;

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- 3) To provide basic information that can serve as guide for nutrition researches;
- 4) To determine the important factors that influence people's food intake so that appropriate measures may be taken to improve nutritional status.

### I. The Sample

A total of 2, 567 households with a membership of 17,411 persons were included in these surveys, at the rate of one region per year. The least number of households surveyed at a time was 187 (Northeastern Mindanao) and the most was 512 (Western Visayas). The Bureau of the Census and Statistics played a major role in the picking of the sample, which was drawn as a sub-sample of that used by the then Philippine Statistical Survey of Households (now the BCSSH). Proper statistical advice and guidance were provided by the U. P. Statistical Center, U. P. Institute of Hygiene and Office of Statistical Coordination and Standards, NEC during the planning of the survey, and particularly in the selection of sample households.

Selection of households employed the multi-stage sampling procedure, development of the design of which has been described by Oñate et al. (1960).<sup>3,4</sup> Three-fourths of the BCSSH regional samples were selected for the dietary and clinical phases. For the biochemical phase, however, because of its being a more objective and precise procedure, only half of those used in the dietary and clinical phases was taken. Two sample households were set as minimum per survey area. Alternate households were provided to take care of refusals and transfers. Substitute households were used when neither original nor alternate households were available.

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<sup>3</sup> Oñate, B. T. "Development of Multi-Stage Designs for Statistical Surveys in the Philippines, "The Statistical Reporter", 4(4), October 1960.

<sup>4</sup> Oñate, B. T. and E. S. Quiogue, "Variability Studies of Data from Household Food Consumption Surveys, "The Philippine Agriculturist, Vol. L, September 1966, pp. 364-389.

Since the design for the nutrition survey was similar to the BCSSH sample design, the computation of estimates, means, variances, and coefficients of variation followed the BCSSH BCSSH procedures. (See Appendix A for more details.)

Results of the dietary survey as reported are on per capita basis since the food intakes were weighed for the total households rather than per individual member. Those of the clinical and biochemical phases, on the other hand, refer to individual subjects, since the survey techniques permitted individual examination of each household member.

## II. Survey Procedures

### 1) *Data Collection:*

The nutrition survey made use of the three-pronged approach, having dietary, clinical, and biochemical phases. The clinical phase, headed by a medical nutritionist, consisted of examination of the household members for signs and symptoms suggestive of malnutrition, supplemented by examination of fecal samples by a medical technician for incidence of intestinal parasitism. The biochemical phase, headed by a biochemist, consisted of collection and analyses of blood and urine samples for nutrient levels, which are means of detecting probable nutritional deficiencies before they show up as clinical deficiency symptoms.

The dietary survey made use of the weighing method for a period of 3 days—starting at breakfast on Tuesday morning and ending at supper Thursday night. Two types of dietetic scales were used—one of 15-kilo capacity and another of 500 grams. The dietary researchers, who were nutritionists adequately trained in the food weighing technique, could do 2 to 3 households each week, provided each was accompanied by a local survey aide who acted as guide in locating the sample households, as helper in carrying her survey paraphernalia, and as local dialect translator when needed. Location of the sample households as previously determined at the Bureau of the Cen-

sus and Statistics was done on the Monday before the food weighing took place, so that the necessary rapport could be established with the household and the necessary consent secured.

An inventory of the food supplies on hand, usually the non-perishables like rice, sugar, salt, cooking fat, etc., commonly stocked in most households, was made at the beginning of the survey period. From then on, all foods that went into the cooking pot as well as those served on the dining table were weighed in their A.P. (as purchased) forms, meaning uncooked and with their bones, stones, shells, peelings, etc. After each meal, all left-overs and plate wastes that were to be thrown away or fed to animals and house pets were weighed, to enable us to arrive at better estimates of net food intakes.

Besides data on food intake and household characteristics, other data collected included food preparation and cooking practices, food beliefs and superstitions, sources of nutrition information, food storage and cooking facilities, infant feeding and weaning practices, local food prices, home food production, health statistics, and other factors that have relevance in the interpretation of results, and merit consideration in future programs calling for improvement in dietary practices. Such data were gathered through questionnaires, either in English or in the local dialect, from existing records, if any, or simply by direct observation.

The assistance of locally hired survey aides in carrying survey equipment and supplies for the 3 teams and in providing some security minimized in some way the hazards in data collection, particularly in the innermost barrios and sitios which a random sample always inevitably includes. Fortunately, the involvement and participation, although indirectly, of the local officials, made the survey more meaningful, particularly in making the people understand the objectives behind these surveys and in allaying their fears and suspicions. Their involvement now was also a means of arousing their interest so that the formulation of action programs would meet with the mi-

nimum of resistance and the maximum of their cooperation and participation at some future date.

## 2. *Data Processing:*

### a) *Preliminary steps:*

Once the survey schedules are edited after the field survey, a program of preliminary evaluation is done, in preparation for electronic data processing, the first phase of which includes:

- i) All A. P. food weights are converted to E. P. weights (edible portion, i.e., minus the peelings, stones, shells, etc.);
- ii) Conversion of weights of cooked foods to their raw equivalents;
- iii) Subtraction of left-overs and plate wastes from the gross food weights recorded;
- iv) Application of conversion factors for meals eaten out by household members and for visitors that partook of the family's meals, to arrive at the per capita consumption unit (PCCU); and
- v) Computation of food costs on the basis of local market survey of food prices.

The second phase of preliminary processing includes coding of the raw data for IBM punching by the same survey staff that collected the dietary data. Once this phase is completed, the data are ready for the electronic computer.

### b) *The use of electronic computer:*

It was not until we reached Western and Eastern Visayas that we were able to avail of electronic com-

puter services. Again the Bureau of Census and Statistics played a major role in this phase of our survey. Due to pressure of work at this Office lately, however, our two regional surveys in Mindanao had to be shifted to the Planning and Programming Staff, Surveys Division of the Bureau of Lands, which employs the IBM 360 machine series.

c) *The use of McBee summary cards:*

Dietary survey results for each household are transferred to individual McBee summary cards, properly identified for future reference. These are hand-punched for easy sorting, and serve as a handy file for the staff in obtaining individual household characteristics.

### III. Evaluation

Evaluation of the food intake in terms of nutritional content was done using our local Food Composition Tables, supplemented by foreign ones where needed,<sup>5,6,7,8</sup> The nutrients for which they were evaluated were calories, protein, fats, carbohydrates, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid. Food sources of some nutrients (protein, fats, iron, and vitamin A) were further classified into animal

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<sup>5</sup> Bocobo, D.L., V.L., Pobre, and C.L.I. Intengan, "Food Composition Tables Recommended for Use in the Philippines," Institute of Nutrition. Handbook I, Manila, April 1951.

<sup>6</sup> Foods and Nutritional, Biochemistry Division, "Food Composition Tables Recommended for Use in the Philippines," Institute of Nutrition. Handbook I, Manila, Revised 1957.

<sup>7</sup> Food and Nutrition Research Center, NIST, NSDB, "Food Composition Tables Recommended for Use in the Philippines," Handbook I (3rd Revision), Manila, 1964.

<sup>8</sup> Watt, B.R. and A.L. Merrill, "Composition of Foods-Raw, Processed, Prepared," U.S. Department of Agriculture, Handbook No. 8, June 1950.

and vegetable, or fresh and cooked in the case of ascorbic acid, to evaluate the availability of the nutrients in the body, as consumed.

On the basis of the per capita food and nutrient intakes, an evaluation of the diets for nutritional adequacy was made, using a table of recommended dietary allowances.<sup>9,10</sup> There are goals or objectives toward which the planning of practical dietaries are made, or a "numerical expression of the quantities of nutrients believed to be needed by an individual representative of the various categories" (e.g., ages, sex, physiological state, degree of activity). They are used as tentative yardsticks against which dietary sufficiency is measured with respect to certain specific nutrients.

#### IV. Dietary Survey Results in Eight Regions

By way of giving you a peak into the picture of food consumption in our various regions, permit me to highlight to you some of our survey findings, which you may find in your mimeographed copies of the paper.

Table 1 shows the distribution of households and persons in the dietary survey sample, as well as the estimated population in the ten regions of the country. It will be noted that the estimated population in 4 regions—Southern Tagalog, Western Visayas, Eastern Visayas, and Southwestern Mindanao—constitute a total of 17.775 millions, or more than half of the estimated population of the country. In a weighted average, the survey results in these regions will weigh heavily because of their high percentage in the population.

<sup>9</sup> Food and Nutrition Research Center, National Institute of Science and Technology, National Science Development Board, "Table. Recommended Daily Food Allowances by Sex, Group Activity, and Age Group," Mimeographed, Revised 1963.

<sup>10</sup> Pascual, C.R. et al, "Nutrition Survey of 189 Households in two Regions in the Philippines." Bureau of Printing, Manila, 1958.

TABLE 1. DISTRIBUTION OF HOUSEHOLDS AND PERSONS IN THE SAMPLE AND IN THE POPULATION IN TEN REGIONS OF THE PHILIPPINES

Region	Date of Survey		HOUSEHOLDS			PERSONS		
			Sample	Estimated Total <sup>1</sup> (in Thousands)	Sample per Thousand Households	Sample	Estimated Population <sup>3</sup> (in Thousands)	Sample per Thousand Population
Totals <sup>2</sup>			2,567			17,411		
Bicol <sup>2</sup>	Mar.-Apr.,	1957	88	371	.24	559	2,188	.26
Central Luzon <sup>2</sup>	Mar.-Apr.,	1957	101	567	.18	594	3,470	.17
Metropolitan Manila	Feb.-May	1958	402	171	2.35	2,967	1,119	2.65
Ilocos- Mt. Province	Apr.-June,	1960	274	289	.95	1,614	1,488	1.08
Cagayan Valley Batanes	Apr.-June,	1960	293	187	1.57	1,814	1,082	1.68
Southern Tagalog	Jan.-Apr.,	1962	368	771	.48	2,502	4,573	.55
Western Visayas	Feb.-May,	1964	512	636	.80	3,485	3,704	.94
Eastern Visayas	Apr.-June,	1965	306	944	.32	1,951	5,437	.36
Southwestern Mindanao	Apr.-May,	1966	225	670	.34	1,743	4,061	.43
Northeastern Mindanao	Apr.-May,	1967	187	417	.45	1,335	2,707	.49

<sup>1</sup> Based on Estimated Number of Persons and Household Sizes

<sup>2</sup> The Two Regions were done as Pilot Studies and Excluded in Totals.

<sup>3</sup> Source: Bureau of Census and Statistics.



Figure 1 shows the percentage breakdown of the regional sample by age and sex compared to the breakdown in the Philippine population. A weighted mean was taken of the age and sex grouping in all 8 regions, and by comparison of these with the respective age and sex groupings in the population, a close similarity between them was found.

Figure 2 shows the estimated mean daily per capita food intakes compared to recommended allowances in the 8 regions of the country. Among the foods recommended for a nutritionally adequate mixed diet, "cereals" were the only group that met recommended allowances (10%), intakes amounting to 339 grams per capita per day. This group includes rice, corn, and wheat products. Intakes of all other food groups, mostly the protective foods, ranged in intake from 14% (milk and milk products) to 93% (other fruits and vegetables) of recommended levels.

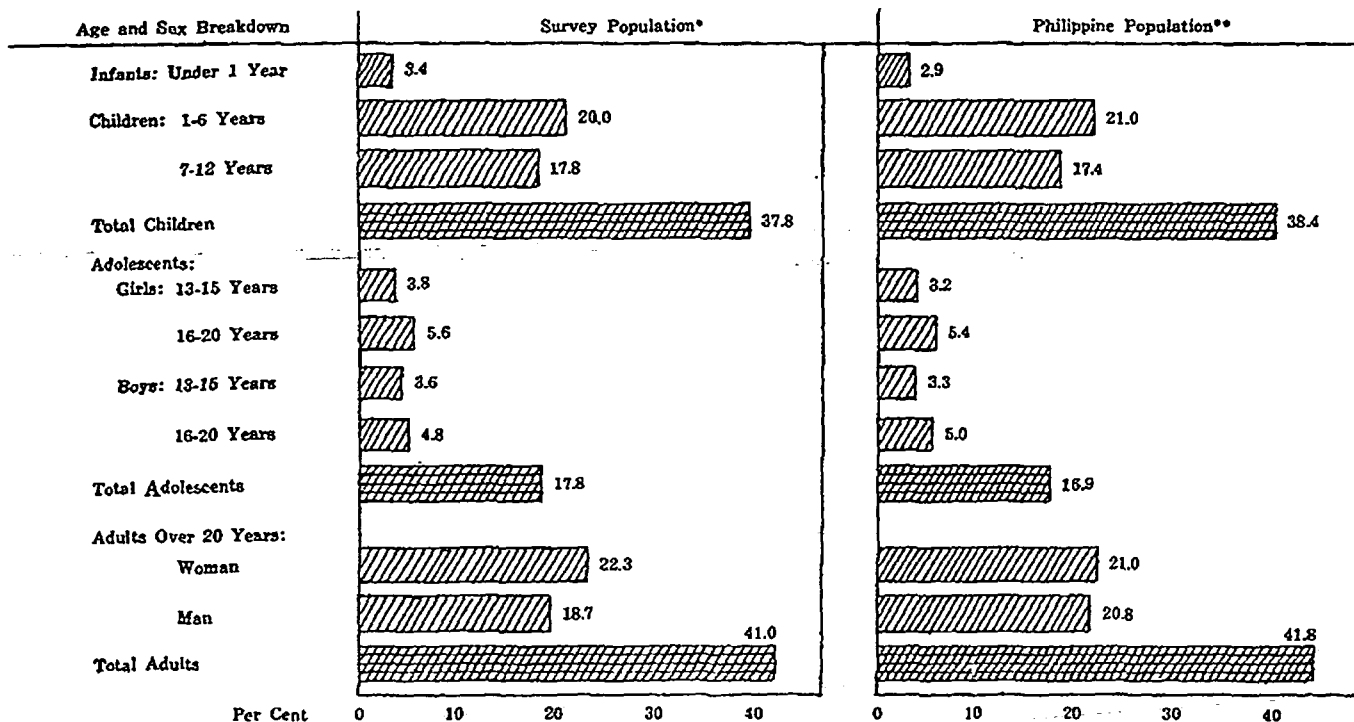
In-between these levels, we have fats and oils (24%), vitamin C-rich foods (26%), leafy and yellow vegetables (26%), eggs (27%), dried, beans, nuts, and seeds (37%), sugars and syrups (54%), meat, fish, and poultry (70%), and starchy roots and tubers (73%), of recommended allowances.

In terms of nutritional content, the diet was found inadequate both in quantity and in quality (Figure 3). The weighted mean for calories is 1674, or only 3/4 of recommended levels, the range being from 1503, or 68% of recommendation (Eastern Visayas) to 1972, or 87% of recommendation (Ilocos-Mountain Province). Proteins were short of recommended levels by 14%; and fats were too low to complement the calories provided by carbohydrates.

Calcium and riboflavin were the least adequately met among the nutrients (1/3 of recommended allowances), followed by vitamin A (1/2), and thiamine (less than 2/3).

Ascorbic acid, although reaching 90% of the recommended level, was further depleted by various cooking methods since

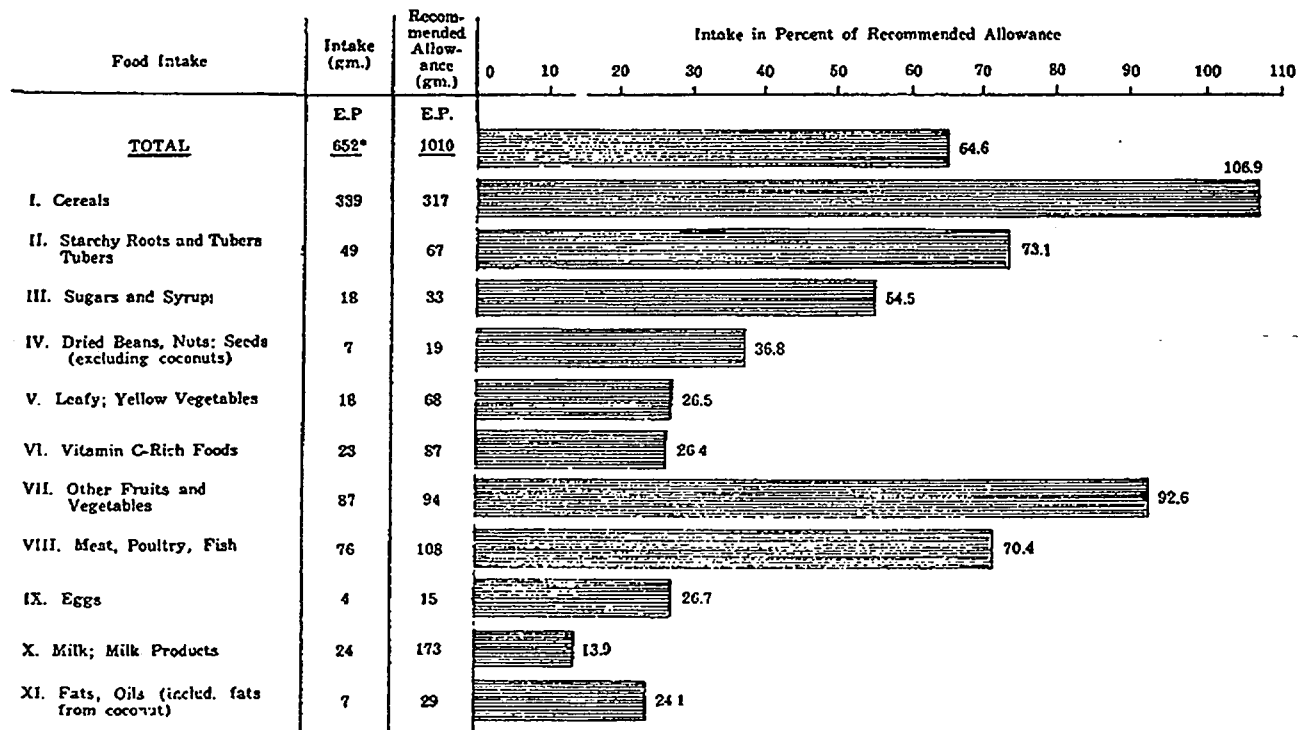
FIGURE 1. PERCENTAGE BREAKDOWN OF REGIONAL SURVEY SAMPLE POPULATION BY AGE AND SEX COMPARED TO BREAKDOWN OF PHILIPPINE POPULATION



\*Includes Eight (8) Regions surveyed, 1958-1967.

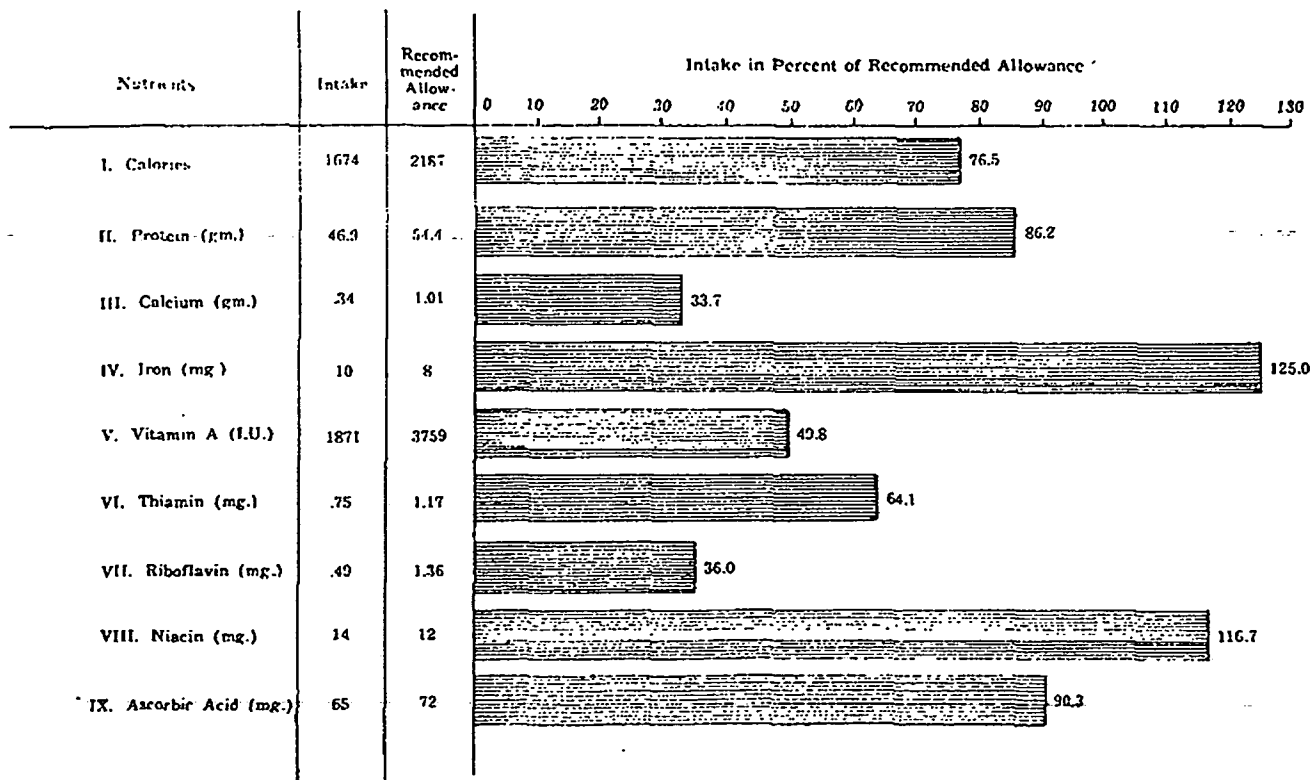
\*\*Based on the 1960 Census of the Philippines, Bureau of Census and Statistics.

FIGURE 2. ESTIMATED MEAN DAILY PER CAPITA FOOD INTAKES COMPARED TO RECOMMENDED ALLOWANCES IN EIGHT REGIONS OF THE PHILIPPINES: 1958-1967



\*Excluding "miscellaneous" food group for which there is no recommendation.

FIGURE 3 ESTIMATED MEAN DAILY PER CAPITA NUTRIENT INTAKES COMPARED TO RECOMMENDED ALLOWANCES IN EIGHT REGIONS OF THE PHILIPPINES: 1958-1967



it was largely derived from vegetables that required cooking, rather than from vitamin-C rich foods which are generally eaten fresh thereby contributing the most of this nutrient.

Iron and niacin were the only nutrients found to exceed recommended allowances in all regions. However, the various factors influencing their consumption, absorption, and utilization give us no assurance of their adequacy in the body.

Figure 4 shows the percentage calorie distribution in the 8 regions. A consistent pattern of high carbohydrates, low proteins, and low fats is apparent, the corresponding figures being 79, 10, and 11, respectively. It is a well-known fact that the higher the percentage of calories derived from carbohydrates (cereals, starchy roots, and sugar) the poorer is the quality of the diet. It will be noted that Manila has the lowest percentage of carbohydrate calories (66%) among the regions, and the highest percentage of protein calories (11.4%) as well as fats (22.5%). Incidentally, it has also the highest percentage of animal protein foods (45.6%), as against the weighted mean of 35% for the 8 regions.

A few factors known to affect dietary patterns were correlated with diet ratings, which are merely average percentage of adequacy of household diets with respect to the various nutrients. Among these factors were household size, level of schooling, and food expenditure. The succeeding figures show the effects of these 3 factors on household diet ratings.

Figure 5 shows that diet ratings decreased from 74.5% to 63.9% with increase in number of household members "1 to 3" to "over 12". There is an inverse relationship between these 2 variables, i.e., the smaller the household size, the higher was the diet rating. The coefficient of correlation was  $-0.430$ , which was significant at the 5% level.

Figure 6 shows that with increase in level of schooling of the household, diet ratings increased from 64% at "below 5

FIGURE 4. PERCENTAGE CALORIE DISTRIBUTION IN EIGHT REGIONS OF THE PHILIPPINES (1958-1967)

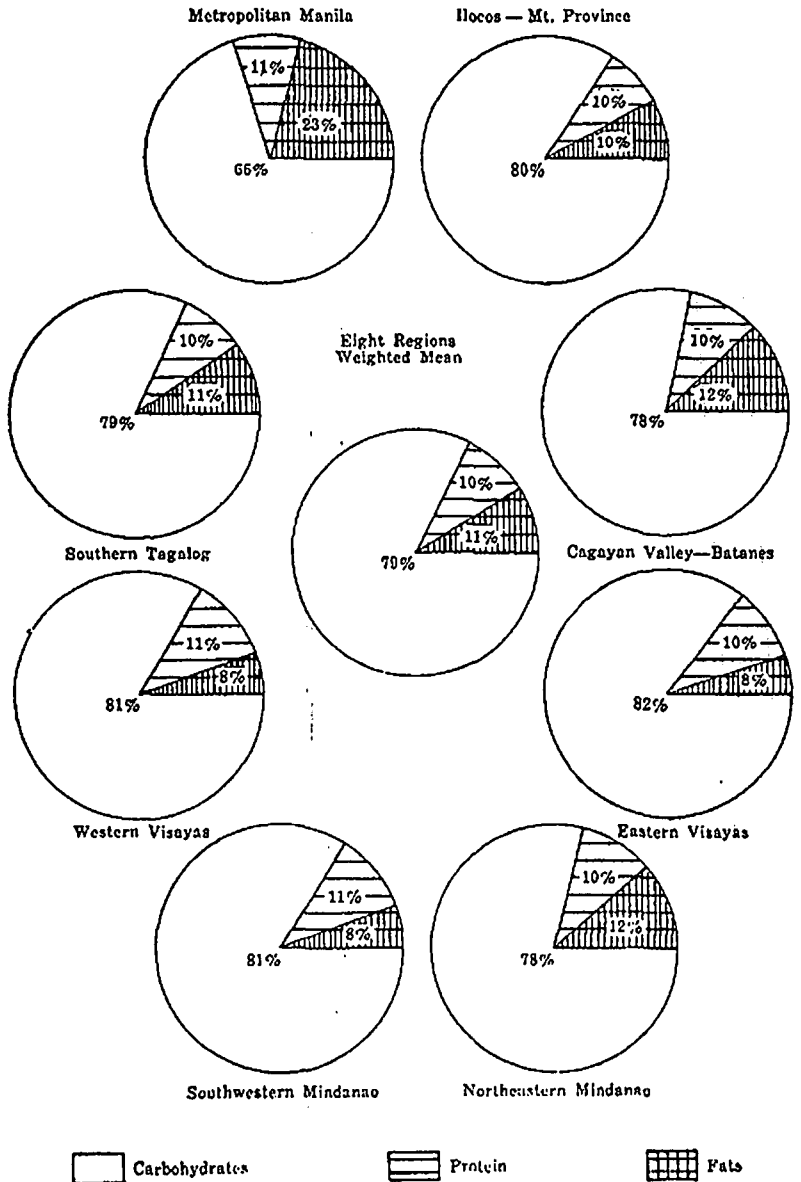
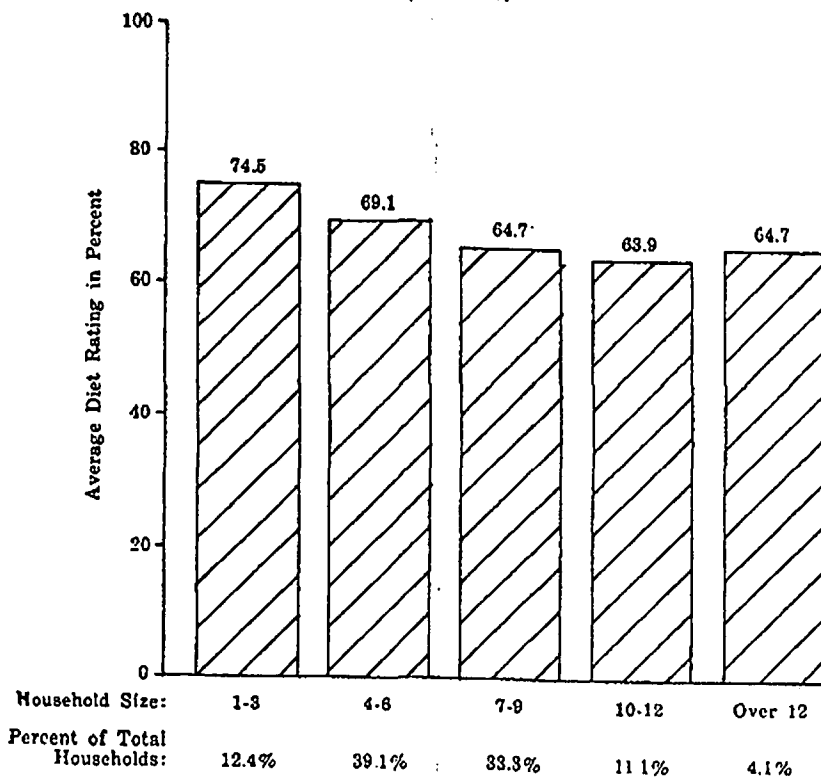
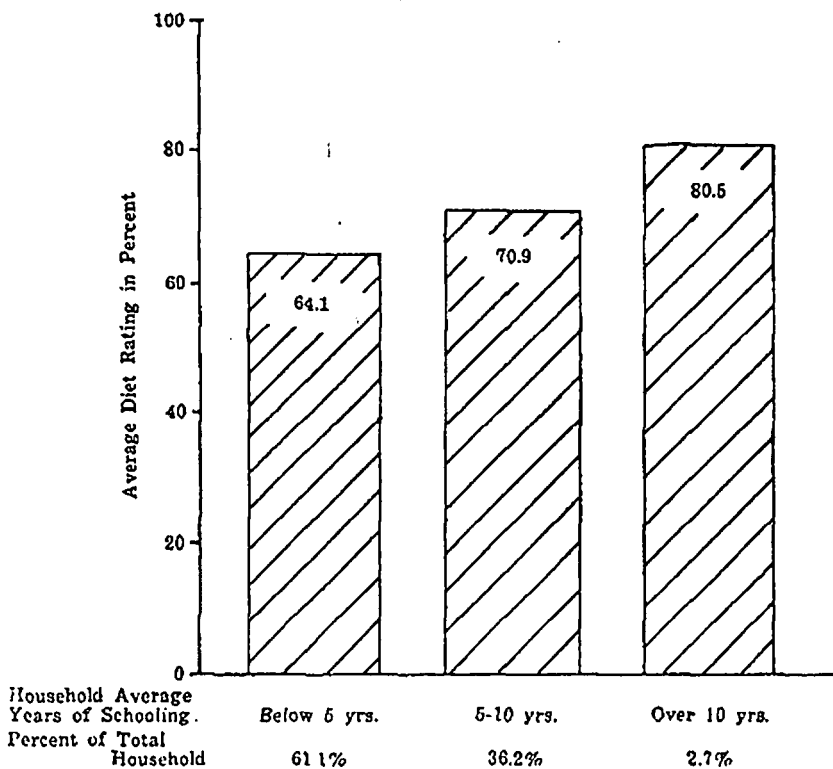


FIGURE 5. MEAN DIET RATING BY NUMBER OF HOUSEHOLD MEMBERS  
IN SIX REGIONS OF THE PHILIPPINES  
(1958-1965)



\*Excluding 2 Mindanao regions which are under process.

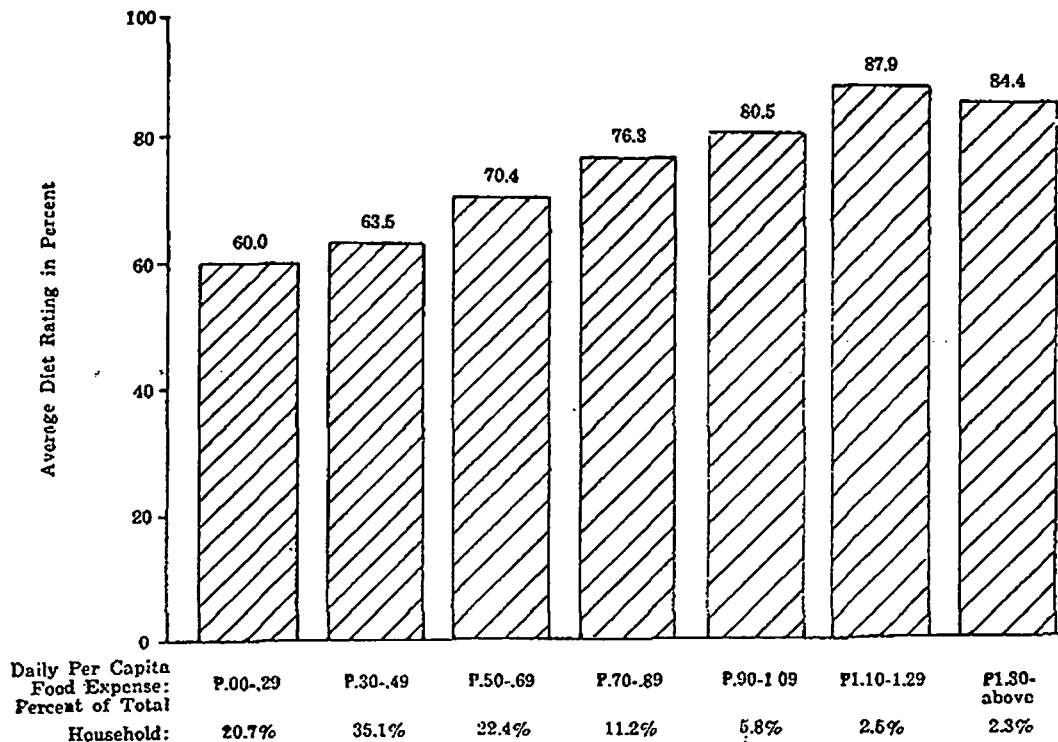
FIGURE 6. MEAN DIET RATING BY YEARS OF SCHOOLING  
IN SIX REGIONS\* OF THE PHILIPPINES  
(1958-1965)



\*Excluding 2 Mindanao regions which are under process.



FIGURE 7. MEAN DIET RATING BY DAILY PER CAPITA FOOD EXPENSE  
IN SIX REGIONS\* OF THE PHILIPPINES  
(1958-1966)



\*Excluding 2 Mindanao regions which are under process.

years" schooling to 80.5% at "over 10 years" schooling. The coefficient of correlation was .713 which was significant at the 1% level.

Figure 7 shows increase in diet rating with increase in daily per capita food expenditure. At the daily per capita food expenditure of 10 to 29 centavos, diet rating was 60%, rising consistently to 87.9% with every increase in food cost up to P1.29 per capita per day. This relationship had a coefficient of correlation of .789, again significant at the 1% level.

#### V. Summary and Conclusions:

The Food and Nutrition Research Center, NIST, NSDB, has completed baseline nutrition surveys in 8 regions of the country using the 3-pronged approach for complete assessment of nutritional status, with dietary, clinical, and biochemical phases. The regional sample households used were sub-samples of the BCSSH. Formulas of estimates for stratified, multi-stage random sampling were used.

Food and nutrient intakes were measured against nutritional standards for optimum health, and the Filipino diet was found sadly inadequate both quantitatively and qualitatively. Factors known to influence food intakes were determined as these would be useful to consider in the formulation of programs aiming to modify or improve dietary practices. While the yardsticks used for measuring adequacy were not necessarily the most suitable for our population, however, they are at best only tentative and not necessarily conclusive. Until such time as we have developed our own nutritional requirements on the basis of actual researches on requirements of our people, we shall have to depend on these tentative yardsticks.

The results of surveys of the nation's food and nutrient situation will be useful in the formulation and implementation of food and agricultural policies, for the periodic assessment

of hunger, malnutrition, and future food requirements, for the establishment of optimum production objectives, and for proper orientation of plans for agricultural and economic development.

Our hope is that these surveys, particularly that on food consumption will be carried on regularly, at yearly intervals and on a national scope. Considering the present rate of our population growth, which we hope will not outpace food production, we may be heading toward poorer rather than better diets. With the Administration's concern for intensified food production, we must have suitable means for measuring food utilization and consumption among the population on a national scope. Studies to keep track of food consumption and food habits provide sound bases for nutrition program planning, and should go hand in hand with programs for increased food production.

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## APPENDIX A

To facilitate the computation of estimates of mean and variances using the PSSH procedures the sample areas are arranged according to orders of selection, for example, for Region IX, Southwestern Mindanao, we have the following:

<u>Stratum</u>	<u>Orders of Selection</u>	
	(1)	(2)
27	Banga	Kabacan
28	Padada	Katipunan

The sample households of the dietary survey being drawn from a sub-sample, some adjustments have to be made on the raising factors. The new raising factor is

$$\text{NRF} = \frac{5}{N} \times \frac{Q}{q} \times \frac{R}{1}$$

where:

N = number of ordered selection,

Q = total number of sample households from the areas which were drawn as sub-samples either as poblacion or barrio or precinct,

q = number of sample households actually included in the dietary survey, and

R = raising factor for the sector.

a) *Estimates of the Mean*

Let  $R_p$ ,  $R_b$ , and  $R_c$  be the new raising factors for poblaciones, barrios, and provincial capitals and chartered cities respectively; and  $X_p$ ,  $X_b$ , and  $X_c$  be the estimates for the mean of the characteristics of interest for the poblaciones, barrios, and provincial capitals and chartered cities respectively, the weighted mean for the region is shown

$$X = \frac{R_p X_p + R_b X_b + R_c X_c}{R_p + R_b + R_c}$$

b) *Estimates of Variances and Coefficients of Variation*

Let  $X_{1p}$ ,  $X_{2p}$ , ...  $X_{NP}$  be the mean  $OS_1$ ,  $OS_2$ , ...  $OS_N$  of the poblaciones and  $X_p$  the mean of the unbiased estimates of mean from the ordered selections, then the variance  $V(\bar{X}_p)$  is

$$V(\bar{X}_p) = \frac{(X_{1p} - X_p)^2 + (X_{2p} - X_p)^2 + \dots + (X_{NP} - X_p)^2}{N(N-1)}$$

Similar formulation for the barrios and provincial capitals and chartered cities can be shown for the computation of their variances by changing the subscript "p" to "b" or "c" as the case may be.

The weighted variance for the region using the new raising factors is

$$V(X) = \frac{R_p^2 V(\bar{X}_p) + R_b^2 V(\bar{X}_b) + R_c V(\bar{X}_c)}{(R_p + R_b + R_c)^2}$$

and the coefficient of variation (C.V.) is

$$\text{C.V. of } \bar{X} = \sqrt{\frac{V(\bar{X})}{\bar{X}}} 100$$