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A STUDY OF THE ADEQUACY OF FOOD SUPPLY
AS RELATED TO TOTAL FOOD NEEDS OF
TWENTY-FOUR URBAN MICHIGAN FAMILIES AS
REVEALED BY FOOD PURCHASE RECORDS
OF THESE FAMILIES

Thesis for the Degree of M. S.
MICHIGAN STATE UNIVERSITY
Edna Scott McArthur
1957

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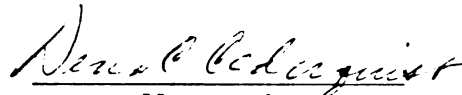
A Study of the Adequacy of Food Supply
As Related to Total Food Needs of
Twenty-Four Urban Michigan Families as
Revealed by Food Purchase Records
Of These Families

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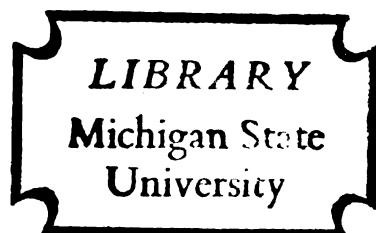
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Major professor

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A STUDY OF THE ADEQUACY OF FOOD SUPPLY AS RELATED TO
TOTAL FOOD NEEDS OF TWENTY-FOUR URBAN MICHIGAN
FAMILIES AS REVEALED BY FOOD PURCHASE
RECORDS OF THESE FAMILIES

by

Edna Scott McArthur

A THESIS

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This study presents a summary by months of weekly food purchase records of twenty-four urban Michigan families according to the eleven food groups suggested by the Bureau of Human Nutrition and Home Economics of the United States Department of Agriculture. The adequacy of the food taken into the home of each family was compared to the amount recommended by the Bureau of Human Nutrition and Home Economics.

The data for the study were drawn from records collected by the Department of Agricultural Economics of Michigan State University. The sample consisted of eight families of similar membership--father, mother, and two children--selected from each of three income levels--high, medium, and low.

The weekly food purchases of these families, recorded for 1953, were classified into the following food groups: leafy, green, and yellow vegetables; citrus fruit and tomatoes; potatoes and sweet potatoes; other fruits and vegetables; milk; meat, poultry, and fish; eggs; flour and cereal; fats and oils; dry peas and beans, nuts; and sugar, sirup, and preserves.

The standard for consumption for each of these food groups was calculated at low- and moderate-cost menu levels for each family as recommended by the Bureau of Human Nutrition and Home Economics.

The yearly food purchases of each family were compared to the calculated standard for that family and examined for

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adequacy and effect of income. The purchases of ten families were studied to note seasonal variation in purchasing.

These data indicate inadequate levels of purchase of all the protective foods except meat--specifically: leafy, green, and yellow vegetables; citrus fruits and tomatoes; potatoes and sweet potatoes; flour and cereal; milk; and eggs. Purchases of sugar, sirup, and preserves were consistently above recommended levels.

The families included in this study purchased similar quantities of food regardless of income.

Analysis of the yearly purchases of ten families indicated little seasonal variation of the food brought into the home.

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INTRODUCTION

The nutritional status of the peoples of the world is of universal interest. Public health workers, nutritionists, and members of the medical profession are concerned with the present state of nutrition of the people of the United States (1). Dietary surveys have presented evidence which suggests inadequate food intakes and varying degrees of malnutrition in widespread areas of this country where the food supply, on a per capita basis, appears to be adequate (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12). An abundant food supply in a given area apparently does not assure maximum or even adequate food intakes by the inhabitants of this area (8, 12).

In order to satisfy the food needs of all persons, the following conditions must be met:

1. Farmers must produce the needed food.
2. Consumers must have the means to obtain enough food to assure an adequate diet.
3. Consumers must be educated to desire or to demand a nutritionally adequate diet (8, 13).

Neither under-production nor unequal distribution of food are major contributing causes for inadequate food intakes in the United States. Estimates of per capita food supplies indicate that sufficient quantities are available to permit the consumption of diets which would meet the recommended

dietary allowances of the National Research Council (12). Although the food supply is distributed somewhat unequally among the seasons of the year as well as the regions of the country (12), recent advances in food preservation and marketing are minimizing these variations (14).

Income may be a limiting factor in the purchase of adequate food (9, 10). In 1945, it was estimated that one-fourth of the four-person families in the United States had incomes under \$2,000 (10). Generally, as incomes rise, the amount of money spent for food increases, but the adequacy of the dietaries does not necessarily improve. Stiebeling (8) has indicated that there is room for improvement in the diets of all income levels--not merely those of low-income families. When sufficient money is available, inadequate dietaries are due to poor buying practices and/or food habits (10). Since individual eating patterns are determined primarily by customs and by food likes, it is difficult to alter them. Education is an important factor in motivating the homemaker to improve the nutritional status of her family. The nutrition survey is an important tool for directing attention toward ineffective nutrition (15). Additional information about food supplies and dietary intakes of individuals and of population groups is needed to define the extent of inadequate diets in the United States.

Using data collected from twenty-four urban Michigan families at varied income levels, the following study was

1

undertaken to determine whether or not these families brought into their homes a sufficient supply of food as judged by the calculated standard of the Bureau of Human Nutrition and Home Economics to meet the calculated needs of each family group. When appropriate data were available, seasonal trends in the purchase or selection of foods by these families were evaluated.

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REVIEW OF LITERATURE

Pett (15) has written, "The food supply is the first necessity of mankind; and a satisfactory food supply is a necessity of advancing civilization." Hundley (16) has stated, "Nutrition has contributed much to the present health and happiness of American people--but many opportunities exist for nutrition to contribute to better and more buoyant health in the future." Nutrition studies concerning food consumption are of ever increasing interest.

Food Consumption in the United States

In 1916, Mendel (17) commented that food supply and availability were dependent upon a variety of factors among which were food production, food preservation and consumption, transportation facilities, customs in diet, and changing industrial and social conditions. Wells (13) in a study of America's changing food consumption patterns from 1909 to 1941 pointed out the chief characteristic of per capita food consumption in America during the last few decades had been stability rather than change, although there had been a number of significant alterations within the rather stable total. Per capita food consumption in 1909 was 1,576 pounds per person per year; in 1952, it was 1,578 pounds per person. Wells noted the following changes:

1. A downward trend in the consumption of potatoes and cereal products.
2. An increase of 25 percent in the consumption of sugar.
3. An increase in the consumption of dairy products.
4. A slight increase in the consumption of milk.
5. Stability of the total fresh fruit consumption, with a shift from apples to citrus fruit.
6. An increase in the vegetable consumption with a slight shift toward more leafy, green, and yellow vegetables and tomatoes.

A similar study by Clark, et al. (12) evaluated trends from 1909 to 1945. The authors analyzed apparent per capita food consumption by major food groups and observed that the per capita nutrients in the food supply for the period of World War II were above recommended allowances suggested by the National Research Council. These authors stated, however, that the food supply was unequally distributed among income groups, seasons, and regions. Therefore, although the per capita food supply appeared adequate, there was no assurance that the population of the United States as a whole consumed satisfactory quantities of essential foodstuffs. A 1939 study by Jolliffe, et al. (2) of food brought into the homes by 2,000 city families indicated that due to inadequate purchasing, 43.6 percent of the families failed to receive fair diets, and 76.2 percent failed to receive good diets. At the time

of this 1939 study, dietary inadequacies were a frequent occurrence in the United States. The Bureau of Human Nutrition and Home Economics of the United States Department of Agriculture (3) completed a study during the war year, 1942, and estimated there were fewer families at that time than in 1936 which had diets furnishing less than the recommended allowances for dietary essentials. The National Research Council Bulletin Number 109 (4) published in 1943 reported that every nutrition survey of the previous decade had revealed widespread consumption of diets below recommended standards. A group of 943 Baltimore families studied by Downes and Baranovsky (5) had inadequate consumptions of green and yellow vegetables, citrus fruits and tomatoes, and milk; whereas the consumptions of eggs and meat were satisfactory. Drake and Lamb (6) in a study of food practices and dietaries of a group of sixty-three families in a Texas town found 50 percent of the dietaries needed improvement. Hardy (7) made a study of the dietary level of one hundred families and cited a need for increased consumption of milk and foods which contribute vitamin C and thiamine. Hardy observed two types of poor meals: one which had so few foods it could not supply an optimum diet unless the foods were chosen carefully; and the other which had too many foods from the same group.

Relationship of Income To Food Consumption

A study published in 1941 by the United States Department of Agriculture (18) on family food consumption showed

income and family type affected the level of consumption of some food groups more than others. In general, as incomes rose, the greatest increases in per capita consumption were found in fresh fruits, fresh vegetables, and in meat, poultry, and fish; the smallest increases, if not a decline, were found in grain products and potatoes. Based on these data Stiebeling (8) noted that fewer than one-fifth of the families in the United States had food supplies in 1936 which met National Research Council dietary recommendations for basic nutrients. One-fourth of the farm families and one-seventh of the non-farm families were in this category. The calculated diets of low- and high-income groups differed mostly with respect to calcium, vitamins A, C, and thiamine. Low-income families tended to consume inadequate quantities of these foodstuffs but all the poor diets were not found among low-income groups. There were wide differences in adequacy of food consumption among families of the same income level. Kruse's (9) study in 1948, of the place of nutrition in the relationship between environment and health revealed, in general, the nutritive quality of the diet varied with the income level. The poorest diets and the greatest percentage of poor diets were noted in the lowest income groups. The data accumulated by Phipard (10) in 1949 supported the thesis that too little income was a major cause of poor diets, but the author added that poor diets were often the result of poor food habits even when enough money was available to buy an adequate supply of food. A summary

by Sebrell (11) of the General Mills Survey covering nearly 60,000 children in thirty-eight states revealed the adequacy of the child's diet was related closely to the occupation and economic status of the parent; however, in one metropolitan area four out of ten children from high-income families had inadequate diets. Conclusions drawn by Sebrell from the General Mills Survey were as follows:

1. Diets tend to become poorer as the child grows older.
2. Fifty-two percent of high school girls' diets were poor.
3. Diets of boys were notably deficient in fruits and vegetables.
4. Adolescent girls drank too little milk.

Seasonal Trends in Food Consumption in the United States

"Relatively little has been done in following a group of families or individuals through the various seasons and obtaining a measure of the adequacy of average diets at different seasons of the year" (National Research Council Bulletin No. 117) (19). A United States Department of Agriculture (14) study published in 1939 showed that seasonal variations in food consumption, with few exceptions, were relatively small. Seasonal consumption of milk, fats, white potatoes, carrots, and cabbage showed no marked trend. Consumption of

eggs increased in the spring; consumption of meat, poultry, and fish increased in the winter. Larger amount of snapbeans, corn, tomatoes, peas, sweet potatoes, and apples were consumed at the time of harvest. The authors were of the opinion that this condition of slight seasonal variation in food consumption would not have been true in the previous generation, thus this condition indicated progress in marketing and distribution.

Regarding the current nutritional status of the American people, Sebrell (11) concluded,

The nutritive quality of diets in this country has improved since World War II, yet there are further opportunities ahead. Just because the average man in the United States today obtains enough food to prevent serious deficiency disease does not mean that he is obtaining enough food of the right kind to give him optimum health, to help his children to grow at the best rates, to prevent chronic disease, to protect him against the added stress of a severe illness, or to give him the extra stamina needed to produce to capacity in today's intensely competitive world.

PROCEDURE

In order to evaluate the adequacy of the food supply of specific families, the food purchase records should be studied in relation to the composition of the family. Food purchase records are generally not used in the United States as a basis for nutrition studies (19). This type of record is difficult to obtain since the homemaker must be willing and able to keep an accurate account of all food brought into the home. The data have limited value since the records present no information relative to what an individual may consume nor to what extent the food which is purchased is wasted. In spite of these limitations food purchase records can still furnish valuable facts about family food supplies.

The Department of Agricultural Economics of Michigan State University is conducting an extensive study of the purchasing practices of 225 urban Michigan families through the maintenance of a consumer marketing panel. Panel members keep continuous records of the weights of all foods brought into the home by purchase, gifts, or home production. Continuous records which cover a period of years are now available for certain families. From these records the material was gathered for the following study.

This thesis presents a study of the food purchases of twenty-four urban Michigan families. An attempt was made to

compare the quantity of food brought into the home with the amount recommended for purchase by the Bureau of Human Nutrition and Home Economics of the United States Department of Agriculture. The records used in this study were assumed to be accurate since the method of collection was regulated by an efficient system involving clerical checking and remuneration to the homemakers.

Few studies have been reported wherein the seasonal food purchases of a group of families or individuals have been observed (19). Little information is available relative to the extent to which family food habits are fixed. With the data available from the Department of Agricultural Economics, it was possible to draw a sample of families of similar type who had completed food purchase records for the period of one year thus presenting an opportunity to compare seasonal data.

Since food purchase records indicate the food choice of the family as a whole, these records may suggest the possibility of certain dietary deficiencies. However, with the use of this type of data, the fact must be kept in mind that these are purchase accounts and present no information relative to food consumed by any member of the family.

Twenty-four families whose records were used in this study were selected from the consumer market panel--eight from each of three income levels defined as follows by the Department of Agricultural Economics:

low-income-----\$0 through \$3,999

medium-income---\$4,000 through \$5,199

high-income-----\$5,200 and above.

The following criteria were established as a basis for selection of the twenty-four families:

1. Family composition. Each family to consist of father, mother, and two children of known ages (Table I).¹
2. Employment status of parents. Father to be employed; occupation of parents to be known in order that approximate energy expenditure could be estimated.²
3. Special diets. No family member to be on a restricted diet.³
4. Non-utilization of frozen food lockers or home freezers. No family to utilize a frozen food locker or home freezer.
5. Completeness of food purchase records. Forty-seven or more weeks to be reported from a possible fifty-two.⁴

¹Two families were increased in size by the birth of children.

²Note Appendix for definition of energy expenditure according to various occupations, p. 49.

³One member of one family was on a high protein diet; one member of another family was on a soft diet.

⁴Eleven families reported 52 weeks, seven reported 51, two reported 50, one reported 49, two reported 48, and one reported 47.

TABLE I
COMPOSITION OF FAMILIES INCLUDED IN THIS STUDY

Family Code No.	Father		Mother		Children			
	Age Years	Activity Class	Age Years	Activity Class	Age Years	Sex	Age Years	Sex
1	35	sed.	34	mod.act.	3½	M	10 mo.	M
2	39	act.	41	sed.	15	F	11	M
3	29	act.	30	mod.act.	4	M	2	M
4	32	sed.	27	mod.act.	4	F	9 mo.	M
5	35	act.	32	mod.act.	5	F	2	M
6	53	act.	45	sed.	16	F	15	M
7	29	mod.act.	27	mod.act. ¹	3	F	2	M
8	31	act.	31	mod.act.	9	M	5	F
9	27	act.	22	mod.act.	3½	F	10 mo.	F
10	25	act.	24	mod.act. ²	6	F	3	M
11	39	act.	31	mod.act.	7	M	5 mo. ³	M
12	24	act.	26	mod.act.	4	F	14 mo.	M
13	31	sed.	31	mod.act.	4	M	2	F
14	51	act.	44	sed.	18	M	16	F
15	28	sed.	28	mod.act.	7	M	5	F
16	36	act.	34	sed.	14	M	12	F
17	36	act.	34	mod.act.	11	M	6	F
18	42	sed.	42	sed.	12	M	9	F
19	38	sed.	37	mod.act.	7	M	3½	M
20	40	act.	35	sed.	16	F	14	M
21	48	sed.	46	sed.	17	M	14	F
22	36	sed.	34	mod.act.	13	M	2	F
23	36	sed.	33	sed.	16	M	13	F
24	39	sed.	37	mod.act.	8	F	5	M

¹Pregnant-week 4; baby-week 40.

²Pregnant-week 8; baby-week 44.

³Used average values for 9-12 mo.

1

The food purchases of each family were recorded by "as purchased" weight from diaries which had been submitted by homemakers who were participating in the study. These food purchases were classified into the eleven food groups described by the Bureau of Human Nutrition and Home Economics of the United States Department of Agriculture as follows: leafy, green and yellow vegetables; citrus fruits and tomatoes; potatoes and sweet potatoes; other fruits and vegetables; milk; meat, poultry, and fish; eggs; dry peas and beans, nuts; flour and cereals; fats and oils; and sugar, sirup, and preserves.

Food classified in the milk group were transposed to the equivalent of one quart of whole milk and foods classified in the flour group were transposed to the equivalent of flour by use of the formulas suggested by the Bureau of Human Nutrition and Home Economics, United States Department of Agriculture (Appendix, p. 50) (20). Also cited in the Appendix are values for specific foods which were determined by use of United States Department of Agriculture Handbook Number 8 (p. 51) (20); arbitrary values established for other specific foods (p. 52) (20); and one group of foods not tabulated since the foods were of the condiment type (p. 53) (20). Still another group of foods were not included for calculation (Appendix, p. 54) (20). These foods were of the type and quantity which in all probability were used by the homemaker for purposes of home preservation and were, therefore, recorded for calculation at the time of consumption. For

example, if a homemaker listed the purchase of one bushel of tomatoes in a diary, this bushel was not recorded for calculation since the homemaker would probably preserve that quantity of tomatoes for future use. In so doing, there was evidence which suggested these same tomatoes were relisted in the diary as they were consumed from the preserved state.

All weights recorded were "as purchased" with the exception of watermelon which was converted to "edible portion" weight. When the purchase weight was not specified, the average can sizes and average "as purchased" weights listed in reference tables (21, 22, 23, 24, 25, 26, 27) were used.

Total yearly food allowances recommended for purchase by each family were determined from the Master Food Plans (Tables II and III) devised by the Bureau of Human Nutrition and Home Economics (20). The food plans were at two cost levels--low and moderate--for 19 age, sex, and activity groups. These food plans were based on the Recommended Daily Dietary Allowances of the National Research Council, revised 1948 (Appendix, p. 55) (28). An explanation of these allowances and their utilization in the master food plans follows:

The dietary allowances for children were based on average needs for the middle year in each age group and were for children of normal activity and average weight and height. For adults, the recommended allowances were based on the needs of a 154-pound man and a 123-pound woman, both of average height (20).

The recommended allowances for adults also were adjusted according to the activity of the individual as defined in the Appendix.

TABLE

MASTER FOOD PLAN AT LOW-COST. WEEKLY QUANTITIES OF

Family Members	Leafy, Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Children through 12 years:						
9-12 months	1	8	1	12	0	8
1-3 years	1	12	1	12	1	0
4-6 years	1	12	1	12	1	8
7-9 years	2	0	2	0	2	8
10-12 years	2	4	2	4	3	0
Girls:						
13-15 years	2	4	2	4	3	4
16-20 years	2	4	2	4	3	0
Boys:						
13-15 years	2	8	2	8	4	0
16-20 years	2	12	2	8	5	0
Women:						
sedentary	2	4	2	0	2	4
moderately active	2	4	2	0	3	0
very active	2	8	2	8	4	0
pregnant	3	0	2	8	2	8
nursing	3	8	3	12	4	0
60 years or over ⁵	2	8	2	4	2	8
Men:						
sedentary	2	4	2	0	3	0
physically active	2	8	2	8	4	0
with heavy work	2	8	2	8	6	0
60 years or over ⁵	2	8	2	4	3	4

¹Or its equivalent in cheese, evaporated milk, or dry milk.

²Count 1½ lb. of bread as 1 lb. of flour. Use as much as possible

³For small children and pregnant and nursing women, cod liver
elderly persons or for persons who have no opportunity for
also desirable.

⁴To meet iron allowance, 1 large or 2 small servings of liver

⁵The nutritive content of the weekly food quantities for a man
Council's recommended daily allowances for the sedentary man

II

FOOD (AS PURCHASED) FOR 19 AGE, SEX, ACTIVITY GROUPS (20)

Other Vege- tables & Fruit	Milk ¹	Meat, Poul- try, Fish	Eggs	Dry Beans & Peas, Nuts	Flour, Cere- als ²	Fats and Oils ³	Sugar, Sirups, Pre- serves
lb. oz.	qt.	lb. oz.	no.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
1 0	6	0 4 ¹	5	0 1	0 10	0 1	0 1
1 0	5 ¹	0 8 ⁴	5	0 1	1 4	0 2	0 2
1 4	5 ¹	1 0	5	0 2	1 12	0 6	0 6
1 8	5 ¹	1 8	5	0 4	2 4	0 8	0 10
1 12	6	1 12	5	0 4	3 4	0 12	0 12
1 12	6 ¹	2 0 ⁴	5	0 4	3 8	0 12	0 12
1 12	5	2 0 ⁴	5	0 4	3 4	0 12	0 10
2 4	6 ¹	2 0	5	0 8	4 8	1 0	0 14
2 8	6 ¹	2 0	5	0 8	5 12	1 6	1 0
1 12	5	2 0	5	0 4	2 0	0 10	0 10
1 12	5	2 0	5	0 4	3 4	0 12	0 12
2 0	5	2 0	5	0 6	4 4	1 0	1 0
2 0	7 ¹	2 4 ⁴	7	0 4	2 8	0 10	0 8
2 4	10 ¹	2 8 ⁴	7	0 4	3 0	0 10	0 8
1 12	5	2 0	4	0 2	2 4	0 8	0 8
1 12	5	2 0	5	0 4	3 4	0 12	0 12
2 0	5	2 0	5	0 6	4 4	1 0	1 0
2 8	5	2 0	5	0 10	7 12	1 14	1 0
1 12	5	2 0	4	0 2	3 4	0 10	0 10

in the form of whole-grain, enriched or restored products.
oil or some other source of vitamin D is also needed. For
exposure to clear sunshine, a small amount of vitamin D is

or other organ meats should be served each week.

and a woman 60 years or over were based on National Research
and woman.

TABLE

MASTER FOOD PLAN AT MODERATE-COST. WEEKLY QUANTITIES OF

Family Members	Leafy Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Children through 12 years:						
9-12 months	1	8	1	12	0	8
1-3 years	2	0	2	0	0	8
4-6 years	2	4	2	4	1	0
7-9 years	2	8	2	8	1	12
10-12 years	3	0	2	12	2	4
Girls:						
13-15 years	3	8	2	12	2	8
16-20 years	3	8	2	12	2	8
Boys:						
13-15 years	3	8	3	0	3	8
16-20 years	4	0	3	8	4	8
Women:						
sedentary	3	4	2	8	1	12
moderately active	3	8	2	8	2	8
very active	3	12	3	0	3	4
pregnant	4	0	3	8	2	4
nursing	4	0	4	8	3	0
60 years or over ⁵	3	8	2	12	2	0
Men:						
sedentary	3	8	2	8	2	8
physically active	3	12	3	0	3	4
with heavy work ⁵	4	0	3	8	5	0
60 years or over ⁵	3	8	2	12	2	12

¹Or its equivalent in cheese, evaporated milk, or dry milk.

²Count 1½ lb. of bread as 1 lb. of flour. Use as much as possible

³For small children and pregnant and nursing women, cod liver
elderly persons or for persons who have no opportunity for
also desirable.

⁴To meet iron allowance, 1 large or 2 small servings of liver

⁵The nutritive content of the weekly food quantities for a man
Council's recommended daily allowances for the sedentary man

III

FOOD (AS PURCHASED) FOR 19 AGE, SEX, ACTIVITY GROUPS (20)

Other Vege- tables & Fruit			Milk ¹		Meat Poul- try, Fish		Eggs		Dry Beans & Peas, Nuts		Flour, Cere- als ²		Fats and Oils ³		Sugar, Sirups, Pre- serves	
lb.	oz.	qt.	lb.	oz.	no.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	
1	0	6	0	4 ⁴ / ₄	5	0	1	0	10	0	1	0	1			
1	12	6	0	12 ⁴ / ₄	6	0	1	1	4	0	2	0	2			
2	4	6	1	4	7	0	1	1	8	0	6	0	8			
2	8	6 ¹ / ₂	1	12	7	0	2	2	0	0	8	0	12			
2	8	7	2	4	7	0	2	2	12	0	12	0	14			
3	8	7	2	12 ⁴ / ₄	7	0	2	2	12	0	14	0	14			
3	8	6	2	12 ⁴ / ₄	7	0	2	2	8	0	12	0	14			
3	8	7	3	0	7	0	4	4	0	1	2	1	2			
3	8	7	3	4	7	0	6	5	4	1	6	1	4			
3	4	5	2	8	7	0	1	1	12	0	10	1	12			
3	8	5	2	12	7	0	2	2	8	0	14	0	14			
4	0	5	3	0	7	0	4	3	12	1	2	1	2			
3	0	7 ¹ / ₂	3	0 ⁴ / ₄	7	0	2	2	4	0	10	0	10			
3	8	10 ¹ / ₂	3	0 ⁴ / ₄	7	0	2	2	8	0	12	0	12			
3	0	5 ¹ / ₂	2	8	6	0	1	1	12	0	8	0	10			
3	8	5	2	12	7	0	2	2	8	0	14	0	14			
4	0	5	3	0	7	0	4	3	12	1	2	1	2			
4	4	5	3	8	7	0	6	7	0	2	0	1	4			
3	0	5 ¹ / ₂	2	12	6	0	2	2	8	0	12	0	12			

in the form of whole-grain, enriched or restored products.
oil or some other source of vitamin D is also needed. For
exposure to clear sunshine, a small amount of vitamin D is

or other organ meats should be served each week.

and a woman 60 years or over were based on National Research
and woman.

In the master food plans the recommended dietary allowances are translated into terms of food. Foods are classified into eleven groups and the quantities needed weekly are given for persons in each of 19 age, sex, and activity groups. Both plans are flexible enough to fit various seasons, places, and family tastes as well as to allow for variety in meals. Classification of foods into eleven groups is for convenience--although the foods in any one group may differ somewhat in nutritive value they are more like each other than like foods of other groups. The groupings differ somewhat from the Basic 7 of the National Food Guide (L-288). To make detailed account of food for a family, a classification of all foods is needed. Therefore, a group of energy foods--sugar, sirup, preserves--which is not included in the Basic 7 is included in the eleven food groups; for convenience the protein foods are divided into three groups; and on the basis of their place in the menu, potatoes and sweet potatoes grouped with other fruits and vegetables in the Basic 7, are considered separately (20).

In both the low- and moderate-cost plan the same adjustment has been made for nutrient loss in cooking.

The plans differ in relative quantities of foods from the different groups and in choice of foods within a group. The low-cost plan relies heavily on the cheaper food groups--potatoes, dry beans and peas, flour and cereals. Also this plan is based on selection of the cheaper foods within the groups, for instance, the less expensive cuts of meat and the lower priced vegetables and fruits. The moderate-cost plan allows for larger quantities from the more expensive food groups such as meat and eggs. It allows for some of the higher priced cuts of meat, a few out-of-season foods (20).

Costs of foods in these plans were based on June, 1952, city food price levels. With reference to the Master Food Plans of the Bureau of Human Nutrition and Home Economics (Tables II and III), Tables IV and V, Recommended Food Purchases for Family Number One, illustrate the method used to determine yearly food allowances recommended for purchase by each of the twenty-four families in this study at both the low-and

TABLE

RECOMMENDED FOOD PURCHASES FOR FAMILY

Family Members Code Number One	Leafy Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Father (sedentary)	2	4	2	0	3	0
Mother (moderately active)	2	4	2	0	3	0
Son ($3\frac{1}{2}$ years old)	1	12	1	12	1	8
Son (10 months old)	1	8	1	12	0	8
Total per week	7	12	7	8	8	0
Total per 4-week period	31	0	30	0	32	0
Total per year	403	0	390	0	416	0

¹Or its equivalent in cheese, evaporated milk, or dry milk.

²Count $1\frac{1}{2}$ lb. of bread as 1 lb. of flour. Use as much as possible

³For small children and pregnant and nursing women, cod liver
elderly persons or for persons who have no opportunity for
also desirable.

⁴To meet iron allowance, 1 large or 2 small servings of liver

⁵The nutritive content of the weekly food quantities for a man
Council's recommended daily allowances for the sedentary man

IV

NUMBER ONE AT LOW-COST MENU LEVEL

Other Vege- tables & Fruit			Milk ¹		Meat Poul- try, Fish		Eggs		Dry Beans & Peas, Nuts		Flour, Cere- als ²		Fats and Oils ³		Sugars, Sirups, Pre- serves	
lb.	oz.	qt.	lb.	oz.	no.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	
1	12	5	2	0	5	0	4	3	4	0	12	0	12			
1	12	5	2	0	5	0	4	3	4	0	12	0	12			
1	4	5½	1	0	5	0	2	1	12	0	6	0	6			
1	0	6	0	4	5	0	1	1	10	0	1	0	1			
5	12	21½	5	4	20	0	11	8	14	1	15	1	15			
23	0	86	21	0	80	2	12	35	8	7	12	7	12			
299	0	1118	273	0	1040	35	12	461	8	100	12	100	12			

in the form of whole-grain, enriched or restored products.
oil or some other source of vitamin D is also needed. For
exposure to clear sunshine, a small amount of vitamin D is

or other organ meats should be served each week.

and a woman 60 years or over were based on National Research
and woman.

TABLE

RECOMMENDED FOOD PURCHASES FOR FAMILY

Family Members Code Number One	Leafy Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Father (sedentary)	3	8	2	8	2	8
Mother (moderately active) . .	3	8	2	8	2	8
Son ($3\frac{1}{2}$ years old)	2	4	2	4	1	0
Son (10 months old)	1	8	1	12	0	8
Total per week	10	12	9	0	6	8
Total per 4-week period	43	0	36	0	26	0
Total per year	559	0	468	0	338	0

¹Or it equivalent in cheese, evaporated milk, or dry milk.

²Count $1\frac{1}{2}$ lb. of bread as 1 lb. of flour. Use as much as possible

³For small children and pregnant and nursing women, cod liver
elderly persons or for persons who have no opportunity for
also desirable.

⁴To meet iron allowance, 1 large or 2 small servings of liver

⁵The nutritive content of the weekly food quantities for a man
Council's recommended daily allowances for the sedentary man

V

NUMBER ONE AT MODERATE-COST MENU LEVEL

Other Vege- tables & Fruit	Milk ¹	Meat Poul- try, Fish	Eggs	Dry Beans & Peas, Nuts	Flour, Cere- als ²	Fats and Oils ³	Sugars, Sirups, Pre- serves
lb. oz.	qt.	lb. oz.	no.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
3 8	5	2 12	7	0 2	2 8	0 14	0 14
3 8	5	2 12	7	0 2	2 8	0 14	0 14
2 4	6	1 4	7	0 1	1 8	0 6	0 8
1 0	6	0 4	5	0 1	0 10	0 1	0 1
10 4	22	7 0	26	0 6	7 2	2 3	2 5
41 0	88	28 0	104	1 8	28 8	8 12	9 4
533 0	1144	364 0	1352	19 8	370 8	113 12	120 4

in the form of whole-grain, enriched or restored products.
oil or some other source of vitamin D is also needed. For
exposure to clear sunshine, a small amount of vitamin D is

or other organ meats should be served each week.

and a woman 60 years or over were based on National Research
and woman.

the moderate-cost menu levels. For example, Family Number One is composed of a father who is engaged in a sedentary type occupation;⁵ a mother whose activities are of the moderately active type;⁶ a son age three and a half years; and a son age ten months. According to the recommendations of the Bureau of Human Nutrition and Home Economics, members of Family Number One should purchase a weekly total of 5 pounds 4 ounces of meat, poultry or fish to adequately meet their needs at the low-cost menu level. For the food group including flour and cereal, the amount recommended for weekly purchase is 8 pounds 14 ounces. At the moderate-cost menu level the weekly recommendation for meat, poultry, and fish is 7 pounds; for cereal and flour it is 7 pounds 2 ounces. A comparison of these food weights illustrates one of the differences between the two Master Food Plans. While the low-cost plan makes use of a larger quantity of low-cost cereal protein (8 pounds 14 ounces) supplemented with a smaller amount of food from the meat group (5 pounds 4 ounces), the moderate-cost plan uses a larger quantity of the higher-cost meat protein (7 pounds) and a smaller quantity of the cereal foods (7 pounds 2 ounces). Upon examination of both plans other variations in their design may be noted, such as differences in recommendations for the citrus fruit and tomato group and

⁵ Refer to Appendix, p. 49.

⁶ Ibid.



the foods classified as other fruits and vegetables. While both Master Plans are designed to allow for the purchase of sufficient food to adequately meet National Research Council recommendations for each nutrient, the variations in relative quantities of food recommended for purchase from the different food groups enable these plans to be adapted to two income levels. In the cases of the two families which were increased in size by the addition of children, the recommended food allowances were adjusted for the mothers' requirements of pregnancy and the food needs of the babies in accordance with the recommendations of the National Research Council (28).

It was recognized that the recommended food purchases for any given family assumed that all meals were eaten at home and that the food available was equitably distributed between the members of the family. Thus the recommended quantity of food to be purchased for a family of four was based on the assumption that three meals a day for four persons during 365 days in the year were prepared from the food brought into the home. The addition of guests or meals eaten away from home were taken into consideration in the evaluation of these data. Since there was no notation as to which family member was away nor was there a description of the guests included in the records, no specific guide was available by which the yearly food purchase recommendations could be corrected; therefore, these variations were accounted for in the following manner:

- (a) If the difference between guest meals and meals eaten away from home was less than five percent of the total number of meals consumed by a family, no adjustment was made in the final calculation.
- (b) If the difference between guest meals and those eaten away from home was more than five percent of the total number of meals consumed by a family, correction was made.

Example: (1) Family Number Twenty had 683 meals eaten away from home in excess of the five percent allowed.

(2) To make correction for the 683 meal variation the food purchase recommendations for one "average member" of Family Number Twenty for one meal were determined at both menu levels using Tables II and III.

(3) The food purchase recommendations for an "average family member" for one meal were multiplied by 683 (the difference of total possible meals served per year and total actual meals served, allowing a five percent variation) to determine total food consumed away from home by the "average member" of Family Number Twenty.

(4) The resulting figures were subtracted



from the recommended yearly food purchases for Family Number Twenty to determine the corrected yearly food purchase recommendations. (Calculation cited in Appendix, p. 57.)

Family food purchase records which were kept for less than a year were corrected to a fifty-two week record by using as the correction factor the average weekly food purchases calculated from available data believed to be representative of the food purchases of the family.

Example: (1) Family Number Ten reported forty-eight of fifty-two weeks. The actual total purchase of meat, poultry, and fish by Family Number Ten for forty-eight weeks was 368 pounds 11 ounces--an average of 7 pounds 2 ounces per week.

(2) The average weekly purchase (7 pounds 2 ounces) was multiplied by the number of weeks not reported (four) to determine the average amount of food purchased but not reported (28 pounds 8 ounces).

(3) The average unreported food purchase (28 pounds 8 ounces) was added to the total actual purchase (368 pounds 11 ounces) in each food group (in this example, meat) to determine the corrected

food purchase on a fifty-two week basis
(397 pounds 3 ounces).

It should be noted that the family records which required this adjustment could not be used in analyzing seasonal purchase trends since those records would not be accurate at the monthly level.

After the above corrections had been made in the necessary cases, the total year's purchases of foods in each group were compared with the calculated standard for that family at low- and moderate-cost menu levels.

To note possible trends in variation between amounts of food purchased during summer and winter months, the records of ten families were studied. These families had completed food purchase records for fifty-two weeks. The remaining records could not be used because the families had not completed the records during a vacation or had had more guests or more meals eaten away from home than the arbitrary percentage allowed. In selecting the ten families, income was not a determining factor. The families' purchases were totaled during two twelve-week periods--winter months, November 29 through February 21; summer months June 14 through September 5. The total purchases for each food group made during the winter period were compared with the total purchases made during the summer period.

10

RESULTS AND DISCUSSION

Adequacy of Purchases

Total yearly purchases in each of eleven food groups were determined for the individual families. These total purchases were then compared to the calculated standard amounts for purchase, and the resulting comparisons were expressed in percentages (Appendix, Tables IX, X, XI).

Figure 1 presents data on the number of families at each of the three income levels whose food purchases met the recommended standard in each of the eleven food groups at the low-cost menu level; Figure 2 presents similar data relative to adequacy of purchases at the moderate-cost menu level. Striking similarity in adequacy of purchase for the various food groups is obvious. In Figure 1 at the low-cost menu level, none of the families purchased adequate amounts of leafy, green, and yellow vegetables; potatoes; and flour and cereal. In Figure 2 at moderate-cost menu level, no family purchased enough leafy, green, and yellow vegetables; and only three families purchased sufficient potatoes; and flour and cereal. Similar patterns of purchase may be noted for citrus fruits and tomatoes--none of the families at the low-cost menu level and only two out of twenty-four at the moderate-cost level purchased adequate amounts of foods in this

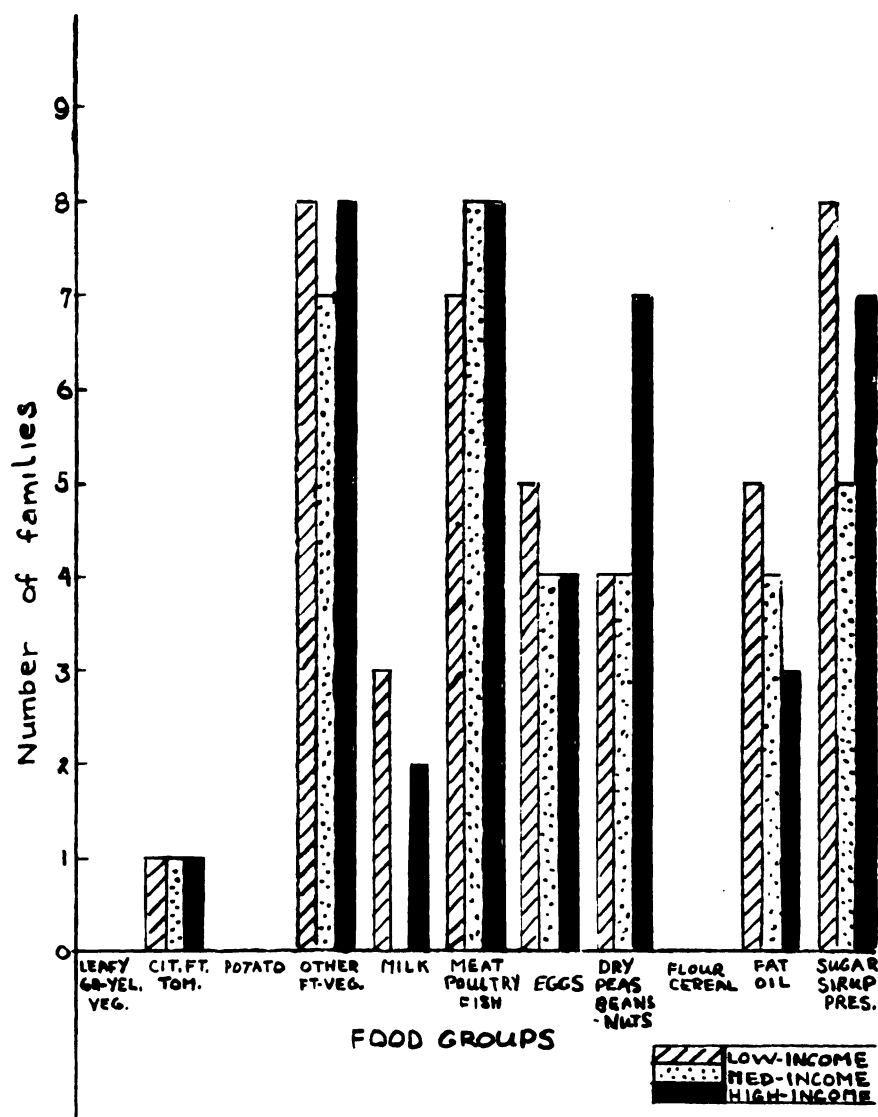


Fig. 1. Total number of families in each income group which met Bureau of Human Nutrition and Home Economics food purchase recommendations for eleven food groups at low-cost menu level.

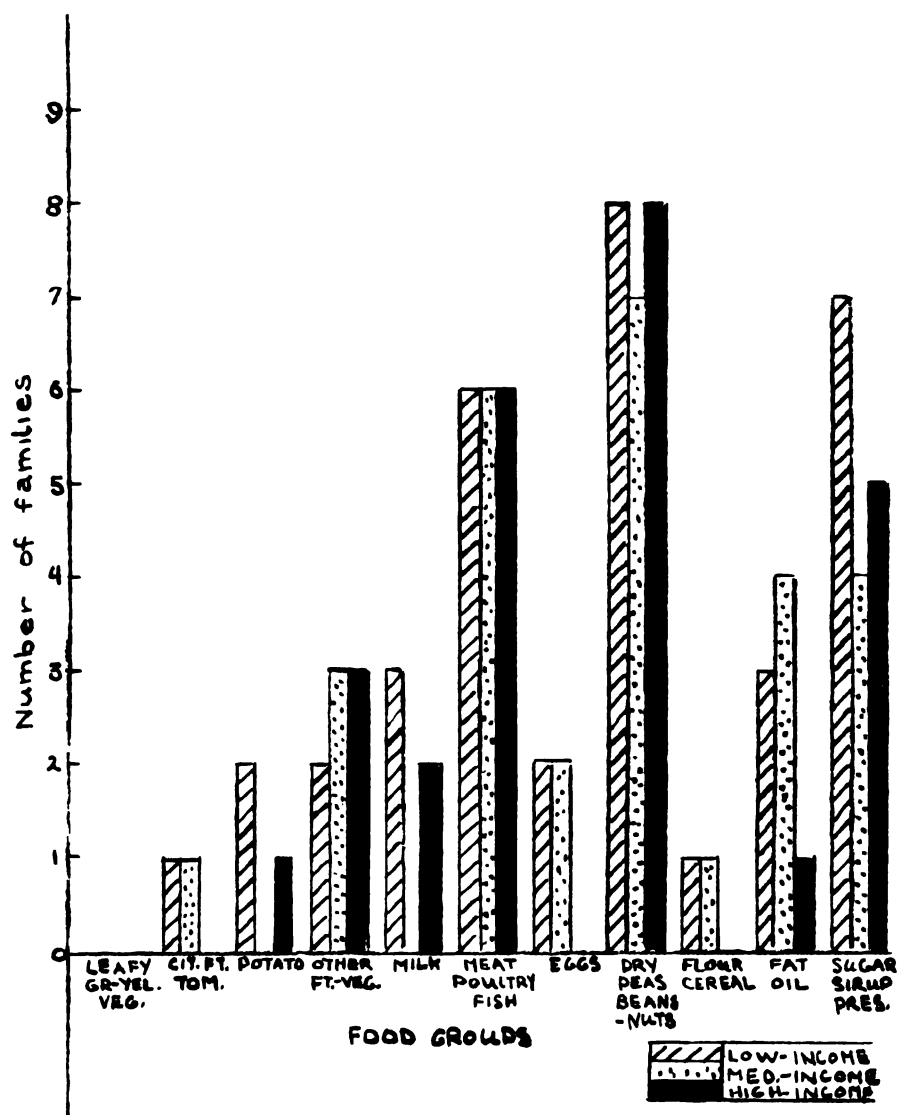


Fig. 2. Total number of families in each income group which met Bureau of Human Nutrition and Home Economics food purchase recommendations for eleven food groups at moderate-cost menu level.

100

100

group. Only five families purchased adequate quantities of milk and milk products at either menu level; eggs were purchased in adequate quantities by thirteen of the twenty-four families at low-cost menu level and by four of the twenty-four at moderate-cost menu level; whereas meat, the other source of animal protein, was purchased in adequate amounts by the majority of families. At the low-cost menu level, twenty-three families purchased adequate quantities of foods in the group labeled, other fruits and vegetables. It might be assumed these purchases would compensate partially for the inadequate purchases of leafy, green, and yellow vegetables and potatoes; however, at the moderate-cost menu level, adequate purchases of this food group were made by only one-quarter of the total families. It follows that although, at low-cost menu level, the purchase of foods in this group appears excessive, at the moderate-cost level this is not the case. Therefore, purchases in this group could hardly be assumed to compensate for inadequate purchases of foods high in vitamin C.

Tables VI and VII present mean purchases and ranges for the various groups of food at three levels of income. For example, the purchase of leafy, green, and yellow vegetables by low-income families at low-cost menu level ranged from 8 to 81 percent of the recommended quantity with a mean of 35 percent. The mean purchases presented in Figures 3 and 4 reveal inadequate purchase levels of all of the protective foods, with the exception of meat, at all income levels using

TABLE VI

ADEQUACY OF FOOD PURCHASED BY URBAN MICHIGAN FAMILIES
 COMPARED TO CALCULATED STANDARDS¹ FOR EACH FAMILY
 AT LOW-COST MENU LEVEL

Food Group	Income Level	Adequacy of Food Purchases	
		Mean	Range
		Percent	Percent
Leafy, green and yellow vegetables	Low	35	8- 81
	Medium	25	13- 45
	High	34	24- 51
Citrus fruits, tomatoes	Low	61	20-139
	Medium	49	12-111
	High	73	31-120
Potatoes sweet potatoes	Low	67	41- 95
	Medium	50	24- 59
	High	59	39- 90
Other fruits and vegetables	Low	148	108-258
	Medium	160	74-261
	High	189	125-228
Milk	Low	48	26-122
	Medium	71	48- 94
	High	87	65-119
Meat, poultry, fish	Low	148	69-184
	Medium	144	108-179
	High	141	106-166
Eggs	Low	110	46-186
	Medium	99	46-165
	High	92	53-127
Dry peas and beans, nuts	Low	131	80-207
	Medium	102	43-165
	High	137	55-273
Flour and cereal	Low	68	54- 88
	Medium	64	45- 83
	High	63	37- 83
Fats and oils	Low	112	74-161
	Medium	101	66-156
	High	86	64-114
Sugar, sirup, preserves	Low	153	114-210
	Medium	129	70-250
	High	131	68-186

¹Suggested by the Bureau of Human Nutrition and Home Economics
 Misc. Pub. No. 662 (20).

TABLE VII

ADEQUACY OF FOOD PURCHASED BY URBAN MICHIGAN FAMILIES
 COMPARED TO CALCULATED STANDARDS¹ FOR EACH FAMILY
 AT MODERATE-COST MENU LEVEL

Food Group	Income Level	Adequacy of Food Purchases	
		Mean	Range
		Percent	Percent
Leafy, green and yellow vegetables	Low	25	6- 56
	Medium	18	9- 33
	High	23	15- 36
Citrus fruits, tomatoes	Low	49	16-115
	Medium	53	10-108
	High	59	26- 95
Potatoes sweet potatoes	Low	85	50-122
	Medium	63	31- 89
	High	72	47-108
Other fruits and vegetables	Low	81	56-144
	Medium	84	38-116
	High	103	68-181
Milk	Low	75	22-116
	Medium	64	45- 88
	High	81	61-111
Meat, poultry, fish	Low	108	49-133
	Medium	104	78-133
	High	102	81-120
Eggs	Low	81	34-143
	Medium	72	36-126
	High	85	38- 90
Dry peas and beans, nuts	Low	227	150-334
	Medium	176	83-264
	High	259	100-534
Flour and cereal	Low	81	62-105
	Medium	75	55-104
	High	75	50- 89
Fats and oils	Low	101	68-142
	Medium	91	64-141
	High	79	58-102
Sugar, sirup, preserves	Low	129	97-176
	Medium	108	57-210
	High	107	54-155

¹ Suggested by the Bureau of Human Nutrition and Home Economics
 Misc. Pub. No. 662 (20).

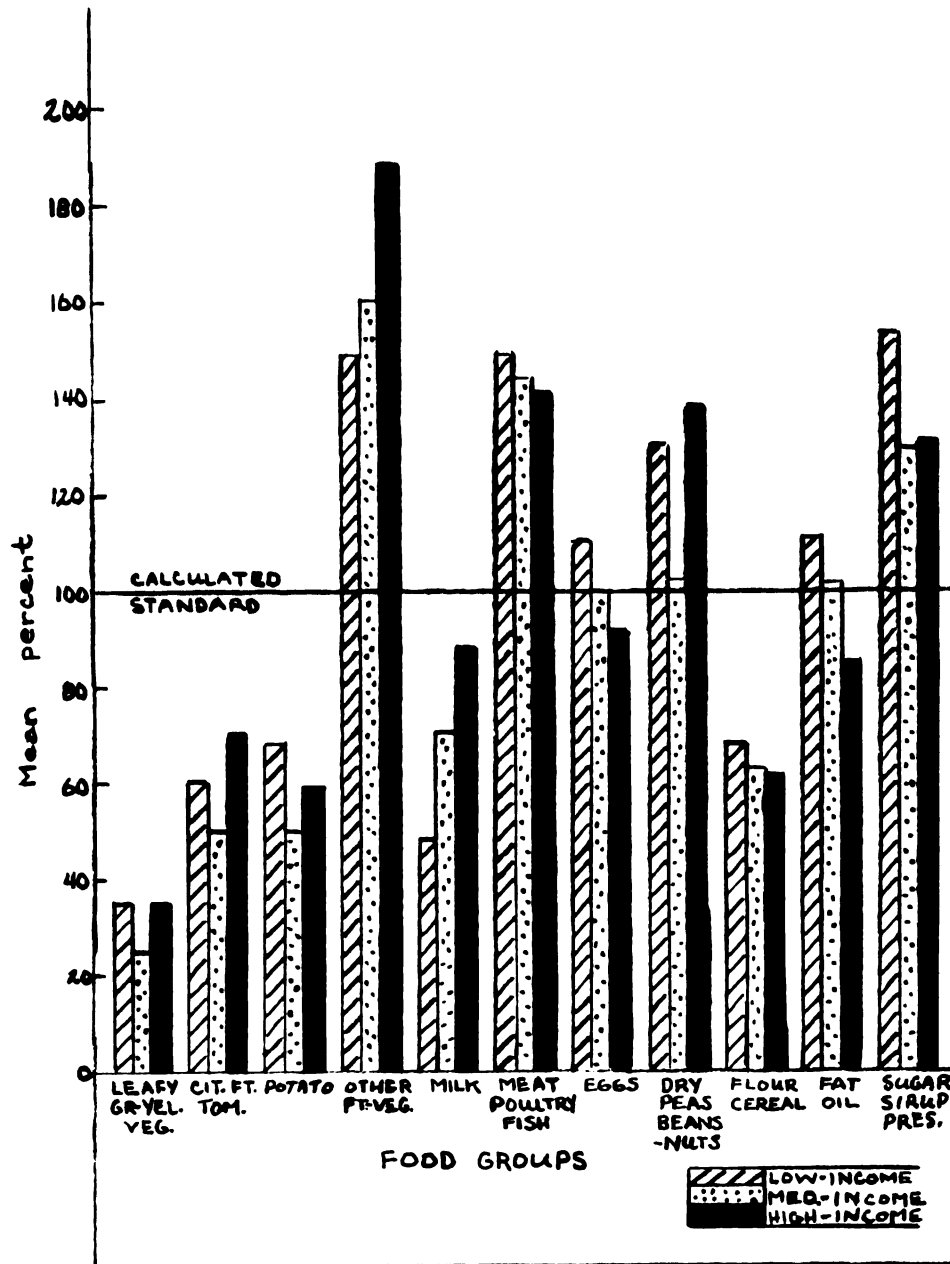


Fig. 3. Adequacy of food purchased by urban Michigan families as compared to calculated standards for each family at low-cost menu level.

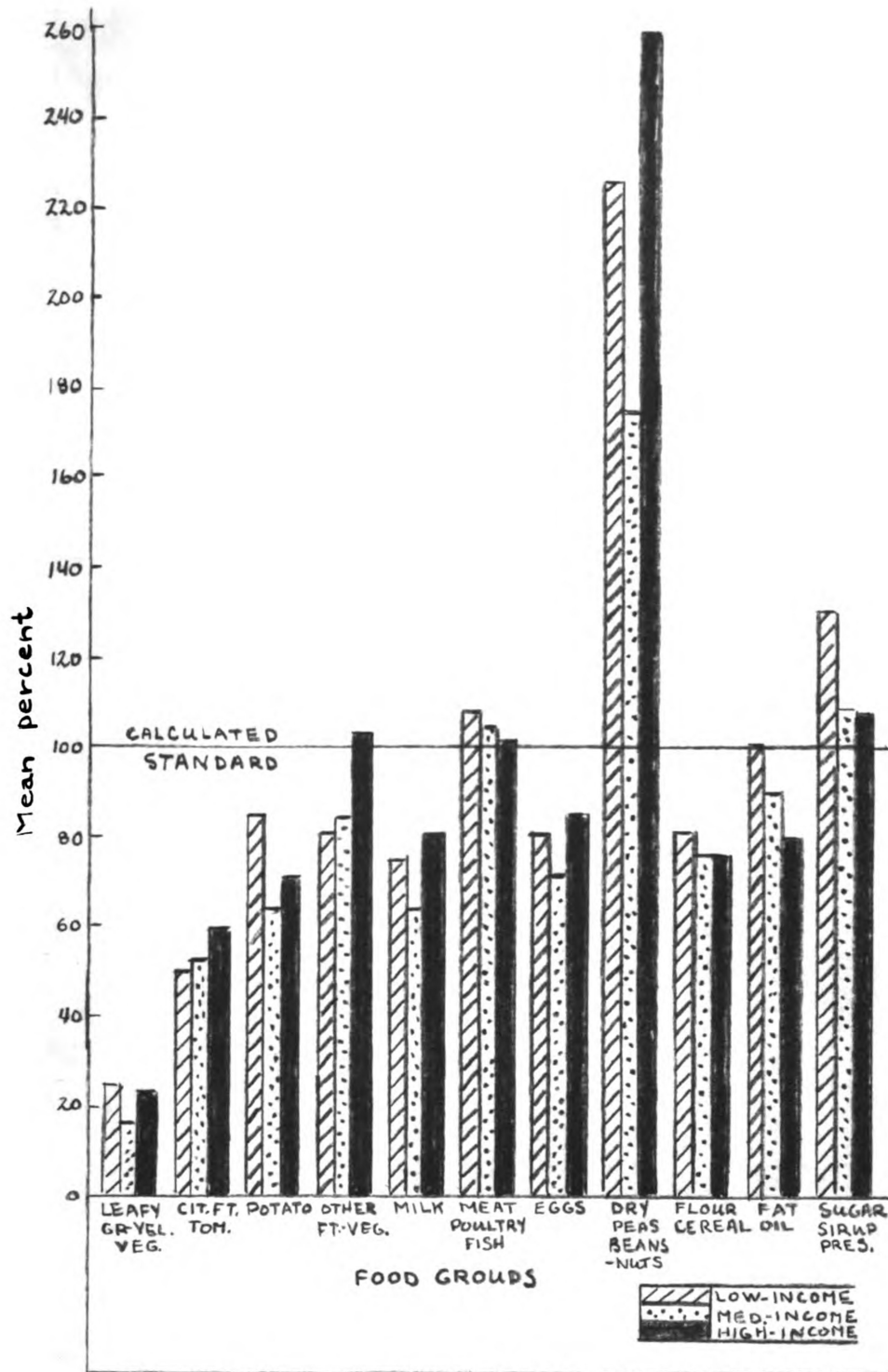


Fig. 4. Adequacy of food purchased by urban Michigan families as compared to calculated standards for each family at moderate-cost menu level.

both low- and moderate-cost menu plans. Therefore, it may be assumed that these families purchased inadequate amounts of leafy, green, and yellow vegetables; citrus fruits and tomatoes; potatoes and sweet potatoes; and flour and cereal.

Purchases of milk and eggs were inadequate for the majority of families. Inadequate purchases of these valuable protein sources may be felt to be of minor importance since, in general families made adequate purchases of meats; however, it must be kept in mind that milk is one of the few rich sources of calcium and riboflavin and eggs are a good source of vitamin A. The amount of meat purchased by the majority of these families is still not sufficient to assure the adequate intakes of calcium and vitamins A and riboflavin which are insured by use of recommended amounts of milk and eggs.

The consistently high purchases in the sugar group are of interest. At both menu cost levels purchases by all income groups were above the amounts recommended. If this trend of purchasing is representative of that of the American homemaker, it could well be the basis for the widespread public health problem of today, overweight. From these data, one may assume that these twenty-four families purchased the high caloric foods classified in this group in amounts beyond their need. Thus, they were obtaining concentrated calories from these sources which are poor in nutrient content instead of using larger quantities of protective foods which supply fewer calories, such as citrus fruits; leafy, green, and yellow

vegetables; potatoes; and milk. The high caloric value of foods in the sugar group may be demonstrated by estimating the calories available per person from this source, for example, Family Number One used an average of 4 pounds 1 ounce of foods from the sugar group per week. This was an average of 1 pound per person which provided approximately 1,748 calories from this source but included no nutrients.

Effect of Income on Adequacy of Purchases

Although mean and ranges of purchase vary for both menu cost levels and at the three income levels, the trend of purchasing by these twenty-four families is similar. Referring to Figures 1 and 2 the number of families which met recommended standards for purchasing tended to be high or low depending upon the type of food purchased not upon the income group they represented. None of the families purchased adequate amounts of leafy, green, and yellow vegetables at any income level-- and with the exception of one low-income family, all purchased the recommended quantity of meats.

An examination of data at each of two menu cost levels indicates the families purchased similar quantities of food regardless of income (Tables VI and VII). The low-cost menu was specifically designed to provide a nutritionally adequate diet for low-income families. For example, it makes major use of low-cost vegetable protein to be supplemented by higher-cost animal protein. Figure 3 reveals purchases of much more

meat by low-income families than flour and cereal foods which would indicate these families did not take advantage of the use of lower-cost vegetable protein which would conform more nearly to their level of income. At the moderate-cost menu level, Figure 4, the families more nearly met amounts recommended for purchase--even the low-income families. Therefore, this low-income group purchased higher-cost foods in larger quantities than their incomes could be expected to accommodate.

Figure 3 and 4 also indicate little variation in purchasing practices between families at various income levels. At both menu levels, the mean purchases of meat varied only six and seven percent. No notation was made as to the type of meat purchased. Further study could possibly reveal that low-income families purchased cheaper cuts of meat; however, the fact remains, these families did not take advantage of the use of vegetable protein.

Families with higher incomes could be expected to purchase a greater quantity of fruit and vegetables than those with lower incomes. This does not seem to be the case. The range of purchases of leafy, green, and yellow vegetables by low-income families at low-cost menu level was 8 to 81 percent; by high-income families, 24 to 51 percent. The means were 35 percent and 34 percent, respectively. Some low-income families purchased more of this food group than did any higher income family.

Seasonal Trends of Purchases

In order to examine the accumulated data for evidence of seasonal trends in purchasing, the food purchase records were used for the ten families which had submitted complete records for fifty-two weeks. The other fourteen families had submitted incomplete records which had had to be corrected to a fifty-two week basis. The manner of correction rendered these data invalid at the monthly level, therefore, they were of no significance for use in comparing seasonal purchases.⁷ Because of similarities in the purchasing habits of all groups there was no apparent reason for not grouping the ten families irrespective of their economic level.

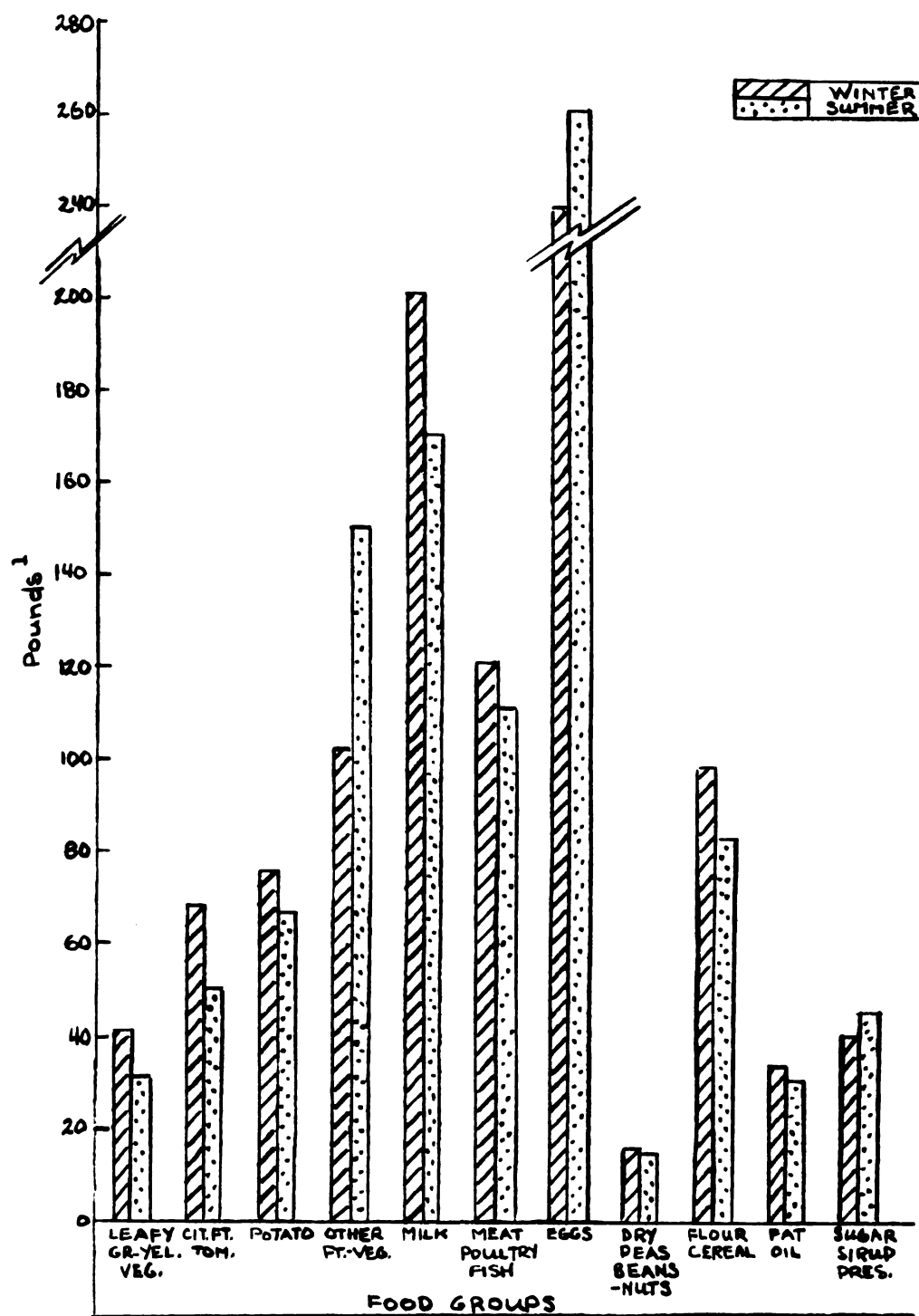
Table VIII presents means and ranges of means for summer and winter purchases, whereas Table XII (Appendix) lists summer and winter purchases for each of these ten families. As may be readily seen (Figure 5) there is little variation between mean food purchases for these seasons except in the group labeled, other fruits and vegetables. Such similarity may be due to greater availability of foods made possible by improved marketing and preservation techniques. Seasons appear to have little effect upon the type of food purchased by these ten families.

⁷Refer to page 23.

TABLE VIII
SEASONAL¹ TRENDS IN PURCHASES OF TEN URBAN MICHIGAN FAMILIES

Food Group	Mean Purchase		Range of Purchases	
	Summer	Winter	Summer	Winter
Leafy, green and yellow vegetables	33 lb.	41 lb.	17- 74 lb.	15- 99 lb.
Citrus fruits, tomatoes	50 lb.	68 lb.	14- 96 lb.	30-114 lb.
Potatoes, sweet potatoes	68 lb.	76 lb.	32-105 lb.	23-149 lb.
Other fruits and vegetables	149 lb.	103 lb.	76-230 lb.	45-148 lb.
Milk	170 qt.	202 qt.	60-307 qt.	63-333 qt.
Meat, poultry, fish	113 lb.	121 lb.	59-162 lb.	60-164 lb.
Eggs	261	240	132-444	108-384
Dry peas and beans, nuts	13 lb.	14 lb.	6- 32 lb.	6- 19 lb.
Flour and cereal	83 lb.	97 lb.	52-107 lb.	64-131 lb.
Fats and oils	30 lb.	33 lb.	19- 45 lb.	21- 55 lb.
Sugar, sirup, preserves	46 lb.	40 lb.	17- 82 lb.	22- 56 lb.

¹ Winter months defined as Nov. 29--Feb. 21, 1953;
summer months defined as June 14--Sept. 5, 1953.



¹ Milk in quarts; eggs in numbers.

Fig. 5. Comparison of mean food purchases during winter months (Nov. 29--Feb. 21, 1953) to mean food purchases during summer months (June 14--Sept. 5, 1953) by ten urban Michigan families.

SUMMARY AND CONCLUSIONS

Weekly food purchase records of twenty-four urban Michigan families were studied. The data were drawn from records collected by the Department of Agricultural Economics, Michigan State University. The sample consisted of eight families of similar membership--father, mother, and two children--selected from each of three income groups--high, medium, and low.

The weekly food purchases of these families, recorded for 1953, were classified into the following food groups: leafy, green, and yellow vegetables; citrus fruits and tomatoes; potatoes and sweet potatoes; other fruits and vegetables; milk; meat, poultry and fish; eggs; flour and cereal; fats and oils; dry peas and beans, nuts; and sugar, sirup, and preserves.

The recommended purchases for each of these food groups were calculated at low- and moderate-cost menu levels for each family using the amounts of food suggested by the Bureau of Human Nutrition and Home Economics.

The yearly food purchases of each family were compared to the calculated quantities for that family and examined for adequacy, effect of income, and seasonal variations in purchasing.

These data indicate inadequate purchasing of all protective foods except meat--specifically; leafy, green, and

yellow vegetables; citrus fruits and tomatoes; potatoes and sweet potatoes; flour and cereal; milk; and eggs.

At both menu cost levels purchases of sugar, sirup, and preserves by all income groups were above the recommended amounts.

The families included in this study purchased similar quantities of food at both menu levels regardless of income.

An analyses of the yearly purchases of ten families indicated little seasonal variation in the food brought into the home.

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DEFINITION OF STATE OF PHYSICAL ACTIVITY
ACCORDING TO OCCUPATION (20)

"Sedentary" persons do office work, clerking in a store, or housekeeping for a small family--the kind of work that calls for comparatively little muscular effort.

"Active" men do work like carpentering, ordinary farm labor, or factory work.

"Moderately active" women do work such as waiting on tables or housekeeping for a moderate-sized family.

Men at "heavy work" spend eight hours or more a day at such work as lumbering, ditch-digging, or heavy farm labor.

"Very active" women do work such as heavy housework at least eight hours a day.

CONVERSION TABLE

SUGGESTED BY THE BUREAU OF HUMAN NUTRITION
AND HOME ECONOMICS (20)

17 oz. by weight evaporated milk	=	1 qt. whole milk
5 oz. by weight cheddar cheese	=	1 qt. whole milk
3 lb. by weight cottage cheese	=	1 qt. whole milk
2 qt. by weight ice cream	=	1 qt. whole milk
Bread, baked goods	=	$\frac{2}{3}$ flour by weight

VALUES DETERMINED FOR SPECIFIC FOODS
BY USE OF UNITED STATES DEPARTMENT
OF AGRICULTURE HANDBOOK
NUMBER EIGHT (27)

3 oz. cream cheese	= 1.3 oz. fat
1 pt. light cream	= 3.2 oz. fat
1 pt. heavy cream	= 6.4 oz. fat
1 pt. salad dressing	= 6.0 oz. fat
8 fl. oz. carbonated beverage	= 2 tbsp. sugar

FOODS FOR WHICH ARBITRARY VALUES WERE ESTABLISHED

Chili	=	1/2 meat by weight; 1/2 beans by weight.
Ravioli	=	1/4 meat by weight; 3/4 flour by weight.
Hash	=	1/4 meat by weight; 1/4 carrots by weight; 1/4 potatoes by weight.
Fruit pie	=	10 oz. fruit; 8 oz. flour.
Meat pie	=	4 oz. meat; 8 oz. flour.
Meat soup	=	2 oz. meat per can.
Vegetable soup	=	1 can vegetable by weight.
Cream soup	=	1/2 qt. milk per 21 oz.
Noodle soup	=	1/2 flour by weight.
Baby food: meat vegetable mixture	=	
		1 oz. meat per 7 oz. can.
Frozen juices ¹	converted to reconstituted juice weight =	
		24 oz. juice per 6 oz. concentrate.

¹Except lemon juice which is not concentrated.

CONDIMENT-TYPE FOODS WHICH WERE NOT RECORDED
FROM THE FOOD PURCHASE DIARIES

Condiments -- tea, coffee, cocoa, ketchup, olives, pickles

Alcoholic beverages

Gelatin

Soups -- pepperpot, gumbo, consommé

WEIGHTS OF FRESH FRUITS AND VEGETABLES ARBITRARILY
DETERMINED TO BE OMITTED FROM FOOD PURCHASE
RECORDS DURING THE SEASON WHEN THEY
COULD HAVE BEEN USED FOR
PRESERVATION PURPOSES

Strawberries	3 qt.
Raspberries	3 qt.
Blueberries	3 qt.
Peaches	1 pk.
Plums	1 pk.
Crabapples	1 pk.
Pears	1 pk.
Grapes, Concord	1 pk.
Beans, string	1 pk.
Cucumbers	1/2 bu.



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RECOMMENDED DAILY

Family Members	Food Energy	Protein	Calcium	Iron
	Cal.	Gms.	Gms.	Mg.
Children up to 12 years:				
Under 1 year	(2)	(3)	1.0	6
1-3 years (27 lb.)	1,200	40	1.0	7
4-6 years (42 lb.)	1,600	50	1.0	8
7-9 years (58 lb.)	2,000	60	1.0	10
10-12 years (78 lb.)	2,500	70	1.2	12
Girls:				
13-15 years (108 lb.)	2,600	80	1.3	15
16-20 years (122 lb.)	2,400	75	1.0	15
Boys:				
13-15 years (108 lb.)	3,200	85	1.4	15
16-20 years (144 lb.)	3,800	100	1.4	15
Women: (123 lbs.)				
sedentary	2,000	60	1.0	12
moderately active	2,400	60	1.0	12
very active	3,000 ⁵	60	1.0	12
pregnancy	2,400 ⁵	85	1.5	15
lactation	3,000	100	2.0	15
Men: (154 lb.)				
sedentary	2,400	70	1.0	12
physically active	3,000	70	1.0	12
with heavy work	4,500	70	1.0	12

¹Source: Recommended Dietary Allowances, National Research

²110 cal./2.2 lb. (1 kg.) body weight at 6 months. (Energy 100 cal./2.2 lb. at 1 year.)

³3.5 gm./2.2 lb. (1kg.) body weight.

⁴For persons who have no opportunity for exposure to sunshine vitamin D may be desirable.

⁵The value of 2,400 cal. represents the allowance for pregnant, needed.

DIETARY ALLOWANCES¹

Vitamin A	Thiamine	Riboflavin	Niacin	Ascorbic Acid	Vitamin D
I. U.	Mg.	Mg.	Mg.	Mg.	I. U.
1,500	0.4	0.6	4	30	400
2,000	0.6	0.9	6	35	400
2,500	0.8	1.2	8	50	400
3,500	1.0	1.5	10	60	400
4,500	1.2	1.8	12	75	400
5,000	1.3	2.0	13	80	400
5,000	1.2	1.8	12	80	400
5,000	1.5	2.0	15	90	400
6,000	1.7	2.5	17	100	400
5,000	1.0	1.5	10	70	(4)
5,000	1.2	1.5	12	70	(4)
5,000	1.5	1.5	15	70	(4)
6,000	1.5	2.5	15	100	400
8,000	1.5	3.0	15	150	400
5,000	1.2	1.8	12	75	(4)
5,000	1.5	1.8	15	75	(4)
5,000	1.8	1.8	18	75	(4)

Council Reprint and Circular Series No. 129, revised 1948.
requirements are 120 cal./2.2 lb. in early infancy and

and for elderly persons, the ingestion of small amounts of
sedentary women. If more active, additional calories may be

METHOD OF CORRECTION OF YEARLY FOOD PURCHASE RECOMMENDATIONS
TO ACCOUNT FOR GUEST MEALS SERVED OR MEALS
EATEN AWAY FROM HOME

Example: Family Number Twenty

- (a) Total possible meals served per year--4380 meals.
- (b) Five percent allowable variation--219 meals.
- (c) Family Number Twenty had 1035 meals eaten away from home and 133 guest meals which equals 902 meals variation (20 percent) from total possible meals served; 15 percent above the allowed variation.
- (d) The 20 percent variation minus the 5 percent allowed variation equals 683 meals variation.
- (e) To determine food purchase recommendations for one average member of Family Number Twenty for one meal at both menu levels, Tables II and III were used as follows:

RECOMMENDED FOOD PURCHASES FOR FAMILY

Family Members Code Number Twenty	Leafy Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Father (active)	3	12	3	0	3	4
Mother (sedentary)	3	4	2	8	1	12
Daughter (16 years old)	3	8	2	12	2	8
Son (14 years old)	3	8	3	0	3	8
Total per week	14	0	11	4	11	0
Average for one person per week	3	8	2	13	2	12
Average for one person per day	0	8	0	6.4	0	6.2
Average for one person per meal	0	2.6	0	2.1	0	2

NUMBER TWENTY AT MODERATE-COST MENU LEVEL

Other Vege- tables & Fruit			Milk		Meat, Poul- try, Fish		Eggs		Dry Beans & Peas, Nuts		Flour, Cere- als		Fats and Oils		Sugars, Sirups, Pre- serves	
lb.	oz.	qt.	lb.	oz.	no.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	
4	0	5	3	0	7	0	4	3	12	1	2	1	2			
3	4	5	2	8	7	0	1	1	12	0	10	0	12			
3	8	6	2	12	7	0	2	2	8	0	12	0	14			
3	8	7	3	0	7	0	4	4	0	1	2	1	2			
14	4	23	11	4	28	0	11	12	0	3	10	3	14			
3	9	5.75	2	13	7	0	3	3	0	0	15	1	0			
0	8	.82	0	6.4	1	0	.4	0	6.8	0	2.1	0	2.2			
0	2.6	.27	0	2.1	.3	0	.1	0	2.2	0	.7	0	.7			

- (f) To determine in this case the total food consumed away from home the food purchase recommendations for one average family member were multiplied by the difference of total possible meals served per year and the total actual meals served allowing five percent variation (683 meals).

	Leafy Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Average amount recommended for one person per meal . . .	0	2.6	0	2.1	0	2
Total food eaten away from home	110	14	89	10	83	8

- (g) To determine the corrected yearly food purchase recommendations the values for total food consumed away from home were subtracted from the family's recommended yearly purchases in this case of excess meals eaten away from home. (In case of excess guest meals, add the corrected values to the yearly food purchase recommendations.)

	Leafy Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes	
	lb.	oz.	lb.	oz.	lb.	oz.
Recommended yearly purchases	707	0	567	12	554	0
Food eaten away from home	110	14	89	10	83	8
Corrected recommended yearly food purchases . .	596	2	478	2	470	8

Other Vege- tables & Fruit	Milk	Meat Poul- try, Fish	Eggs	Dry Beans & Peas, Nuts	Flour, Cere- als	Fats and Oils	Sugars, Sirups, Pre- serves
lb. oz.	qt..	lb. oz.	no.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
0 2.6	.27	0 2.1	.3	0 .1	0 2.2	0 .7	0 .7
110 14	184	89 10	205	4 5	93 13	29 13	29 13

Other Vege- tables & Fruit	Milk	Meat Poul- try, Fish	Eggs	Dry Beans & Peas, Nuts	Flour, Cere- als	Fats and Oils	Sugars, Sirups, Pre- serves
lb. oz.	qt.	lb. oz.	no.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
720 0	1157	567 12	1414	34 10	604 8	182 14	195 8
110 14	184	89 10	205	4 5	93 13	29 13	29 13
609 2	973	478 2	1209	30 5	512 11	153 1	165 11

TABLE

ADEQUACY OF FOOD PURCHASED BY LOW-INCOME URBAN
STANDARDS¹ FOR EACH FAMILY AT LOW

Low- Income Fami- lies	Leafy, Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes		Other Vege- tables and Fruit		Milk	
	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost
Code No.	Percent		Percent		Percent		Percent		Percent	
1	43	31	43	35	91	112	181	101	104	102
2	81	56	37	28	57	73	120	65	26	22
3	8	6	20	16	75	99	108	56	74	71
4	38	28	139	115	41	50	258	144	104	101
5	25	18	37	27	61	80	139	72	60	58
6	29	20	85	70	61	73	110	60	122	116
7	20	15	34	28	51	69	120	67	69	67
8	34	24	90	72	95	122	151	81	68	63

¹Suggested by the Bureau of Human Nutrition and Home Economics,
(20).

IX

MICHIGAN FAMILIES AS COMPARED TO CALCULATED
AND MODERATE-COST MENU LEVELS

Meat, Poultry, Fish		Eggs		Dry Beans and Peas, Nuts		Flour, Cereals		Fats and Oils		Sugar, Sirups, Pre- serves	
Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost
Percent		Percent		Percent		Percent		Percent		Percent	
168	126	145	111	88	150	76	95	161	142	210	176
174	129	119	85	82	165	77	92	120	119	139	120
111	78	64	47	207	334	58	67	91	82	172	147
177	133	186	143	116	210	56	69	150	131	114	97
184	131	46	34	193	311	62	73	100	90	178	152
69	49	149	98	80	158	75	86	74	68	125	101
150	108	49	40	197	331	54	62	97	84	126	108
150	112	122	87	87	154	88	105	106	97	162	136

United States Department of Agriculture, Misc. Pub. No. 662

TABLE

ADEQUACY OF FOOD PURCHASED BY MEDIUM-INCOME
STANDARDS¹ FOR EACH FAMILY AT

Medium Income Fami- lies	Leafy, Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes		Other Vege- tables and Fruit		Milk	
	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost
Code No.	Percent		Percent		Percent		Percent		Percent	
9	31	23	71	60	59	73	128	71	48	47
10	24	18	72	59	53	68	140	77	51	45
11	45	33	52	44	71	89	261	113	87	83
12	13	9	12	10	58	76	74	38	58	55
13	29	20	63	51	24	31	129	68	82	59
14	19	13	64	50	33	39	146	81	66	60
15	24	17	111	108	45	58	218	116	83	78
16	16	11	54	44	57	71	187	109	94	88

¹Suggested by the Bureau of Human Nutrition and Home Economics,
(20).

X

URBAN MICHIGAN FAMILIES AS COMPARED TO CALCULATED
LOW-AND MODERATE-COST MENU LEVELS

Meat, Poultry Fish		Eggs		Dry Beans and Peas, Nuts		Flour, Cereals		Fats and Oils		Sugar, Sirups, Pre- serves	
Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost
Percent		Percent		Percent		Percent		Percent		Percent	
108	78	72	55	165	264	63	74	116	103	117	99
143	103	46	36	112	180	54	61	127	117	95	80
179	133	165	126	91	155	83	104	77	70	177	151
146	103	110	81	107	173	69	80	111	100	250	210
139	102	75	54	97	175	45	55	81	72	70	59
163	114	150	107	89	152	51	59	66	64	71	57
125	96	51	37	115	230	68	84	156	141	122	102
153	108	123	85	43	83	82	82	70	65	133	111

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TABLE

ADEQUACY OF FOOD PURCHASED BY HIGH-INCOME
STANDARDS¹ FOR EACH FAMILY AT

High Income Fami- lies	Leafy, Green, and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes Sweet Potatoes		Other Vege- tables and Fruit		Milk	
	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost
Code No.	Percent		Percent		Percent		Percent		Percent	
17	26	18	71	58	64	82	180	84	65	61
18	28	17	96	75	68	78	228	121	76	70
19	40	28	120	95	42	54	218	116	119	111
20	40	27	31	26	90	108	125	68	80	75
21	30	20	87	68	55	67	174	98	76	73
22	51	36	86	71	39	47	301	181	115	106
23	24	15	55	43	50	60	132	74	70	67
24	31	22	41	32	63	82	153	81	93	87

¹Suggested by the Bureau of Human Nutrition and Home Economics,
(20).

XI

URBAN MICHIGAN FAMILIES AS COMPARED TO CALCULATED
LOW-AND MODERATE-COST MENU LEVELS

Meat, Poultry Fish		Eggs		Dry Beans and Peas, n Nuts		Flour, Cereals		Fats and Oils		Sugar, Sirups, Pre- serves	
Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost	Low Cost	Mod. Cost
Percent		Percent		Percent		Percent		Percent		Percent	
147	107	53	38	144	258	74	89	68	62	106	90
166	120	127	90	104	186	83	87	98	82	100	82
106	81	121	87	141	282	68	83	111	93	186	155
150	105	106	74	124	240	37	50	64	58	68	54
160	114	109	77	55	100	59	70	104	97	130	108
153	108	58	42	145	275	64	76	86	76	165	129
109	77	96	68	109	197	58	69	65	64	141	117
137	105	66	47	273	534	63	78	114	102	150	121

United States Department of Agriculture, Misc. Pub. No. 662

TABLE
SEASONAL¹ PURCHASES OF TEN

Family Code Number	Leafy, Green and Yellow Vegetables		Citrus Fruit, Tomatoes		Potatoes, Sweet Potatoes		Other Vege- tables and Fruit		Milk	
	Win-	Sum-	Win-	Sum-	Win-	Sum-	Win-	Sum-	Win-	Sum-
	ter	mer	ter	mer	ter	mer	ter	mer	ter	mer
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	qt.	qt.
19	30	38	98	74	30	32	45	188	287	307
20	41	23	37	41	149	74	80	147	183	130
23	15	17	30	24	23	47	85	172	201	134
21	38	27	99	96	70	76	148	177	226	210
17	35	37	58	25	113	72	103	106	168	164
18	28	24	114	76	62	105	136	215	190	197
11	54	25	66	51	68	93	147	230	237	208
9	37	20	78	57	54	45	71	80	134	87
1	30	44	68	14	92	76	94	100	333	204
2	99	74	36	43	102	55	117	76	63	60

¹Winter months defined as Nov. 29--Feb. 21, 1953; summer

XII

URBAN MICHIGAN FAMILIES

Meat, Poultry Fish		Eggs		Dry Beans and Peas, Nuts		Flour, Cereal		Fats and Oils		Sugars, Sirups, Pre- serves	
Win- ter	Sum- mer	Win- ter	Sum- mer	Win- ter	Sum- mer	Win- ter	Sum- mer	Win- ter	Sum- mer	Win- ter	Sum- mer
lb.	lb.	no.	no.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
94	79	252	360	19	8	75	103	28	30	45	82
134	105	192	180	11	32	64	53	21	19	22	17
88	106	228	166	18	16	101	71	28	23	41	71
160	138	234	264	10	6	105	78	53	38	50	45
123	110	108	132	15	17	106	107	24	24	48	29
138	162	264	372	14	9	110	103	25	45	29	37
119	126	314	444	19	14	119	88	21	22	47	61
60	59	138	156	19	10	80	52	28	20	24	24
129	90	384	300	6	8	78	85	41	37	35	52
164	151	288	240	9	14	131	91	55	38	56	42

months defined as June 14--Sept. 5, 1953.

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