THE INFLUENCE OF NUTRITION EDUCATION IN FAMILIES OF THE MULBERRY AREA OF NEW YORK CITY[1]

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DURING the period from 1935 to 1938 a community program for the control of tuberculosis was undertaken in the Mulberry area of New York City. The program was a cooperative project shared by the Mulberry Health Center, which was a district health service of The Association for Improving the Condition of the Poor;[2] the Bureau of Tuberculosis of the New York City Department of Health; and the Milbank Memorial Fund. Reports on certain aspects of this special study have been published (1,2,3). This particular report is concerned with a special study of the effectiveness of nutrition education which was carried on as part of the program of health supervision.

Instruction in dietary and other habits which affect nutrition is taking an increasingly important place in health education. Animal research in nutrition has suggested that better growth and greater resistance to infection may result from improved nutrition (4,5,6,7).

Rose has expressed the need for instruction in proper food and health habits as follows: "The development of habits which make for optimum nutrition is wholly a matter of education. There is no instinct for a good diet—apparently quite the contrary." (8) It has also been shown that the principles of an adequate diet may be adapted to various income levels, yet insure a diet that meets essential nutritional requirements for safeguarding health (9).

Adequate nutrition as a factor in the maintenance of good health was considered important for all members of the tuberculous fam-

[1] From the Community Service Society of New York, the Milbank Memorial Fund, and the New York City Department of Health.

[2] The Study was begun when Mulberry Health Center was part of The Association for Improving the Condition of the Poor. This organization merged with the Charity Organization Society in 1939, and both are now known as the Community Service Society of New York.

ilies under supervision in the Mulberry area. Consequently, it was desirable to measure the effectiveness of nutrition education in these families.[3]

This special study was carried out during the period July, 1937, to December, 1939, by the staff nutritionist and the Mulberry Health Center nursing staff under the supervision of Miss Clara R. Price, R.N. The nutrition education work was under the supervision of Miss Lucy H. Gillett, director of the Nutrition Bureau of the Community Service Society of New York.

General nutrition education had been a part of the health program of the Mulberry Health Center for twenty years or more. Through the general program, which included several intensive nutrition education campaigns[4] (10,11) and a program of sustained nutrition teaching by the nurses, it is believed that the food and health habits of these families had been improved previous to the period of the present study. However, the extent of improvement and present status were not known. The special study reported upon in this paper was planned so that the effectiveness of teaching could be measured.

Description of the Mulberry Area

The Mulberry area, known as "Little Italy," is the oldest Italian section in New York City. It is located on the lower East Side of New York, and lies between Canal Street on the south, Houston Street on the north, the Bowery on the east, and Broadway on the west. It is a congested area occupied by families with a relatively low economic status and of Italian origin. Most of the dwellings are of the tenement type with few modern conveniences. Many of the families have lived in the district—often in the same houses—for

[3] The term "nutrition" is used in this study to indicate the quality of the dietary and other factors, such as sunshine, fresh air, sleep and rest, and regularity, which are essential to the proper utilization of food by the body. It is not used to denote the complex bodily processes involved in metabolism.

[4] A school dental-nutrition, education campaign was conducted in seven public schools in the community from 1930 to 1937.

years. They have successfully transferred a large part of their customs, traditions, and the use of many of their familiar foodstuffs from their native land, and have adopted few of the customs of the country to which they have come.

The diet, characteristic of this group of Italians in the Mulberry area, includes large amounts of macaroni and spaghetti and white bread made from refined flour. Very little whole-grain cereal is used except an occasional dried variety. Potatoes and root vegetables are used infrequently, and these low-income families use fewer greens than is generally supposed. The vegetables are often cooked too long, and greens are sometimes precooked in a "first water" which is thrown away because it is thought to be impure. Canned foods are not used because there is an aversion of long standing to them. The popular canned tomato paste is an exception. Milk is used if it is encouraged, and eggs are included daily if income permits. Fish and legumes are used abundantly, and fruits of all varieties are prominent in the diet of nearly every Italian.

Method and Data of Study

As was stated before, the objective of the special project in nutrition education was to find out whether intensive teaching in the home will bring about needed change in habits of eating and of living which are believed to be related to health. The plan of study provided for nutrition education or observation in a total of 135 families. These families were selected from 539 families which were given public health supervision in the special tuberculosis study. There were no cases of adult pulmonary tuberculosis in these families, but in each of them there was one or more children under 17 years of age with demonstrable evidence of primary infection.[5] The family names were arranged alphabetically and every fourth family selected until the total of 135 families was reached. Before any

[5] Demonstrable evidence of primary infection included a positive Mantoux or x-ray evidence of a primary lesion of tuberculosis.

special nutrition education was started, all of the families were visited by the nutritionist and data were secured concerning certain environmental conditions of the family and inquiry was made as to the food and health habits of each child under 17 years of age. These data were recorded on a schedule devised for that special purpose.

After the preliminary survey made by the nutritionist was completed the 135 families were arranged alphabetically and divided into three groups of forty-five families each. One group of forty-five families was assigned to the nutritionist and one group to the nurses for special nutrition teaching. The third group of forty-five families was set aside as a control and in these families no special nutrition work was done. It should be emphasized that neither the nurses nor the nutritionist had anything to do with any part of the selection of the families and did not know in advance which families would be assigned to them.

Intensive nutrition education was carried on in the ninety families by the nutritionist and the nurses for a period of nine months. At the end of that time the 135 families were again visited by the nutritionist and the health and food habits of each child were graded according to the same scale as was used in the preliminary survey.

The schedule used in the survey visits made by the nutritionist included data on certain socio-economic conditions of the family. These were as follows: (1) income and certain expenditures; (2) housing; (3) home management; and (4) attitude of the mother. Data on income and expenditures included the amount of family income from earnings or relief, the average daily amount of money spent for food, and the amount spent for rent. Housing included sleeping arrangements for all members of the family and data concerning ventilation, light, and location of the living quarters. Home management was recorded and graded on the basis of selection and preparation of food, orderliness and cleanliness of the home, the quality of the equipment, and the use of time by the person responsible for the management of the home. The attitude of the

mother toward the household was judged by her indifference to or interest in the general welfare of her children. These data were collected in order to outline more clearly certain problems in each family which might be encountered in the educational program.

For the purpose of grading food habits, information was secured concerning the quality and quantity of food consumed by each child under 17 years of age in the family. The foods which were considered as important for revealing good or poor food habits were: milk, bread and cereals, vegetables, fruits and tomatoes, meat, fish, cheese and legumes, eggs, fats, sugar, tea and coffee, and cod-liver oil. The mother or person responsible for the management of the home was questioned concerning the daily quantity of each of these foods consumed by each child. Information was also sought concerning the kinds of bread and cereals used; that is, white or dark; the kinds of vegetables, whether root or leafy; and the kinds of fruits eaten.

Each child in the family was given a rating on habits of living which are believed to be related to health. The mother was asked about the child's appetite, regularity of meals, the number of hours of sleep, the usual hour of bedtime, time in fresh air and exercise, the daily amount of water or milk used, and habits of elimination.

Each food habit of each child was graded and classified according to the following categories: good, fair, poor, excess, and "none." These categories for each food were carefully defined according to known standards of nutritional adequacy, both as to quality and quantity. "Good," for the food items, corresponded to an optimum adequate requirement, and "fair" covered the minimum adequate requirement. "Poor" included quality and quantity less than the minimum adequate requirement. "Excess" was practically synonymous with "poor," and the category "none" is self-explained. As an example, for vegetables the categories were as follows: "good"—3 or more vegetables daily (2 green vegetables and 1 root vegetable, or 3 green vegetables); "fair"—2 vegetables daily (1 green and 1 root

vegetable, or 2 root vegetables, or 2 green vegetables with potatoes three or four times a week); "poor"—1 vegetable daily with potatoes two or three times weekly (1 root or 1 green vegetable with potatoes as specified); "none"—no vegetables used.

Health habits were classified according to the same categories as those for food habits. The ratings for health habits were defined according to generally accepted standards of good health practices. For example, for water, "good" was defined as 6 to 8 glasses daily; "fair"—4 to 5 glasses daily; "poor"—1 to 3 glasses daily.

A detailed description of the content of the categories "good," "fair," "poor," etc. for each food item and health habit is shown in Appendix I.

Any rating of food and health habits is obviously somewhat arbitrary and subject to inaccuracy. One of the weaknesses is that it is based to a certain extent on personal judgment. In order to offset as much as possible the personal element in judging and to maintain consistency of rating, the nutritionist made all of the survey visits throughout the study.

As was stated above, the record secured on all survey visits was usually taken from the mother in the household. Ample time was allotted for the interview in order to secure as accurate and complete information as possible. The need of sufficient time for the interview was explained to the mother, and if her time was too limited when the first visit was made, a special appointment was arranged with her for the interview. The nutritionist used a technique of questioning which it was hoped would preclude the likelihood of suggesting answers. A rating was entered on the record forms on the basis of the mother's answers. No comments were made by the nutritionist on the quality of the food habits or health practices during the visit.

On each survey visit the nutritionist set up a family budget according to the budget allowance schedules used by The Association for Improving the Condition of the Poor. These schedules included allowances for good shelter, an adequate diet at moderate cost,

clothing, fuel and light, household supplies and extras, and carfare and lunch money for working members of the family.

When the first survey visit was completed, the nutritionist made a summary of each family's situation and needs. The main nutrition problems, revealed through the survey, were listed and a tentative plan for correction of the problems was outlined. This summary was attached to each family record so that it could be used as a guide by the nurses and the nutritionist in planning their educational program for the family. Furthermore, the nutritionist acted as a consultant to the nurses, helping them with any nutrition problems by offering suggestions, providing educational materials, and visiting in the homes with them upon request.

Similarity of the Groups of Families

The method of selection of the 135 families for special study has been described, and the method of allocation of the families to their respective groups for special teaching or control purposes has been explained. If no selective factor or bias has influenced the method of sampling and of allocating the families to the three groups—(1) those to be given special teaching by the nutritionist; (2) those to be given special teaching by the nurses; and (3) those set aside for control purposes—the three groups of families should, at the beginning of the special study, be fairly similar in such respects as the age of the children and number per family, source of family income, and food and health habits of the children. From data secured on the first survey of the families it is possible to examine the similarity of the three groups.

There were 413 children under 17 years of age in the 135 families. The distribution of the children by age is shown in Table 1. It is evident that in this respect the three groups of families were generally similar. The number of children per family was 3.0 in the families given special teaching by the nurses, 3.1 in the control group, and 3.2 children per family in the nutritionist's group.

There were no striking differences among the three groups of

Families Classified According to Source of Education	Total Children	Age Groups			
		0–4	5–9	10–14	15 and 16
	PER CENT				
None-Control	100.0	13.0	30.4	42.8	13.8
Nurses	100.0	15.0	30.8	38.4	15.8
Nutritionist	100.0	17.7	32.4	40.1	14.8
	NUMBER				
None-Control	138	18	42	59	19
Nurses	133	20	41	51	21
Nutritionist	142	18	46	57	21

Table 1. Distribution of the children by age in three groups of families in the Mulberry area of New York City.

families with regard to source of income. In Table 2 the families are classified according to the source of income at the beginning of the study period. For approximately 50 per cent of the total in each group the source of the income was earnings alone.

The data concerning food habits of the children obtained from the mother at the time of the initial survey visit are presented in Table 3. The ratings "good" and "fair" were combined and used as "good," and the ratings "poor," "excess," and "none" were com-

Table 2. Source of income in three groups of families in the Mulberry area of New York City.

Families Classified According to Source of Education	Total	Source of Income			Source of Income Unknown
		Earnings	Earnings and Relief	Relief Only	
	PER CENT				
None-Control	100.0	50.0	25.0	25.0	
Nurses	100.0	47.5	15.0	37.5	
Nutritionist	100.0	58.5	19.5	22.0	
	NUMBER				
None-Control	45	22	11	11	1
Nurses	45	19	6	15	5
Nutritionist	45	24	8	9	4

Food Habits	Per Cent of Children in Each Group with Specified Rating						Number of Children Rated		
	good			poor					
	Control	Nurses	Nutri-tionist	Control	Nurses	Nutri-tionist	Control	Nurses	Nutri-tionist
Milk	72.3	70.7	64.8	27.7	29.3	35.2	137	133	142
Meat, Cheese, Legumes	83.1	88.5	83.6	16.9	11.5	17.0	136	130	141
Eggs	68.4	51.1	70.4	31.6	48.9	29.6	136	131	142
Fruits, Tomatoes	69.6	68.7	75.1	30.4	31.3	24.8	138	131	141
Vegetables	32.4	46.6	42.9	67.6	53.4	57.4	136	131	141
Bread, Cereals	30.9	33.6	27.0	69.1	66.4	73.0	136	131	141
Fats	45.6	38.5	41.8	54.4	61.5	58.2	136	130	141
Sugar	68.4	58.4	65.2	31.6	41.5	34.8	136	130	141
Cod-Liver Oil	10.1	20.6	11.3	89.9	79.4	88.7	138	131	142
Tea and Coffee	22.1	18.5	16.3	77.9	81.5	83.7	136	130	141

Table 3. Rating on food habits of the children in three groups of families at the time of the first survey visit—Mulberry area of New York City.

bined and used as "poor." "Good" includes anything within the range of minimum adequate requirement to optimum requirement, while "poor" includes inadequate or excessive. In general, the children in all three groups had fairly similar food habits as indicated by the proportion in each group with a "good" or "poor" rating for the various foods. For example, the proportion of children who had a rating of "good" for the drinking of milk ranged from 65 per cent in the nutritionist's group of families to 72 per cent in the control families. In the families carried by the nurses the children had a relatively low rating of "good" on the consumption of eggs as part of the diet, and in the control families the children had relatively low ratings on vegetables. However, in no one of the groups of families were the ratings for food habits consistently different from the other groups studied.

Table 4 shows the rating on the various health habits for the children in each group of families. These habits, like the food habits,

Health Habits	Per Cent of Children in Each Group with Specified Rating						Number of Children Rated		
	good			poor					
	Control	Nurses	Nutri-tionist	Control	Nurses	Nutri-tionist	Control	Nurses	Nutri-tionist
Appetite	76.6	87.1	88.0	23.4	12.9	12.0	137	132	142
Regular Meals	89.0	86.4	93.7	11.0	13.6	6.3	137	132	142
Water Drinking	97.8	95.4	93.7	2.2	4.6	6.4	135	131	141
Bedtime	38.0	53.0	38.0	62.0	47.0	62.0	137	132	142
Hours of Sleep	44.9	40.5	43.0	55.1	59.5	57.0	127	121	137
Fresh Air	96.4	99.2	99.3	3.6	0.8	0.7	137	132	142
Exercise	88.9	91.5	77.7	11.1	8.5	22.3	135	130	139
Elimination	79.6	89.3	93.7	20.4	10.7	6.4	137	131	142

Table 4. Rating on health habits of the children in three groups of families at the time of the first survey visit—Mulberry area of New York City.

show a fairly close similarity at the beginning of the study for the three groups of families.

From the data presented, it may be concluded that the three groups of families which constitute the sample for special study and education in nutrition were generally alike in all important respects, such as the number of children per family, source of income, and living and dietary habits of the children.

Before considering the results of the special teaching in these families there are certain indications in Tables 3 and 4 which merit some discussion. The proportion of children with a rating of "good" on food habits (Table 3) reveals that most of those in the total 135 families had a diet which included adequate amounts of the protective foods, namely, milk, eggs, fruits and tomatoes, and vegetables. A high proportion also had adequate amounts of meat, cheese, and legumes. The ratings on bread and cereals were relatively low, due for the most part to the quality of the bread and cereals used; that is, lack of bread and cereals containing the whole-wheat grain.

Table 4 indicates that a high proportion of the children in all

families had an acceptable rating on habits of living. The only exceptions were "bedtime" and "hours of sleep." These habits were generally poor for the children in all families. These are habits determined in part by crowded living quarters and generally poor housing, conditions which were common to the district studied.

Problems, Method, and Content of Nutrition Teaching

Before presentation of the results of nutrition education in the families selected for special study, it is of interest to call attention to some of the problems encountered and to indicate the method and content of the nutrition teaching.

No two families presented the same problems. Incomes, as well as family needs and abilities, varied. The food budget of a family, for example, is subject to variations due to individual differences in age, sex, height, weight, and kind of activity performed. Some member of a household may have special diet needs, such as a diabetic or an allergic person, whose food requires special consideration. On a low income this is an important problem, calling for skillful adjustment of family expenditures. Thus, the cost of food for a family will vary according to its size, make-up, and physical condition.

In some instances the income was too small, or it was adequate but unwisely spent. Food and health habits of the children in some families may be poor, due to neglect because the mother was ill or employed outside of the home, or she may be indifferent to the welfare of the children. Problems of this type require special attention and adjustment suited to the individual family. Other problems include inadequate sleeping facilities, poor kitchen equipment, an oven that won't bake, feeding and behavior problems, and poor management of time, any one or all of which may be factors which contribute to poor nutrition.

Today, most families have access to general nutrition information through radio, magazines, and newspapers. This information may

be helpful in improving nutritional practice in families. However, among foreign groups with traditional habits, personal teaching is necessary. For example, a mother may be quite indifferent to the suggestion that her child needs three or four oranges a week if there is very little money to spend and the full amount of weekly income is already being spent on things which seem to her indispensable. She may be quite convinced that this recommendation cannot be applied to her family. These mothers need individual help with their food and budget problems; they must be shown how to adjust the dietary and substitute important foods for less important ones so as to provide the proper food values for their families. In some instances less money than is being spent may be required to feed the family well-balanced meals.

The families observed in this study showed the particular problems indicated above and many other important ones requiring special attention.

Method and Content of Nutrition Teaching. It is appropriate at this point to describe in some detail the method and content of teaching nutrition in the family which was used by the nutritionist. Regular home visits were made to give instruction as to how the nutrition problems of the family could be solved. Where a large food expenditure yielded a poor return in food value, the mother was shown how she might adjust her expenditures through a budget plan. She was shown how the food-dollar should be proportioned among the various food groups. Where income was low and a large proportion had to be spent for food, an economical food-plan was suggested to suit the level of income for the particular family. Such a food-plan included the amounts and kinds of food which could be bought at current prices in the neighborhood.

Where a mother was unfamiliar with methods of preparing foods which were recommended but strange to her, the nutritionist demonstrated the preparation in the home. Where careless or extravagant buying was a problem, the mother was taken on a trip to the

market and wise selection of food was discussed. If storage space permitted, buying food in quantity was advocated. Such suggestions as the use of day-old bread, tub butter, brown eggs for cooking, were given; and the value of reading labels to compare measures and standards was pointed out as a method of thrift which would help reduce food costs. In some homes instruction in menu planning, child training, and infant feeding was given. Special attention was directed to families where there were undernourished or underweight children and expectant mothers whose food needs are naturally greater. The use of undesirable foods and laxatives was discouraged in all homes, and emphasis was placed on the practice of good food and proper health habits, such as regularity of meals, elimination, ample sleep, fresh air, sunlight, and the use of sufficient water for drinking.

The use of devices by which food values could be represented were helpful with mothers as well as with children. When a mother was unable to speak English, instruction often had to be given through the use of visual material and literature translated into Italian. If these devices were ineffective, some neighbor was usually willing to act as an interpreter. Where the mother failed to cooperate, the father or an older child was urged to carry out the suggestions.

Problems which were outside the scope of nutrition were referred to the nurse or to the supervisor for attention. Where insufficient income was a problem, the family was referred to a relief agency before nutrition education was begun.

The nurses were encouraged to use the same methods of nutrition teaching as those employed by the nutrition worker.

Results of Special Education in Nutrition

As a starting point, a description of the food and health habits of the children in each family was secured, which indicated to the nutritionist and the nurses what nutrition and health teaching were

Food Habits	Per Cent of Children in Each Group with Specified Rating					
	good			poor		
	Control	Nurses	Nutri-tionist	Control	Nurses	Nutri-tionist
Milk						
First Survey	72.3	70.7	64.8	27.7	29.3	35.2
Second Survey	73.2	82.0	93.5	26.8	18.0	6.5
Meat-Legumes						
First Survey	83.1	88.5	83.6	16.9	11.5	17.0
Second Survey	87.7	95.5	97.9	12.3	4.5	2.1
Eggs						
First Survey	68.4	51.1	70.4	31.6	48.9	29.6
Second Survey	69.6	70.7	89.2	30.4	29.3	10.8
Fruits-Tomatoes						
First Survey	69.6	68.7	75.1	30.4	31.3	24.8
Second Survey	81.9	87.2	92.8	18.1	12.8	7.2
Vegetables						
First Survey	32.4	46.6	42.9	67.6	53.4	57.4
Second Survey	34.8	75.2	87.8	65.2	24.8	12.2
Bread-Cereals						
First Survey	30.9	33.6	27.0	69.1	66.4	73.0
Second Survey	34.1	48.1	65.5	65.9	51.9	34.5
Fats						
First Survey	45.6	38.5	41.8	54.4	61.5	58.2
Second Survey	54.4	45.9	66.2	45.6	54.1	33.8
Sugar						
First Survey	68.4	58.5	65.2	31.6	41.5	34.8
Second Survey	76.8	80.5	92.8	23.2	19.5	7.2
Cod-Liver Oil						
First Survey	10.1	20.6	11.3	89.9	79.4	88.7
Second Survey	8.0	18.9	19.4	92.0	81.1	80.6
Tea and Coffee						
First Survey	22.1	18.5	16.3	77.9	81.5	83.7
Second Survey	23.2	19.5	33.1	76.8	80.5	66.9

Table 5. Comparison of first ratings on food habits of the children in three groups of families with ratings on the same children after an interval of nine months, Mulberry area of New York City.

most needed. This also provided a status as to eating and health habits for each child which could be compared with the child's status after nine months of teaching.

Table 5 shows the proportion of children with a "good" or with a "poor" rating on the second survey visit compared with the ratings on the survey which preceded the period of special nutrition education. It is clearly evident from Table 5 that improvement was shown for the nutritionist's group in all the food items studied, and for the nurses' group the proportion of children with "good" ratings increased for all but two of the food items, namely, cod-liver oil, and tea and coffee. It is apparent also that emphasis was placed on the need for the "protective foods"—milk, fruits, vegetables, and eggs[6] and on a reasonable consumption of sugar. Relatively large gains were shown in each of these food items in the families given special instruction by the nutritionist and the nurses. In a number of instances the food habits of the control group showed some improvement compared with the status at the beginning of the study.

The relatively low level of good ratings shown by the first survey visit for the use of cod-liver oil in all three of the study groups was maintained on the second survey visit. An intensive rickets campaign was carried on for several years in the Mulberry area, when the Health Center was first established, in an attempt to reduce the incidence of rickets among infants (11). The data from the present study indicate that the use of cod-liver oil the year round as a preventive measure is not being generally employed after the period of infancy. If the food budget was limited, cod-liver oil as a part of the diet was not considered important enough to buy regularly.

Frequent emphasis upon the elimination of coffee from the diet may have been responsible for the gain of from 16 per cent to 33 per cent in good ratings for the use of coffee and tea in the nutritionist's group. The use of both coffee and tea for children was discour-

[6] The Sherman classification for protective foods has been used for the purpose of this study.

aged as an unnecessary, as well as an undesirable, habit. In most cases the actual amount of coffee consumed was quite small, as it was largely used to flavor milk. However, for the purposes of this study a "poor" rating was applied to this habit if any amount of coffee was consumed daily.

Table 6. Comparison of first ratings on health habits of the children in three groups of families with ratings on the same children after an interval of nine months, Mulberry area of New York City.

Health Habits	Per Cent of Children in Each Group with Specified Rating					
	good			poor		
	Control	Nurses	Nutri-tionist	Control	Nurses	Nutri-tionist
Appetite						
First Survey	76.6	87.1	88.0	23.4	12.9	12.0
Second Survey	85.5	95.5	92.8	14.5	4.5	7.2
Regular Meals						
First Survey	89.0	86.4	93.7	11.0	13.6	6.3
Second Survey	92.0	92.5	97.8	8.0	7.5	2.2
Water Drinking						
First Survey	97.8	95.4	93.7	2.2	4.6	6.4
Second Survey	94.2	97.7	99.2	5.8	2.3	0.8
Bedtime						
First Survey	38.0	53.0	38.0	62.0	47.0	62.0
Second Survey	30.4	50.4	64.0	69.6	49.6	36.0
Hours of Sleep						
First Survey	44.9	40.5	43.0	55.1	59.5	57.0
Second Survey	51.1	50.4	69.6	48.9	49.2	30.4
Fresh Air						
First Survey	96.4	99.2	99.3	3.6	0.8	0.7
Second Survey	97.8	99.2	100.0	2.2	0.8	.0
Exercise						
First Survey	88.9	91.5	77.7	11.1	8.5	22.3
Second Survey	91.2	94.6	83.3	8.8	5.4	16.7
Elimination						
First Survey	79.6	89.3	93.7	20.4	10.7	6.4
Second Survey	89.1	94.7	98.6	10.9	5.3	1.4

Table 6 shows that for most of the health habits the generally high level of "good" ratings noted on the first survey visit was maintained on the second visit for all three groups of children. Bedtime hours and habits of sleep were the exceptions in the group of health practices studied. The only important increase in the proportion of children rated "good" on these habits was shown for the nutritionist's group.

The chances that the change in ratings of habits of eating noted after the period of special nutrition education might occur as a result of chance variation may be tested statistically. For this purpose it is preferable to present the average picture of food habits of all children for each of the three groups of families. These data are summarized in Table 7. All food habits are included except the use of cod-liver oil and of tea and coffee. The ratings for the eight remaining food habits for each child in each study group have been totaled and constitute the population. The proportions that were "good" are indicated for both survey visits. On the first visit all three groups show a marked similarity in the proportion of ratings in the category "good." On the second survey visit the proportion of the total ratings which were in the class "good" is considerably higher in the nurses' and nutritionist's groups than was noted on the first visit.

Table 7. Differences in ratings of "good" on eight food habits among children in three groups of families after an interval of nine months.

Families Classified According to Source of Education	Per Cent of Ratings "Good"		Differences and Their Standard Errors	Number of "Good" Ratings		Total Ratings on Eight Food Habits[1]	
	First Visit	After Nine Months		First Visit	After Nine Months	First Visit	After Nine Months
None-Control	58.8	64.1	5.3 ± 2.1	642	706	1,091	1,102
Nurses	57.0	73.1	16.1 ± 2.1	597	777	1,047	1,063
Nutritionist	58.8	85.2	26.4 ± 1.9	664	953	1,130	1,118

[1] The food habits are: (1) milk; (2) meat, cheese, and legumes; (3) eggs; (4) fruits and tomatoes; (5) vegetables; (6) bread and cereals; (7) fats, and (8) sugar.

The difference between these per cents or rates after the period of teaching is shown with their standard errors in Column 3 of the table. The difference of 16.1 in the ratings of "good" for the nurses' group is more than seven times its standard error ± 2.1; that is, the probabilities of a deviation of this magnitude arising from chance would be much less than one in a million. In the nutritionist's group the difference in "good" ratings is even greater. On the other hand, the difference of 5.3 shown for the children in the control group of families is only slightly more than twice its standard error, which may be interpreted as of borderline significance.

The use of the four protective foods in the diet showed the same general measure of improvement. This is evident from the average results presented in Table 8.

The conclusion may be drawn that the improvement in eating habits in families given special instruction was statistically significant; that is, it was not due to a chance variation. These results must not be interpreted too broadly; they do not indicate improvement of nutritional status of the children. No objective measure of the individual state of nutrition was included in this special study. The results do signify a measure of success in teaching. However, it has been necessary to accept the reliability of the information given by the mothers to the nutritionist on her second survey. No objective

Table 8. Differences in ratings of "good" on the use of four "protective foods" among children in three groups of families after an interval of nine months.

Families Classified According to Source of Education	Per Cent of Ratings "Good"		Differences and Their Standard Errors	Number of "Good" Ratings		Total Ratings 4 "Protective Foods" Habits[1]	
	First Visit	After Nine Months		First Visit	After Nine Months	First Visit	After Nine Months
None-Control	60.7	64.9	4.2 ± 2.9	332	358	547	552
Nurses	59.3	78.8	19.5 ± 2.8	312	419	526	532
Nutritionist	63.3	90.8	27.5 ± 2.5	358	505	566	556

[1] The protective foods are: (1) milk, (2) eggs, (3) fruits and tomatoes, and (4) vegetables.

observations of the children's actual performance were possible, and it is likely that some of the improvement represents an increase in the mother's ability to give the right answers as much as a change in habits. This is a recognized difficulty in the appraisal of the results of educational efforts, but perhaps it is not being too optimistic to think that where a knowledge of proper dietary practices has been acquired, it will have some influence on action.

The children in the nutritionist's group showed greater improvement than did the children in the nurses' group of families. The difference in the results for the two groups may be significant. However, it is difficult to ascribe this result entirely to more successful teaching by the nutritionist. It is impossible to correct for two factors which may have had considerable effect upon the results obtained by the nutritionist. The nutritionist made all of the survey visits. Since she had given intensive teaching in her own group of families, she may have received a higher proportion of proper responses to the survey questions relative to diet from her families than would have been given to a person who had not done the teaching. Also, all of the nutritionist's visiting time was devoted to nutrition education. On the other hand, the nurses included nutrition education in a program of general health teaching and each nurse had under her supervision approximately one hundred families in addition to those given special nutrition teaching.

In 1928 Gillett and Rice made a study of the influence of education on the dietaries of a group of low-income families in New York City which was compared with a similar study made in 1914 (12). Though the method of the present study is not directly comparable with those of the earlier studies, the general results of education were somewhat similar. Changes in the food habits of the groups of "influenced" and "noninfluenced" families were evaluated on the basis of cost and quantity of foods consumed. The findings indicated that families in which dietary education had been given distributed their money among the various types of food in such a way

as to obtain diets of a higher food value at less cost than did the "uninfluenced" families.

Summary

A special nutrition education program was carried on in ninety families for a period of nine months by the staff nutritionist and the nurses of the Mulberry Health Center. An additional forty-five families in which no special nutrition teaching was done were observed during the same period of time. The purpose of the project was to find out whether intensive nutrition instruction in the home will bring about needed change in habits of eating and living which are believed to be related to health. The children in all of the 135 families were rated on food and health habits at the beginning of the study, and again after an interval of nine months.

Food habits of the children showed significant improvement in all families in which special educational work was done. There was a marked increase in the use of the protective foods, milk, eggs, fruits and tomatoes, and vegetables. The habits of the children in the control families showed relatively little change.

Habits of living which are believed to be related to nutrition were noted for each child in the 135 families. A relatively high proportion of all children had acceptable health habits. Hours of sleep and bedtime were the only habits upon which the majority of children in all families were rated "poor." These are habits determined to a considerable extent by crowded living conditions, and no unusual improvement in them was noted among the children in any group of families.

It is believed that the relatively high proportion of children in this sample of 135 families, which had acceptable ratings on habits of eating and living before this special study of nutrition education was started, offers some evidence of the effectiveness of the general health program which had been conducted in the Mulberry area over a period of about twenty years.

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APPENDIX I

Scale Used for Grading Food Habits

Milk	Good—3-4 glasses a day.
	Fair —2 glasses a day.
	Poor —1 glass a day.
	None—No milk.

Meat, Fish, Cheese, and Legumes	Good—1 or more servings daily, including meat or fish (meat not more than once daily). Fair —(a) 1 serving of cheese or legumes daily (no meat or fish)—provided eggs and milk are adequate or, (b) meat two or three times a week with occasional legumes and cheese—provided milk and eggs are adequate. Poor —1 serving of cheese or legumes daily (no meat or fish) and milk and eggs inadequate. None—No meat, fish, cheese, or legumes. Excess—Meat and others more than once daily.
Eggs	Good—5-7 weekly. Fair —3-5 weekly. Poor —1-3 weekly. Excess—More than 7 weekly. None—No eggs.
Fruit and Tomatoes	Good—1 generous serving or 2 or more smaller servings daily, such as: 1 generous fresh fruit daily with tomato or orange *at least* 3 times a week. Fair —1 small serving daily, such as: 1 serving uncooked fresh fruit with tomato or orange 3 times a week, or 1 serving cooked dried or cooked fresh fruit with tomato or orange 3 times a week. Poor —1 serving of dried fruit daily, or fresh fruit 2 or 3 times weekly, such as: cooked dried fruit only, daily (no citrus or tomato), or fresh fruit only, 2 or 3 times weekly. None—No fruit used.
Vegetables	Good—3 or more vegetables daily, such as: 2 green vegetables and 1 root vegetable daily, or 3 green vegetables daily. Fair —2 vegetables daily, such as: 1 green and 1 root vegetable or 2 root vegetables, or 2 green

vegetables daily and potatoes 3 or 4 times weekly.

Poor —1 vegetable daily with potatoes 2 or 3 times weekly, such as: 1 root vegetable daily, potatoes 2 or 3 times weekly, or 1 green vegetable daily, and potatoes 2 or 3 times weekly.

None—No vegetables used.

Bread

Good—Bread and/or cereal or spaghetti at each meal with dark bread or cereal more than once a day.

Fair —Bread and/or cereal or spaghetti at each meal with dark bread or cereal once a day.

Poor —Insufficient bread and/or cereal or spaghetti at each meal, but no dark bread or cereal *(all white)*.

Excess—Too much bread and/or cereal used.

None—No bread, cereal, or spaghetti used.

Fat

Good—Some fat at each meal (see Fat Schedule for Age).

Fair —Some fat at 2 meals (see Fat Schedule for Age).

Poor —Fat at one meal only (see Fat Schedule for Age).

Excess—All olive oil used, or excess of any fat (see Fat Schedule for Age).

Sugar

Up to 5 Years of Age

Good—2 oz. or less weekly.

Fair —3 oz. weekly.

Poor —4 oz. weekly.

Excess—More than 4 oz. weekly.

5-10 Years of Age

Good—5 oz. or less weekly.

Fair —6 or 7 oz. weekly.

Poor —8 oz. weekly.

Excess—More than 8 oz. weekly.

Over 11 Years of Age
Good—12 oz. or less weekly.
Fair —13-14 oz. weekly.
Poor —15-16 oz. weekly.
Excess—More than 16 oz. weekly.

Cod-Liver Oil
Good—One or more teaspoons daily, or its equivalent in other fish oils.
Fair —Same—3 or 4 times a week.
Poor —Occasionally given.
None—No cod-liver oil or its equivalent in other fish oils.

Coffee and Tea
Good—No tea or coffee.
Fair —Occasional tea or coffee.
Poor —Frequent tea or coffee.
Excess—Daily tea or coffee.

Scale Used for Grading Health Habits

Appetite
Good—Hungry at three meals.
Fair —Hungry at two meals.
Poor —Hungry at one meal—fussy appetite at all meals.
None—No appetite at any meal.

Meals (Regularity)
Good—Three meals at same hour daily—well-balanced meals.
Fair —Two meals at same hour daily—third irregular—well-balanced meals.
Poor —One meal at same hour daily—others irregularly.
None—No regular time for meals.

Water (Including Milk)
Good—6-8 glasses daily.
Fair —4-5 glasses daily.
Poor —1-3 glasses daily.
None—No water and/or milk.

Bedtime	Good—In bed at accepted bedtime hour for age every night, with one late night a week. Fair —In bed at accepted bedtime hour every night, except two or three nights a week. Poor —In bed later than accepted bedtime hour more than three nights a week, or stays up more than one hour later than accepted bedtime hour every night during the week. See Bedtime Schedule, Appendix II.
Hours of Sleep	Record actual number of hours.
Fresh Air	*Day* / *Night* Good—Out-of-doors or in well-ventilated room at least 2 hours daily. / Windows open. Fair —Same—5 or 6 days per week. / Windows opened occasionally. Poor —Same—4 or less days per week. / Windows not opened.
Exercise	Good—Plays out-of-doors or in well-ventilated room 2 hours or more a day. Fair —Plays out-of-doors or in well-ventilated room 1 hour at least, daily. Poor —Seldom plays out-of-doors. Usually plays indoors in poorly-ventilated room, or works every day in home after school (if school child). None—No exercise in the form of play. Excess—Plays too long and/or too hard and tires out.
Elimination	Good—Normal, natural bowel movement daily without laxative. Fair —Normal movement five or six days out of seven, with occasional laxative. Poor —Normal movement less than five days per week and use of frequent laxatives.

APPENDIX II

Schedule for Fat—Used as a Guide *(Approximate Values)*

1-2 Years

Good—2 tablespoons weekly with some butter.
Fair —3-4 tablespoons weekly with some butter.
Poor —5-6 tablespoons weekly with some butter or all olive oil.
Excess—More than 6 tablespoons of any fat.

3-8 Years

Good—6-12 tablespoons weekly with some butter.
Fair —13-16 tablespoons weekly with some butter.
Poor —16-20 tablespoons weekly with some butter or all olive oil and no butter.
Excess—More than 20 tablespoons of any fat.

9-17 Years

Good—21-28 tablespoons weekly with some butter.
Fair —29-32 tablespoons weekly with some butter.
Poor —33-36 tablespoons weekly with some butter or all olive oil and no butter.
Excess—More than 36 tablespoons of any fat.

Bedtime Schedule[1]

Age	*Hours Sleep*	*Approximate Bedtime Hour*
2 - 3 years	12½	6:30
4 - 5 "	12	7:00
6 - 7 "	11½	7:00 - 7:30
8 - 9 "	11	8:00
10 - 11 "	10½	8:00
12 - 13 "	10	8:00 - 8:30
All through growing period	9	9:00

[1] Adapted from Roberts, Lydia: Nutrition Work with Children. Revised Edition, 1935. Chicago University Press, p. 181.