

1954

A study of the nutritional value of the school box lunch program in the Everett School system.

<https://hdl.handle.net/2144/9262>

"Downloaded from OpenBU. Boston University's institutional repository."

Ed.

Crossman, D.M.

Service paper

1954

Stack

Copy #1

BOSTON UNIVERSITY
SCHOOL OF EDUCATION

Service Paper

A STUDY OF THE NUTRITIONAL VALUE
OF THE SCHOOL BOX LUNCH PROGRAM IN THE EVERETT SCHOOL SYSTEM

Submitted by

Dorothy May Crossman

(B.S. in Ed., Boston University, 1948)

In Partial Fulfillment of Requirements for
the Degree of Master of Education

1954

Boston University
School of Education
Library

First Reader:

Dr. Leslie W. Irwin
Professor of Education

Second Reader:

Dr. Clem W. Thompson
Assistant Professor of Education

TABLE OF CONTENTS

CHAPTER	Page
I. INTRODUCTION.....	1
Statement of the problem.....	1
Selection of the problem.....	1
Scope of the problem.....	1
Justification.....	2
II. RESEARCH TECHNIQUES AND PROCEDURE.....	4
Collection of data.....	4
Analysis of data.....	4
Evaluation of data.....	5
III. DISCUSSION OF DATA.....	6
IV. CONCLUSIONS AND RECOMMENDATIONS.....	29
BIBLIOGRAPHY.....	39

LIST OF TABLES

Table	Page
1. List of Food Items Included in Lunches of 100 Fourth Grade Children.....	9
2. Frequency Distribution of Amounts of Protein Present in Lunches of 100 Fourth Grade Children.....	11
3. Frequency Distribution of Amounts of Calcium Present in Lunches of 100 Fourth Grade Children.....	12
4. Frequency Distribution of Amounts of Iron Present in Lunches of 100 Fourth Grade Children.....	13
5. Frequency Distribution of Amounts of Vitamin A Present in Lunches of 100 Fourth Grade Children.....	14
6. Frequency Distribution of Amounts of Thiamine Present in Lunches of 100 Fourth Grade Children.....	15
7. Frequency Distribution of Amounts of Vitamin C Present in Lunches of 100 Fourth Grade Children.....	16
8. Frequency Distribution of Amounts of Riboflavin Present in Lunches of 100 Fourth Grade Children.....	17

LIST OF FIGURES

Figure	Page
1. Bar Diagram to Illustrate Distribution and Range in Amounts of Protein in Lunches of 100 Fourth Grade Children.....	19
2. Bar Diagram to Illustrate Distribution and Range in Amounts of Calcium in Lunches of 100 Fourth Grade Children.....	20
3. Bar Diagram to Illustrate Distribution and Range in Amounts of Iron in Lunches of 100 Fourth Grade Children.....	22
4. Bar Diagram to Illustrate Distribution and Range in Amounts of Vitamin A in Lunches of 100 Fourth Grade Children.....	23
5. Bar Diagram to Illustrate Distribution and Range in Amounts of Thiamine in Lunches of 100 Fourth Grade Children.....	25
6. Bar Diagram to Illustrate Distribution and Range in Amounts of Vitamin C in Lunches of 100 Fourth Grade Children.....	26
7. Bar Diagram to Illustrate Distribution and Range in Amounts of Riboflavin in Lunches of 100 Fourth Grade Children.....	28
8. Bar Graph to Illustrate Contribution to Dietary Allowances.....	31
9. Bar Graph to Illustrate Contribution to Dietary Allowances.	31
10. Bar Graph to Illustrate Contribution to Dietary Allowances.....	32
11. Bar Graph to Illustrate Contribution to Dietary Allowances.....	32

Figure	Page
12. Bar Graph to Illustrate Contribution to Dietary Allowances.....	33
13. Bar Graph to Illustrate Contribution to Dietary Allowances.....	33
14. Bar Graph to Illustrate Contribution to Dietary Allowances.....	34
15. Bar Graph to Illustrate Contribution to Dietary Allowances.....	36
16. Bar Graph to Illustrate Contribution to Dietary Allowances.....	37

CHAPTER I

INTRODUCTION

Statement of the problem.-- The purpose of this study is to attempt to learn to what extent the school box lunch provides one third of the daily dietary allowances recommended by the Food and Nutrition Board of the National Research Council.^{1/}

Selection of the problem.-- A great deal of discussion has been carried on by parents and teachers as to the relative nutritional merits of the lunch served to school children in the school cafeteria as opposed to the lunch prepared at home and carried to school in a lunch box. The writer has had extensive opportunity to observe the box lunches of hundreds of Everett school children over a period of at least seven years. It is her opinion that with a few exceptions the nutritional needs of the children can be amply provided for by box lunches. However, it is the purpose of this study to obtain specific data to support this opinion, to discover in what nutrients the lunches may be deficient, and to provide graphic material that will serve as a teaching technique to improve the status of the lunch program.

Scope of the problem.-- This study has been confined to the contents of the lunch boxes of 650 fourth grade boys and girls from ²13 schools in

^{1/}Recommended Dietary Allowances, Revised, National Research Council, Washington, D. C., Reprint and Circular Series, No. 129, October, 1948.

Everett. Each child recorded the contents of his lunch box seven different days during months ranging from October to April. Out of the 4550 lunch records that were obtained, the writer has made a random sampling and selected 100 cases, 50 of which are girls and 50 of which are boys. These 100 cases are representative of all the socio-economic groups in the city. Through the use of standard food tables,^{1/} the items on each lunch record were analyzed to determine to what extent the following nutrients were present: protein, calcium, iron, vitamin A, thiamine, vitamin C, and riboflavin. These nutrients are the ones recommended by the National Research Council who believe that if adequate diets containing foods in these groups are consumed, other minerals and vitamins necessary for the growth of children will also be adequately supplied. The figures acquired through this analysis were then compared with dietary allowances recommended by the Food and Nutrition Board of the National Research Council.^{2/}

Justification.-- The writer is cognizant of the fact that the calculations of the nutritional value of lunches using standard food tables are not too exact, and that they are subject to some inaccuracies, but that they serve as single practical checks on the inadequacy of the lunch and indicate where changes are necessary in the amounts and classes of foods to meet the requirements of different age groups. Diet records have been

^{1/}E. G. Donelson and J. M. Leichsenring, "Food Composition Table for Short Method of Dietary Analysis," Journal of American Dietetics Association (July-August, 1945), 21:7.

B. K. Watt and A. L. Merrill, Composition of Foods--Raw, Processed, Prepared, U. S. Department of Agriculture, 1950.

^{2/}Recommended Dietary Allowances, op. cit.

of great practical value in this study. They also serve to stimulate interest in pupils, teachers, and parents because they provide an objective picture of the lunch program as it exists at present, and they present information that will stimulate interest in improving the program in those areas where improvement seems necessary.

CHAPTER II

RESEARCH TECHNIQUES AND PROCEDURE

The following procedures and techniques were used in carrying on this study:

Collection of data.--

1. The contents of the lunch boxes of the fourth grade pupils from 13 schools were observed and recorded over three two-week periods in October, February, and April. Thus lunch records were kept for seven different days during the school year. This procedure furnished the writer with 4550 lunch records.
2. From this number, by a random sampling, 100 cases were pulled out for analysis and comparison with the recommendations of the Food and Nutrition Board of the National Research Council. ^{1/} This random sampling consisted of 50 boys and 50 girls and is representative of all the socio-economic groups in the city.

Analysis of data.-- With each of the 100 cases, the contents of the lunch were broken down into the seven nutrients described above to determine to what extent each nutrient was present in the lunch. ^{2/}

^{1/}Recommended Dietary Allowances, op. cit.

^{2/}Sources of food values, unless otherwise stated:
E. G. Donelson and J. M. Leichsenring, op. cit.
B. K. Watt and A. L. Merrill, op. cit.

Evaluation of data.--

1. After the calculation of the amounts of the seven nutrients present in each of the lunches, a frequency distribution was set up for each nutrient. Because of the badly skewed distributions with extreme measurements at either side of the distribution, the median was computed. Bar diagrams were drawn to illustrate the range of the middle 50 per cent and the range of the middle 90 per cent of the cases.
2. These scores were compared with one third of the daily allowances recommended for the 10 to 12-year-old group to determine to what extent these needs were being met and to determine in which areas need for improvement in the lunch program is indicated.^{1/}

^{1/}Recommended Dietary Allowances, op. cit.

CHAPTER III

DISCUSSION OF DATA

A total of 100 lunch records from 13 different schools was analyzed to determine to what extent each of the following nutrients was present: protein, calcium, iron, vitamin A, thiamine, vitamin C, and riboflavin. Almost every lunch followed the same pattern consisting of a sandwich, a beverage, a piece of fruit, and a dessert. The lunches did not differ particularly with the season. A glass of milk as pure milk or in cocoa or chocolate milk was recorded by 79 per cent of the children. Of the sandwiches, 34 per cent had meat filling in them; 19 per cent had peanut butter; 18 per cent had tuna fish; and 15 per cent had jam or jelly. The remaining sandwiches consisted of cheese and egg salad fillings. Only 6 per cent reported mayonnaise and 4 per cent reported butter on the bread. Where fruit was recorded, 22 per cent had apples; 10 per cent had oranges; 8 per cent had bananas; 7 per cent had tangerines; and 6 per cent had tomatoes. When a dessert was included, 35 per cent reported cookies, 23 per cent cake, with the remaining having doughnuts or candy.

The protein allowance was supplied by the following items:

2 slices of bread	approximately 20 per cent
$\frac{1}{2}$ oz. of tuna fish	50 per cent
1 tbs. peanut butter	20 per cent
$\frac{1}{2}$ pint of milk	34 per cent

1 oz. bologna, etc.	20 per cent
2 oz. cheese (processed)	50 per cent

Calcium was provided almost entirely by the milk, with a small proportion from fruit and eggs and the additional milk in bread or cake. The half pint of milk, when included, supplied about 70 per cent of the calcium allowance.

The chief sources of iron were the bread in the sandwiches, the eggs, cheese, tuna fish, meat fillings, cocoa, and chocolate candy.

About 25 per cent of the vitamin A allowance was supplied by the milk which was recorded in 78 per cent of the lunches. When present, eggs, cheese, banana, tangerine, oranges, tomato, and butter in addition to the milk supplied 50 per cent of the vitamin A allowance.

Wherever a tomato or carrot was included in addition to the above, approximately 80 per cent of the vitamin A allowance was provided.

Some degree of thiamine and riboflavin was furnished by all items in the lunch records.

A small degree of vitamin C, or approximately 12 per cent, was supplied by the milk. When an apple was included, 30 per cent of the allowance was furnished. A banana supplied 40 per cent. Only those lunches having a tangerine, a tomato, or an orange met 100 per cent of the recommended vitamin C allowance.

One third of the recommended daily allowance of protein, or 23.3 grams, was met in 45 per cent of the lunches. The calcium allowance of 400 mgs. was met in 32 per cent of the lunches; the iron allowance of 3 mgs. in 21 per cent of the lunches; the vitamin A allowance of 1500 units in

only 9 per cent of the lunches; the thiamine allowance of .4 mgs. in 20 per cent of the lunches; the ascorbic acid or vitamin C allowance of 25 units in 25 per cent; and the riboflavin allowance of .6 mgs. was met in 62 per cent of the lunches.

In comparing the median with one third of the recommended dietary allowances, it can be observed that the protein, calcium, and riboflavin allowances were met by 90 per cent of the group; that the iron requirement was met by 75 per cent; the thiamine requirement by 65 per cent; and that less than 40 per cent met the vitamin A and C requirements.

In the lower quarter of the cases, between 70 and 80 per cent met the protein, calcium, and riboflavin allowance, with between 50 and 60 per cent meeting the thiamine allowance, 45 per cent meeting the iron allowance, and less than 25 per cent meeting the vitamin A and C allowance.

Table 1. List of Food Items Included in Lunches of 100 Fourth Grade Children

Items	Number of cases
(1)	(2)
<u>Sandwiches</u>	
Meat (bologna, roast beef, corned beef, luncheon meat, boiled ham, etc.).....	34
Peanut butter.....	19
With marshmallow.....	3
Tuna fish.....	18
Jam or jelly.....	15
Cheese (sliced processed).....	9
Egg salad.....	10
Salmon.....	1
Mayonnaise.....	6
Butter.....	4
Lettuce.....	4
<u>Beverage</u>	
Milk.....	69
Cocoa.....	4
Chocolate milk.....	5
Eggnog.....	1
Orange juice.....	1
Coca Cola.....	1

(concluded on the next page)

Table 1. (concluded)

Items	Number of cases
(1)	(2)
<u>Dessert</u>	
Cookies.....	35
Cake (1 piece).....	23
Cup cakes.....	9
Chocolate bar.....	6
Doughnut.....	5
Crackers.....	2
Candy (not bar).....	5
<u>Fruit or Vegetable</u>	
Apple.....	22
Orange.....	10
Banana.....	8
Tangerine.....	7
Tomato.....	6
Cucumber.....	2
Pear.....	1
Green pepper.....	1
Dates.....	1
<u>Miscellaneous</u>	
Potato chips.....	8
Pickles.....	3
Olives.....	1

Table 2. Frequency Distribution of Amounts of Protein
Present in Lunches of 100 Fourth Grade Children

gms.	f
(1)	(2)
45-47.....	1
42-44.....	0
39-41.....	0
36-38.....	0
33-35.....	2
30-32.....	8
27-29.....	12
24-26.....	12
21-23.....	12
18-20.....	27
15-17.....	11
12-14.....	11
9-11.....	3
6-8.....	0
3-5.....	1
Sum.....	100
Md.....	20.2
90P.....	30
Q3.....	26
Q1.....	17
10P.....	14

Table 3. Frequency Distribution of Amounts of Calcium
Present in Lunches of 100 Fourth Grade Children

mgs.	f
(1)	(2)
800-849.....	2
750-799.....	2
700-749.....	0
650-699.....	1
600-649.....	0
550-599.....	0
500-549.....	3
450-499.....	10
400-449.....	14
350-399.....	25
300-349.....	25
250-299.....	1
200-249.....	0
150-199.....	3
100-149.....	3
50-99.....	4
0-49.....	7
Sum.....	100
Md.....	363
90P.....	489
Q3.....	424
Q1.....	313
10P.....	87

Table 4. Frequency Distribution of Amounts of Iron Present
in Lunches of 100 Fourth Grade Children

Mgs.	f
(1)	(2)
7.0-7.4.....	1
6.5-6.9.....	0
6.0-6.4.....	0
5.5-5.9.....	0
5.0-5.4.....	1
4.5-4.9.....	1
4.0-4.4.....	2
3.5-3.9.....	6
3.0-3.4.....	10
2.5-2.9.....	14
2.0-2.4.....	30
1.5-1.9.....	21
1.0-1.4.....	7
.5-.9.....	1
.0-.4.....	6
	100
Sum.....	100
Md.....	2.2
90P.....	3.7
Q3.....	2.8
Q1.....	1.4
10P.....	1.1

Table 5. Frequency Distribution of Amounts of Vitamin A
Present in Lunches of 100 Fourth Grade Children

Units	f
(1)	(2)
3600-3899.....	1
3300-3599.....	0
3000-3299.....	0
2700-2999.....	0
2400-2699.....	1
2100-2399.....	0
1800-2099.....	2
1500-1799.....	5
1200-1499.....	5
900-1199.....	12
600-899.....	21
300-599.....	40
0-299.....	12
Sum.....	100
Md.....	584
90P.....	1499
Q3.....	983
Q1.....	345
10P.....	250

Table 6. Frequency Distribution of Amounts of Thiamine
Present in Lunches of 100 Fourth Grade Children

Mgs.	f
(1)	(2)
.80-.84.....	2
.75-.79.....	0
.70-.74.....	0
.65-.69.....	1
.60-.64.....	3
.55-.59.....	4
.50-.54.....	3
.45-.49.....	3
.40-.44.....	4
.35-.39.....	9
.30-.34.....	26
.25-.29.....	16
.20-.24.....	14
.15-.19.....	10
.10-.14.....	5
Sum.....	100
Md.....	.3
90P.....	.5
Q3.....	.37
Q1.....	.2
10P.....	.17

Table 7. Frequency Distribution of Amounts of Vitamin C Present in Lunches of 100 Fourth Grade Children

Units	f
(1)	(2)
85-89.....	1
80-84.....	8
75-79.....	4
70-74.....	0
65-69.....	0
60-64.....	0
55-59.....	0
50-54.....	0
45-49.....	1
40-44.....	0
35-39.....	4
30-34.....	2
25-29.....	5
20-24.....	0
15-19.....	2
10-14.....	6
5-9.....	17
0-4.....	50
Sum.....	100
Md.....	4
90P.....	78
Q3.....	24
Q1.....	2
10P.....	1

Table 8. Frequency Distribution of Amounts of Riboflavin Present in Lunches of 100 Fourth Grade Children

Mgs.	f
(1)	(2)
1.10-1.14.....	2
1.05-1.09.....	0
1.00-1.04.....	2
.95-.99.....	1
.90-.94.....	0
.85-.89.....	8
.80-.84.....	7
.75-.79.....	5
.70-.74.....	10
.65-.69.....	11
.60-.64.....	14
.55-.59.....	9
.50-.54.....	8
.45-.49.....	0
.40-.44.....	0
.35-.39.....	2
.30-.34.....	4
.25-.29.....	4
.20-.24.....	4
.15-.19.....	6
.10-.14.....	3
Sum.....	100
Md.....	.6
90P.....	.8
Q3.....	.7
Q1.....	.5
10P.....	.2

The diagram in Figure 1 represents the distribution and range of the amounts of protein found to be present in the lunches. One third of the daily allowance of protein is 23.3 grams, as shown by the red line.^{1/} The median is 20.2 grams, or approximately 90 per cent of the protein allowance. The middle half of the cases fall between 17 grams, or 70 per cent of the allowance, and 26 grams, or more than 100 per cent of the allowance. Approximately 35 per cent of the 100 cases have more than the required amount of protein in the lunches. This would seem to substantiate the belief that in a large percentage of the cases the protein allowance is being amply met by the box lunches.

The diagram in Figure 2 represents the distribution and range of the amounts of calcium found to be present in the lunches. One third of the daily calcium allowance is 400 milligrams, as shown by the red line.^{2/} The median is 363 milligrams, or a little more than 90 per cent of the allowance. The middle half of the cases fall between 313 milligrams, or about 80 per cent of the allowance, and 424 milligrams, or slightly more than 100 per cent of the allowance. About 32 per cent of the cases have more than the required allowance of 400 milligrams. Here again the data would seem to substantiate the opinion that for a large percentage of the cases the calcium allowance is being amply met by the box lunches.

^{1/}Recommended Dietary Allowances, op. cit.

^{2/}Ibid.

Figure 1. Bar Diagram to Illustrate Distribution and Range of Amounts of Protein in Lunches of 100 Fourth Grade Children

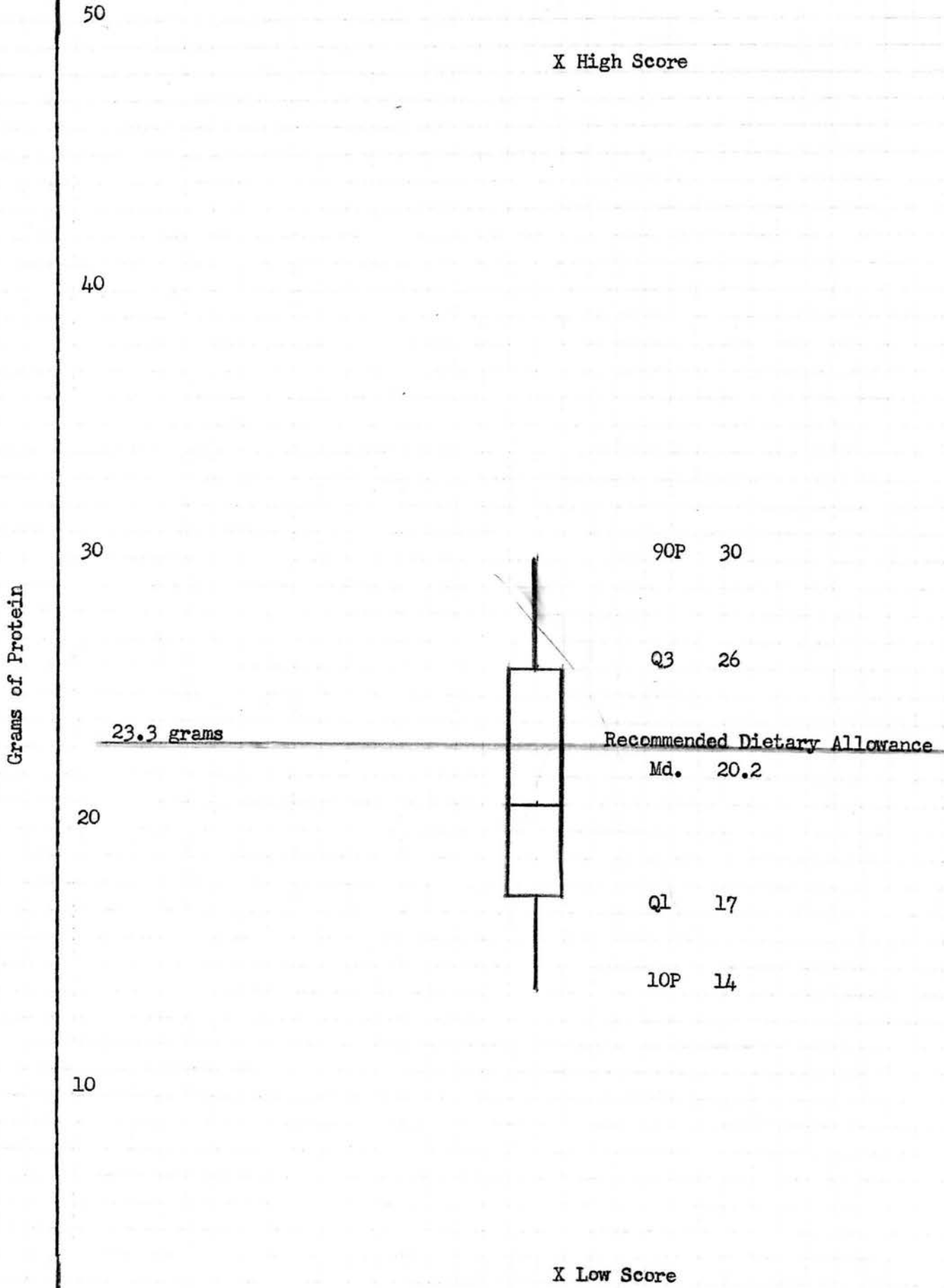


Figure 2. Bar Diagram to Illustrate Distribution and Range of Amounts of Calcium in Lunches of 100 Fourth Grade Children

Milligrams of Calcium

1000

X High Score

800

600

400 mgs.

90P 489

Q3 424

Recommended Dietary Allowance

Md. 363

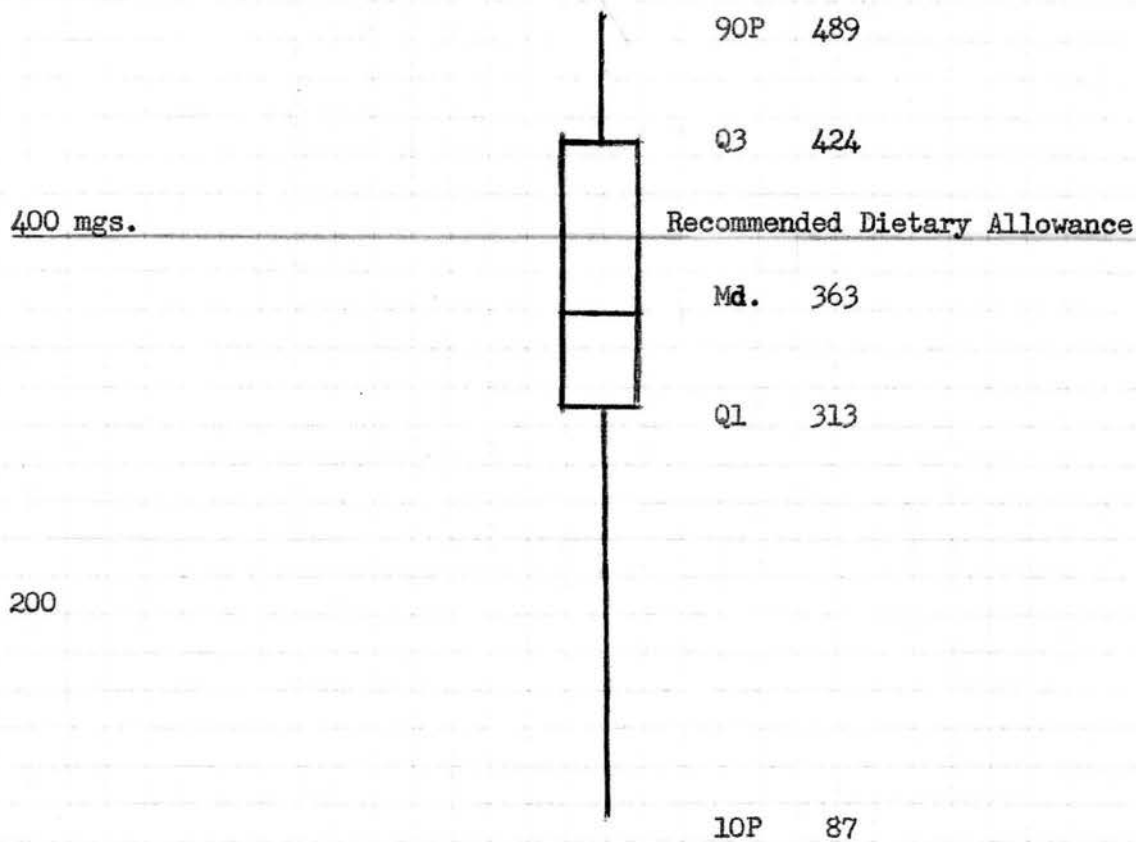
Q1 313

200

10P 87

0

X Low Score



The diagram in Figure 3 represents the distribution and range in the amounts of iron found to be present in the lunches. One third of the daily iron allowance^{1/} is 3 milligrams, as shown by the red line. The median is 2.2 milligrams, or about 75 per cent of the allowance. The middle half of the cases fall between 1.4 milligrams, or 45 per cent of the allowance, and 2.8, or 90 per cent of the allowance. Approximately 21 per cent of the cases have more than the required allowance of 3 milligrams of iron. This would indicate that the daily allowance of iron is not being amply met by some of the box lunches. At another place in the study, recommendations for improving the lunch program in relation to its meeting the daily allowance of the nutrient will be suggested.

The diagram in Figure 4 represents the distribution and range in the amounts of vitamin A found to be present in the lunches. One third of the daily allowance^{2/} is 1500 units, as shown by the red line. The median is 584 units, or only about 35 per cent of the allowance. The middle half of the cases fall between 345 units, or about 25 per cent of the allowance, and 983 units, or about 65 per cent of the allowance. Only 9 per cent of the cases have more than the allowance of 1500 units of vitamin A. A very serious deficiency exists in this nutrient. Later in the study specific recommendations for increasing the vitamin A content of the lunches will be suggested.

^{1/}Recommended Dietary Allowances, op. cit.

^{2/}Ibid.

Figure 3. Bar Diagram to Illustrate Distribution and Range of Amounts of Iron in Lunches of 100 Fourth Grade Children

7.5

X High Score

6.

4.5

Milligrams of Iron

3.

3 mgs.

Recommended Dietary Allowance

90P 3.7

Q3 2.8

Md. 2.2

Q1 1.4

10P 1.

1.5

0

X Low Score

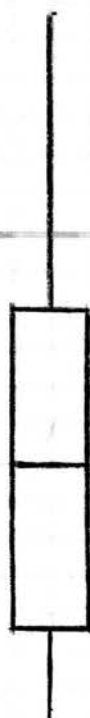
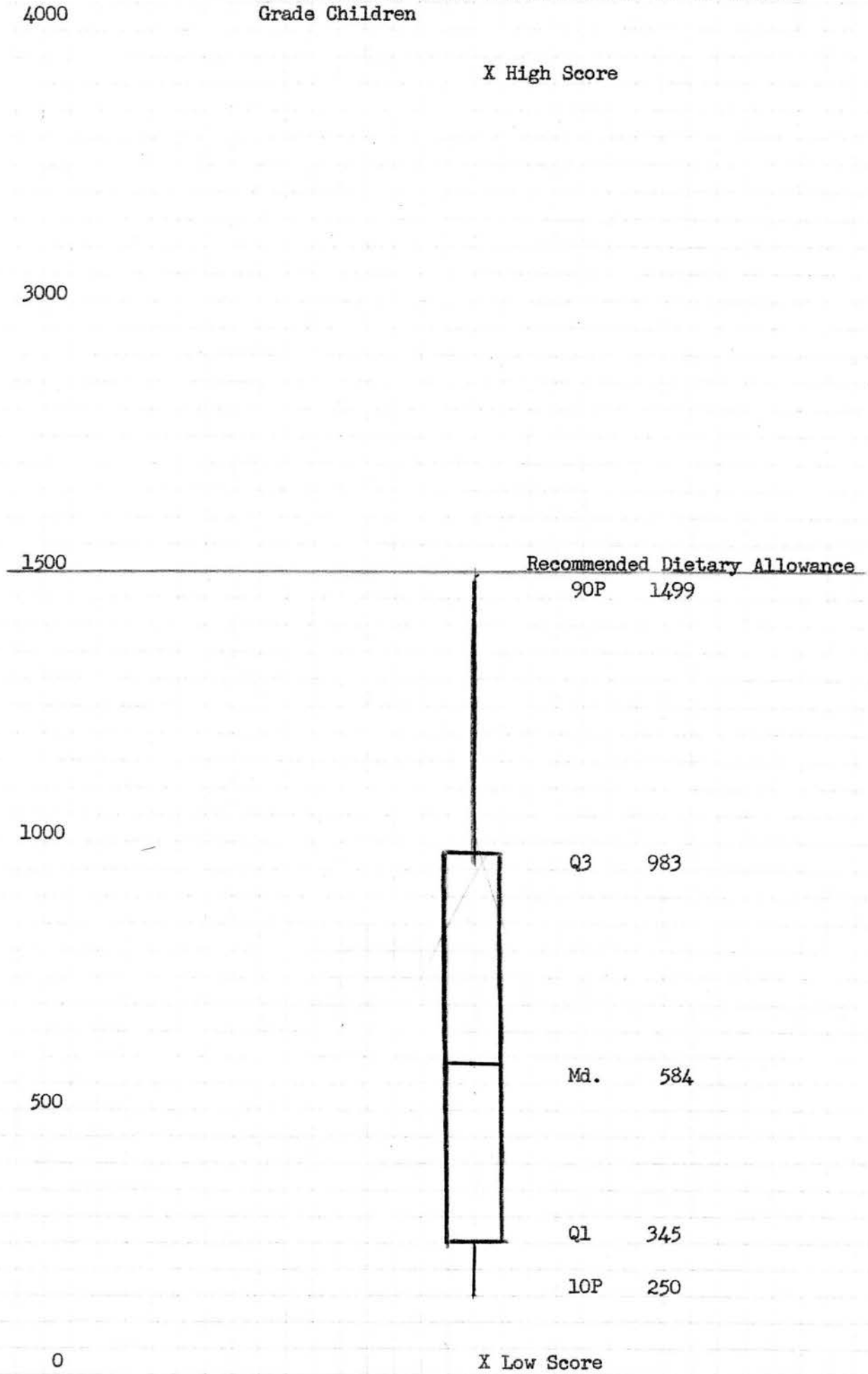


Figure 4. Bar Diagram to Illustrate Distribution and Range of Amounts of Vitamin A in Lunches of 100 Fourth Grade Children

Units of Vitamin A



The diagram in Figure 5 represents the distribution and range in the amounts of thiamine found to be present in the lunches. One third of the daily allowance of this nutrient is .4 milligrams, as shown by the red line.^{1/} The median is .3 milligrams, or about 80 per cent of the allowance. The middle half of the cases fall between .22 milligrams, or about 55 per cent of the allowance, and .37 milligrams, or about 90 per cent of the allowance. Only 16 per cent of the cases have more than the allowance of .4 milligrams of thiamine. The deficiency in this nutrient, while not too serious, should be corrected. Specific recommendations for correcting this deficiency will be offered later in this study.

The diagram in Figure 6 represents the distribution and range in the amounts of vitamin C found to be present in the lunches. One third of the daily allowance of this nutrient is 25 units, as shown by the red line.^{2/} The median is 4 units, or less than 20 per cent of the daily allowance. The middle half of the cases fall between 2 units, or 10 per cent of the allowance, and 24 units, or about 95 per cent of the allowance. Approximately 25 per cent of the cases have more than the allowance of 25 units of vitamin C, but 50 per cent of the cases have less than 20 per cent of the allowance. Here again a very serious deficiency exists in this nutrient. Later in this study specific recommendations for the correction of this deficiency will be offered.

^{1/}Recommended Dietary Allowances, op. cit.

^{2/}Ibid.

Figure 5. Bar Diagram to Illustrate Distribution and Range of Amounts of Thiamine in Lunches of 100 Fourth Grade Children

.85

X High Score

.70

Milligrams of Thiamine

.55

90P .54

.40 .4 mgs.

Recommended Dietary Allowance

Q3 .37

Md. .3

.25

Q1 .22

10P .17

.10

X Low Score

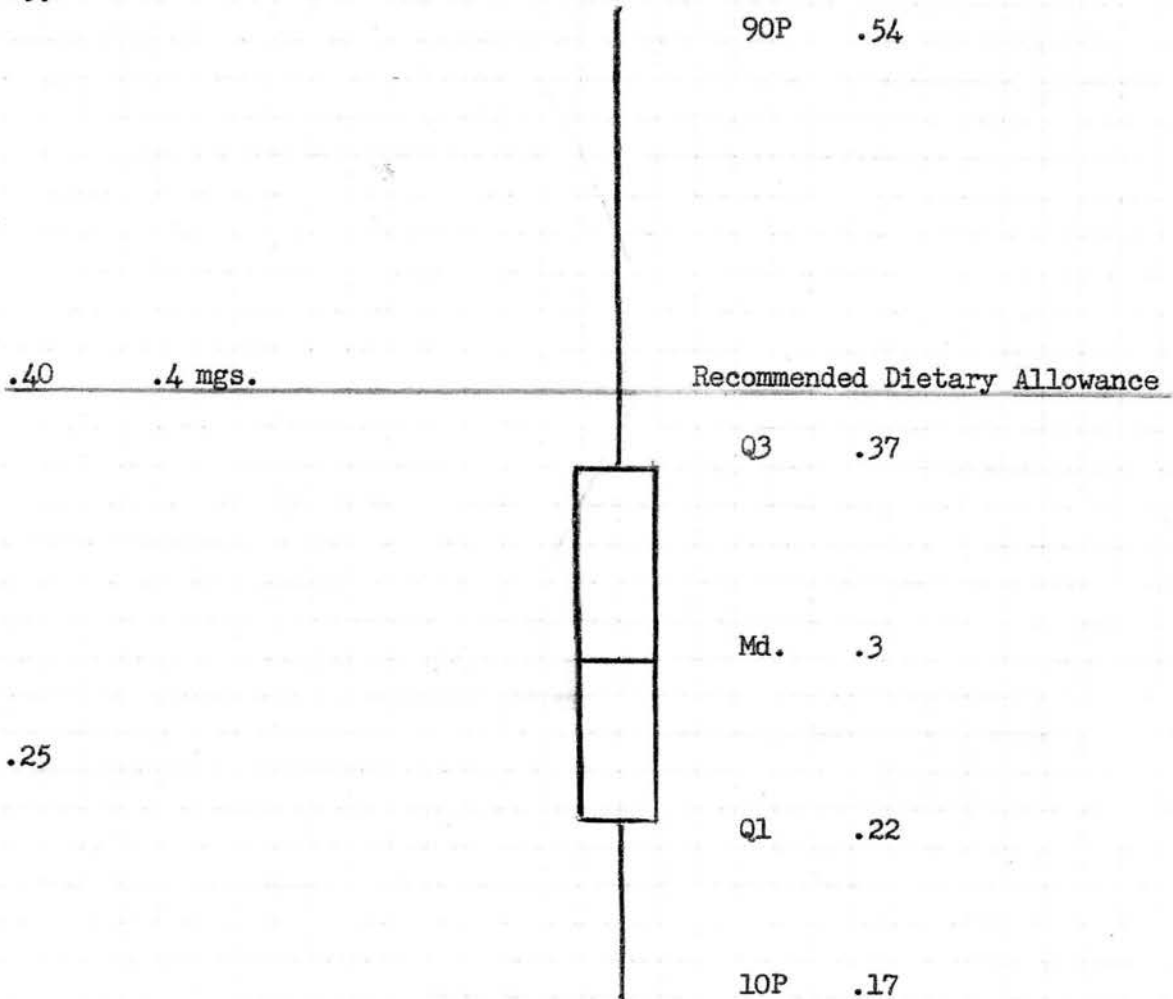


Figure 6. Bar Diagram to Illustrate Distribution and Range of Amounts of Vitamin C in Lunches of 100 Fourth Grade Children

Units of Vitamin C

100

X High Score

80

90P 78

60

40

25 units

Recommended Dietary Allowance

20

Q3 24

0

Md 4
Q1 2
10P 1



The diagram in Figure 7 represents the distribution and range in the amounts of riboflavin found to be present in the lunches. One third of the daily allowance of this nutrient is .6 milligrams, as shown by the red line. ^{1/} The median is .63, or more than 100 per cent of the allowance. The middle half of the cases fall between .51 milligrams, or about 90 per cent of the allowance, and .74 milligrams, a considerable degree over the 100 per cent allowance. This would substantiate the opinion of the writer that in a good proportion of the cases the riboflavin allowance is being met by the box lunches.

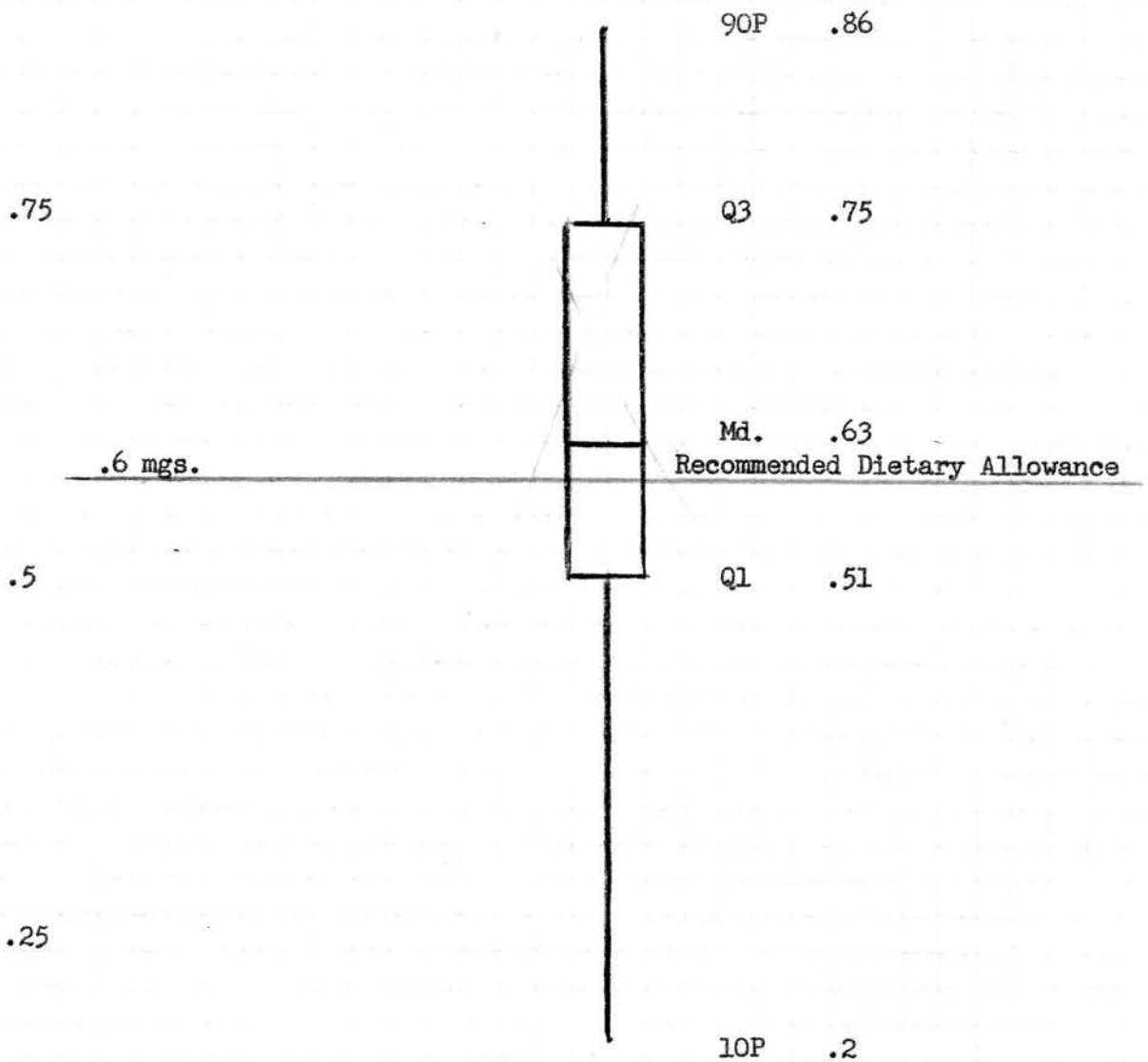
Figure 7. Bar Diagram to Illustrate Distribution and Range of Amounts of Riboflavin in Lunches of 100 Fourth Grade Children

Milligrams of Riboflavin

1.25

X High Score

1.



.75

.6 mgs.

.5

.25

90P .86

Q3 .75

Md. .63

Recommended Dietary Allowance

Q1 .51

10P .2

X Low Score

.10

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

The information revealed by this study indicates that about one third of the children are receiving good box lunches. In this top group are included approximately 9 per cent of the cases whose box lunches have met 80 to 100 per cent of the dietary allowances ^{1/} in all seven nutrients, and about 23 per cent of the cases who have met 80 to 100 per cent of the allowances with the exception of the vitamin A or C allowance.

Approximately one half of the children are receiving a fair lunch. In this group are included children whose lunches met 60 to 80 per cent of the dietary allowances in all seven nutrients and those meeting the allowances in all but the vitamins A and C.

The remaining 22 per cent of the children have poor lunches which do not meet 60 per cent of the allowances in four or more nutrients.

The lunch pattern provides very little vitamin A and C and in some instances questionable amounts of iron. This pattern is satisfactory if items containing these nutrients are added to the lunches. The box lunches can adequately meet the nutritional needs of the school child if parents and children are educated to understanding what these daily dietary allowances are and what specific food will help the lunches to meet these allowances. ^{2/}

1/Recommended Dietary Allowances, op. cit.

2/Ibid.

The bar graphs on the following pages show the contribution made by representative foods, that can be included in a box lunch, to the daily nutritional needs of a school child. These graphs are an excellent technique for directing attention to and stimulating interest in carrying out suggestions that will improve the lunch program. Since the children themselves are a great determining factor in what the parents prepare for the lunch, it is desirable that these graphs be made available to them for study and observation.

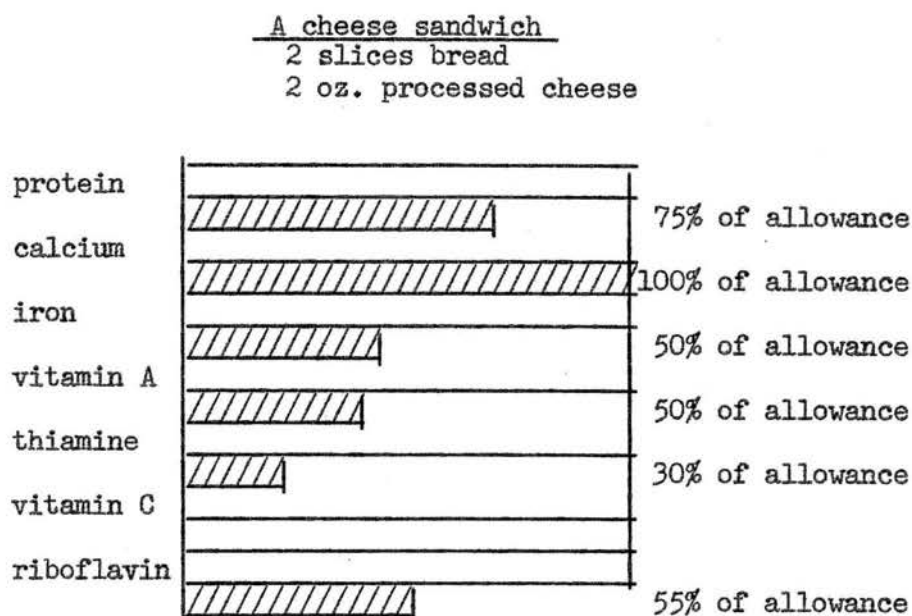


Figure 8. Bar Graph to Illustrate Contribution to Dietary Allowances

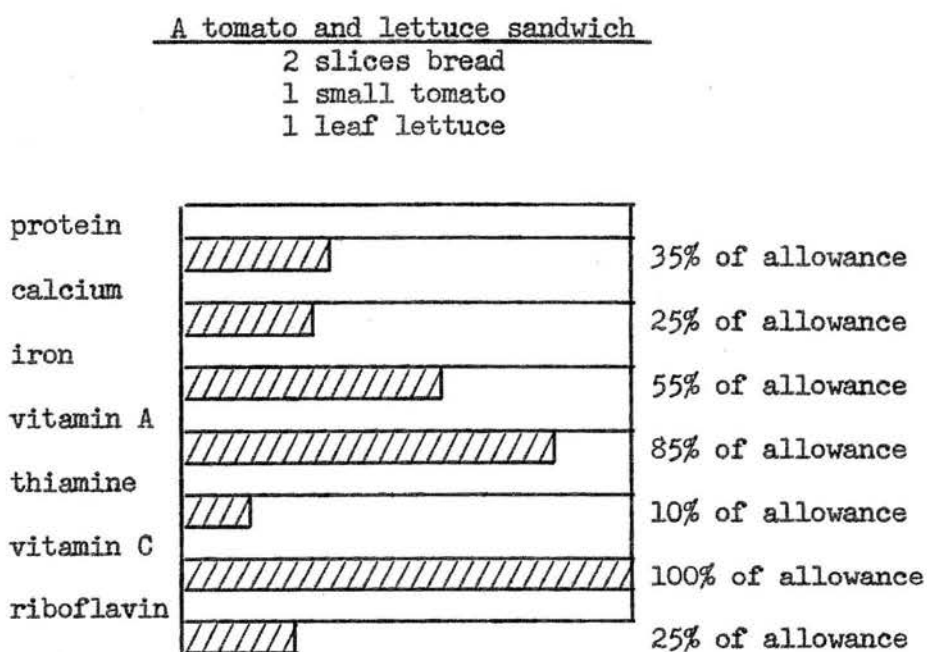


Figure 9. Bar Graph to Illustrate Contribution to Dietary Allowances

An egg salad sandwich

2 slices bread

1 egg

1 tbs. mayonnaise

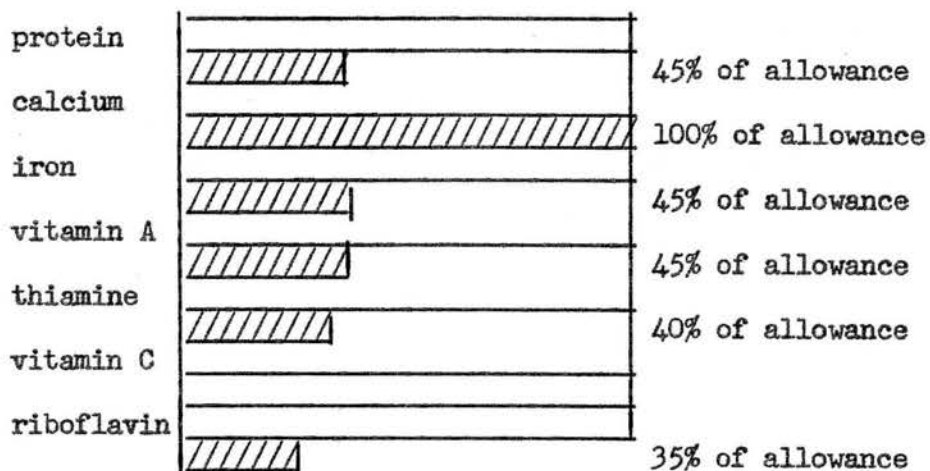


Figure 10. Bar Graph to Illustrate Contribution to Dietary Allowances

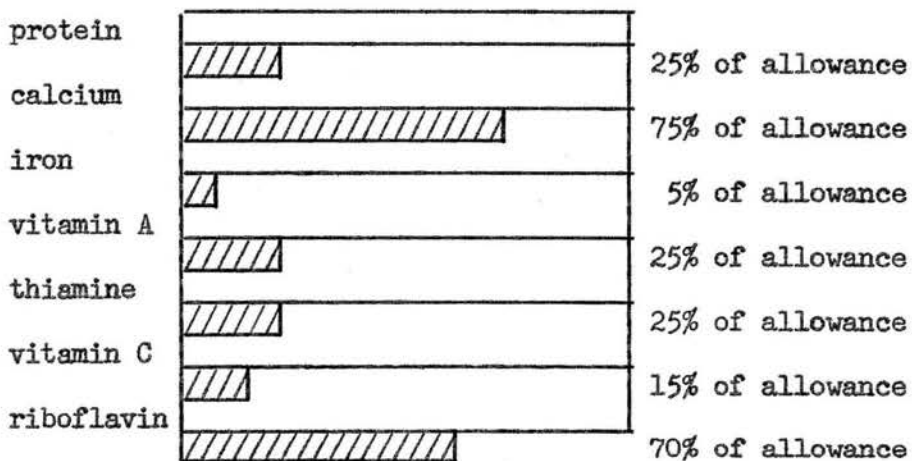
A glass of milk

Figure 11. Bar Graph To Illustrate Contribution to Dietary Allowances

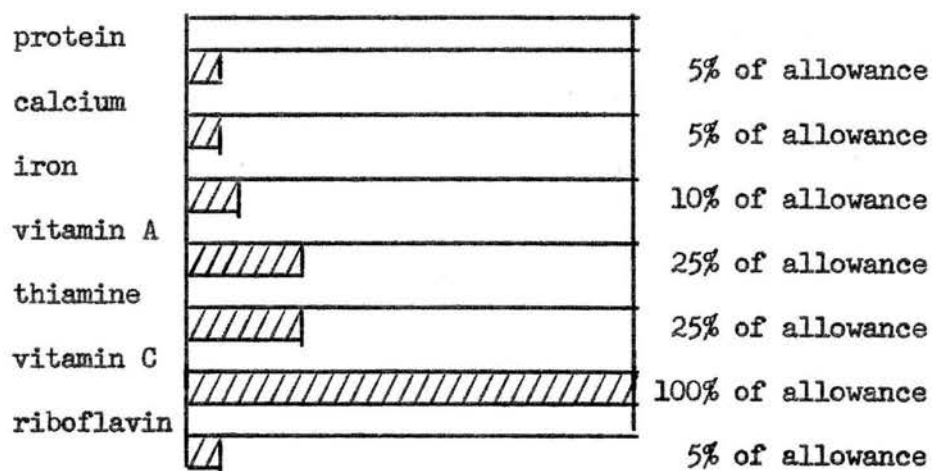
A tangerine

Figure 12. Bar Graph to Illustrate Contribution to Dietary Allowances

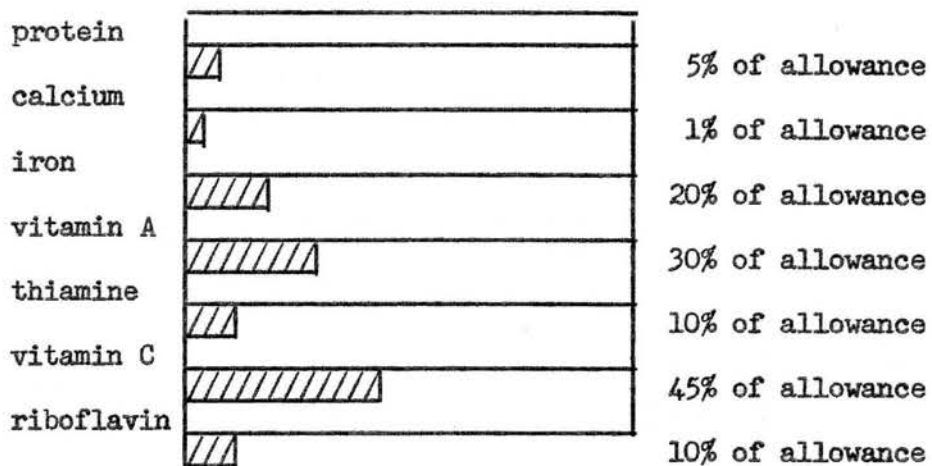
A banana

Figure 13. Bar Graph to Illustrate Contribution to Dietary Allowances

$\frac{1}{2}$ raw carrot ($5\frac{1}{4}$ by 1")

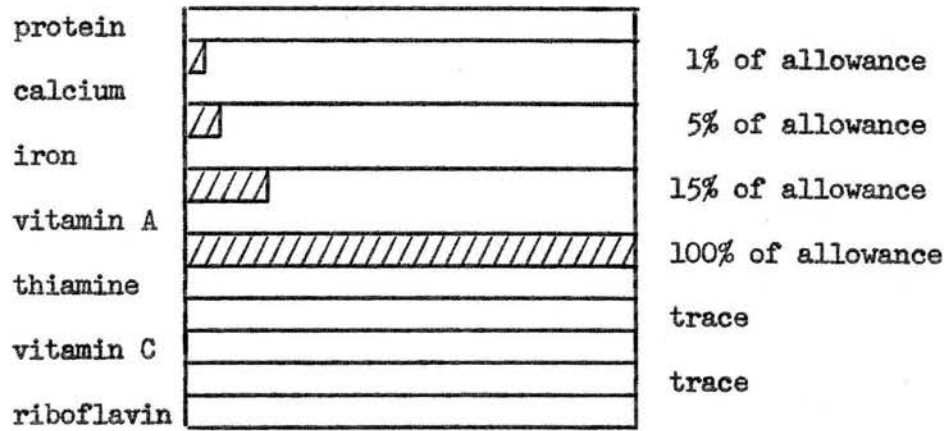


Figure 14. Bar Graph to Illustrate Contribution to Dietary Allowances

A program of nutrition education can greatly improve the eating habits of children. In observing and studying these graphs, children and parents will understand which specific foods contribute to an adequate diet. They will learn why milk is a necessary complement to any lunch. (See Figure 10.) Milk, because of its unique nutritional contribution, cannot be replaced in the diet. Because it is an outstanding source of calcium it is almost impossible to meet the daily calcium needs from ordinary foods.

When the allowance of vitamin A has not been met, these graphs will show how the foods such as carrots, cheese, bananas, and tomatoes which, if added to the lunches, will help the lunches to meet this allowance.

Vitamin C, which is lacking in the lunches, can be supplied by the inclusion of a tangerine, an orange, a tomato, or a banana.

The study shows questionable amounts of iron in some lunches. This deficiency could be supplied by a banana, a tomato and lettuce sandwich, an egg salad sandwich, or a cheese sandwich.

The bar graph below illustrates very well how a good lunch meets the nutritional needs recommended by the National Research Council.^{1/} This lunch consisted of:

1 ham and cheese sandwich
1 tangerine
1 glass of milk

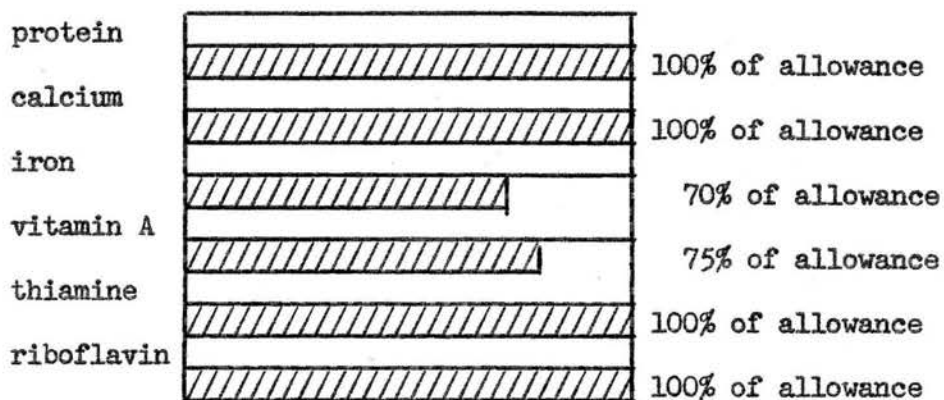


Figure 15. Bar Graph to Illustrate Contribution to Dietary Allowances

^{1/}Recommended Dietary Allowances, op. cit.

The bar graph below illustrates how a poor lunch fails to meet the nutritional needs recommended by the National Research Council.^{1/} This lunch consisted of:

1 jelly sandwich
1 cookie

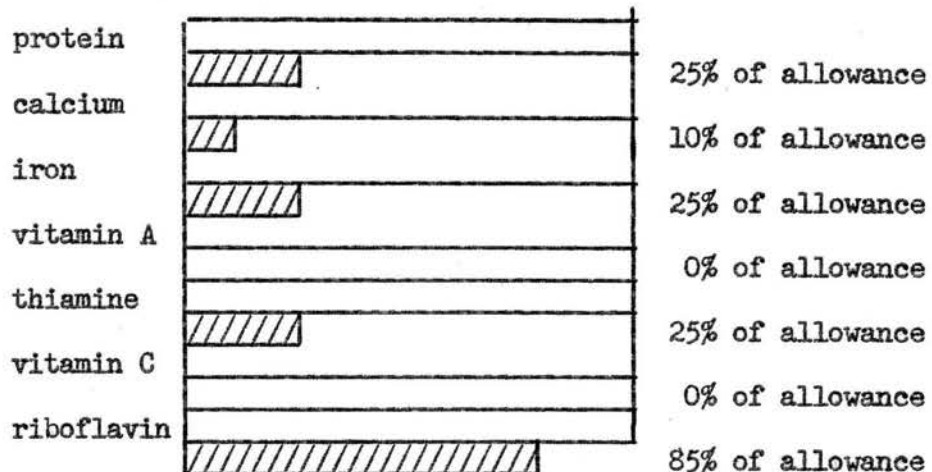


Figure 16. Bar Graph to Illustrate Contribution to Dietary Allowances

^{1/}Recommended Dietary Allowances, op. cit.

SUMMARY

In conclusion, this study has attempted to measure the effectiveness of the school lunch program that is carried on in the City of Everett. A picture of the eating habits of the fourth grade children has been presented. From the results, it has been possible to determine that approximately one third of the children are receiving good box lunches, approximately one half are receiving fair lunches, and nearly one quarter of the children are receiving poor lunches that fail to meet one third of the daily dietary allowances as recommended by the National Research Council.^{1/}

It has shown that all but approximately 9 per cent of the lunches show some degree of deficiency in vitamins A or C, or both. Some deficiency in iron exists.

However, the results of this study substantiate the belief of the writer that a box lunch, if intelligently prepared, can meet the nutritional needs of the school child to the same degree that the meal served in the school cafeteria can. (See Figure 15.)

The bar graph illustrating the contribution of certain foods to the dietary allowances has been used as a technique to effect the translation of nutrition information into the dietary habits of children.

This nutrition education technique should prove effective in improving the status of the school lunch program because it is closely related to the school lunch experience.

^{1/}Recommended Dietary Allowances, op. cit.

BIBLIOGRAPHY

1. Clayton, M. M., "Food Habits of Maine School Children," American Journal of Public Health (August, 1952).
2. Donelson, E. A. and J. M. Leichsenring, "Food Composition Table for Short Method of Dietary Analysis," (Revised), Journal of the American Dietetic Association (1945), 21:440.
3. Hathaway, M. L., F. L. Meyer, and S. F. Adelson, "School Lunches: Their Nutritional Value and Relation to the Health and Diet of Children," American Journal of Public Health (September, 1950).
4. Merrow, S. B., "Improving Children's Nutritional Status Through School Lunch Program," The Nation's Schools (September, 1952).
5. Nutrition for Every Day Use, National Dairy Council, Chicago, Illinois. Revised, 1951.
6. Recommended Dietary Allowances, Revised, National Research Council, Washington, D. C., 1948.
7. Roberts, L. J., The Road to Good Nutrition, Children's Bureau Publication, No. 270, Federal Security Agency, Washington, D. C., 1947.
8. Todhunter, E. N., Everyday Nutrition for School Children, University Extension Division, University of Alabama, 1945.
9. Watt, B. K., and A. L. Merrill, Composition of Foods--Raw, Processed, Prepared, U. S. Department of Agriculture Handbook, No. 8, 1950.
10. What Children Eat, Education Section, Dept. of Public Services, General Mills, Minneapolis, Minnesota, 1951.
11. Your Child From One to Six, 2nd Edition, Children's Bureau Publication, No. 30, Federal Security Agency, Washington, D. C., 1945.