

Dietary Intake and Social Characteristics

By JEAN K. BOEK, PH.D.*

THE CONTENT of people's diets, as well as factors associated with food choice, are of interest to nutritionists and social scientists alike. The studies conducted by both groups of scientists in different parts of the world have contributed evidence that food intake of an individual is influenced by the rules and traditions of the society in which he lives and by his relative position within that society. A number of the surveys have shown quite specifically how variations in diet are associated with differences in the social environment. Such studies involve description and measurement not only of diet but also of factors in the social milieu. Results of these investigations were utilized in the present research in the formulation of hypotheses which were tested in a study of 184 Michigan farmers.

RESEARCH METHODS

The 184 farm operators lived in or near Hillsdale County, which is in the southernmost tier of Michigan counties. Criteria for their selection were that they were male heads of households which had never been broken through death or separation, that they were actively operating a farm, and that they had either at one time received a Farmers Home Administration loan or were similar to a family which had received an FHA loan. The selection process thus resulted in a group homogeneous with respect to family status, occupation, sex, locale, and age in that all were in the productive years of their lives.

They were interviewed with a schedule of

* Project Director for Driver Behavior Research, New York State Department of Public Works, Albany 1, N. Y.

This study was made while the writer was Instructor in Research (on leave) in the Department of Foods and Nutrition, Michigan State University, East Lansing, Michigan. The project of which this work is a part was partially financed by a grant from the Michigan Rehabilitation Corporation.

questions in their homes during the summer of 1950, which meant seasonal factors influencing diet were kept constant. Dietary information was obtained using the 24-hour recall technique. This had the advantages of securing the co-operation of every respondent and of permitting everyone to remember his intake easily and accurately. The 24-hour period was the entire day prior to that of the interview, a modification of the technique utilized by Ohlson and others.^{1,2} An approximately equal number of diets were obtained for each day of the week.

Eight different social characteristics were chosen for comparison with food intake. Four of the characteristics were measured by utilization of scales, and the remaining were obtained by direct questioning. Scales were used for (1) participation in community organizations, (2) informal visiting, (3) level of living, and (4) health.

For *organizational participation*, the scale consisted of questions of membership, attendance, and committee or officer posts held in organized groups such as Farm Bureau, church, political parties, and others during the year prior to the interview. Financial contributions to associations and public offices occupied were also recorded. The sum of points given for each answer was the operational definition of organizational participation.

The scale for *informal participation* consisted of points for type and frequency of visiting with friends and relatives on occasions such as dinners, evening gatherings, auctions, or sports.

The *level of living* scale was composed of questions about possession of household goods and conveniences.

Health was operationally defined as number of symptoms a man said he had during the six months prior to the interview. The Symptoms Schedule used had been developed and validated by a team of social scientists and

physicians. It was made up of items such as unexplained tiredness, persistent headache, repeated vomiting, and other symptoms considered to be indicative of present or potentially serious ailments.³

Income, years of schooling, size of household, and age were ascertained by direct inquiry. Income was gross amount earned by the family during 1949, and many respondents answered the question by showing the interviewer their income tax return for that year. Years of schooling was amount of formal training received, and size of household was the number of persons who ate together, a definition similar to the one used by Eppright (Ref. 4, p. 909).

In analysis of interview data, diet records were translated into number of calories, milligrams of ascorbic acid, and grams of calcium, using a Department of Agriculture table.⁵ The number of different foods were counted to indicate the variety of the menu. These data, along with measurements of the eight characteristics of the men, were punched on Holerith cards and tabulated by machine.

Comparisons of the four dietary measures with each of the eight characteristics were made initially in 32 marginal tables. The 32 comparisons were tested for association by coefficient of correlation using procedures for grouped data as a general guide (Ref. 6, pp. 673-678). Significance of r was determined with the use of Edward's Table D (Ref. 7, p. 331). Where other survey material pointed to the possibility that association between dietary and other factors might be curvilinear rather than linear, a second test was made with correlation ratio, adapted from methods presented in Croxton and Cowden (Ref. 6, pp. 721-727). The test of significance used for η was epsilon-square, according to the formula:

$$\epsilon_{yz}^2 = \frac{\eta_{yz}^2 (N - 1) - (k - 1)}{N - k}$$

and Table F in Edwards (Ref. 7, pp. 232; 339).

DISCUSSION OF FINDINGS

The major hypothesis of the study was that an association exists between diet and the eight characteristics measured. For each of the dietary measures and the sociological characteristics, working hypotheses were formulated and tested. Discussion of these findings are arranged by the eight factors and all results are

summarized in Table I, which also includes mean dietary values for the men.

Diet and Organizational Participation

Men who are active in the formal organizational life of a community have different experiences than those who are not, and these differences may extend to their attitude and behavior concerning food. The men more active in community associations were found to have diets containing greater amounts of calcium and a greater variety of foods than those who participated less.

Diet and Informal Participation

In a setting where people are together for relaxation rather than working for some formal goal, there can be a free exchange of news, ideas, and information, and there can be a re-enforcement or alteration of individual values. It is a situation in which patterns of food intake can be influenced both through discussion and through what is served during the visits. In their study of southern rural regions, Cussler and DeGive⁸ found family dinners and informal visiting to be important in dissemination of ideas about content and preparation of meals, as well as in sharing out-of-the-ordinary foods. The leading role played by a neighbor or relative in suggesting new methods of preparation, and experiences with different foods through visiting in a rural area was pointed out by Dickens.⁹ For the 184 Michigan farmers, however, there was no linear relationship between amount of visiting done and diet, as indicated by the low r 's in Table I.

Diet and Level of Living

In this investigation, the level of living score was regarded as a mirror of ability to possess goods and services valued by members of this society. In a real sense, it is the interpretation of income in terms of values and aspirations of a family which is related to their position within the society. Measures of social position, somewhat analogous to the concept of level of living, were utilized in a United States and a French study. In both instances diets were found to vary in quality and quantity at different levels of the social structure.^{10,11}

TABLE I

Summary of Statistical Tests of Relationship of Four Dietary Measures and Eight Sociological Characteristics, as well as Group Dietary Means, for 184 Michigan Farmers

Sociological characteristic and statistical test used	Results with respect to dietary measures			
	Calories	Ascorbic acid mg.	Calcium g.	Number of foods
Organizational participation				
Correlation coefficient	+0.093	+0.113	+0.195*	+0.161*
Informal participation				
Correlation coefficient	+0.002	+0.005	+0.021	+0.089
Level of living				
Correlation coefficient	+0.056	+0.064	+0.087	+0.021
Correlation ratio	0.95*	0.89*		
Income				
Correlation coefficient	+0.002	+0.127	+0.117	+0.078
Correlation ratio	0.31**	0.25	0.32**	
Schooling				
Correlation coefficient	-0.016	+0.090	+0.221*	+0.124
Correlation ratio	0.13			
Household size				
Correlation coefficient	+0.057	-0.094	+0.095	-0.144
Correlation ratio		0.26	0.45*	0.54*
Age				
Correlation coefficient	-0.227*	-0.001	-0.196*	-0.063
Health (number of symptoms)				
Correlation coefficient	-0.114	+0.002	-0.219*	-0.016
Means for the 184 men	3,510	139	1.33	17.6

* Significant at 1% level.

** Significant at 5% level.

At different levels of living for the Michigan group, diet was found to vary with respect to calories and ascorbic acid content, as shown by the highly significant correlation ratios. Level of living and grams of calcium and level of living and number of foods, however, were not found to be related.

Diet and Income

The most common comparison in American and European dietary surveys has been of food intake with income. The frequency of this comparison is not unexpected, since money is an important gauge of many characteristics of Western society. A few findings from the surveys most nearly pertinent to the present investigation can be cited.

The diets of United States farm families, sampled April to June 1942, were shown to have increased energy value and then to diminish in calories as income went up.¹² Eighty-one Tennessee farm families who spent more for food had a greater caloric intake than those spending less.¹³ Rising income of Georgia

and Ohio farm families was associated with a greater energy value of their diets.¹⁴

For the 184 men reported in this study, the relationship between income and calories paralleled that of the sample of United States farm families in being curvilinear.

Among the surveys showing a change in vitamin C intake at different income levels was one carried out on a nation-wide sample by Gallup and his staff,¹⁵ who reported that the proportion of diets lacking vitamin C was highest in the low income class and lowest in the top income group. Georgia farm families were able to have a greater ascorbic acid intake with rising income, but for the Ohio farm group, ascorbic acid content went from 115 mg to 100 mg, 106 mg, 130 mg, and 140 mg as annual income rose from under \$494 to over \$2995.¹⁴ A somewhat different result was reported in the 1942 United States study where average daily intake for farm dwellers was 110 mg, 120 mg, 155 mg, 145 mg, and 124 mg as income increased.¹² More money was spent for food

by Groton Township, New York, farm families than others in the survey, and they had a higher nutrient usage which included vitamin C (Ref. 16, p. 670).

No relationship between income and ascorbic acid intake was found for the Michigan farm operators, as indicated by the low r 's and η 's in Table I. This may be the consequence of summer availability of fresh fruits and vegetables to all the men irrespective of income.

Because milk and milk products are the most important sources of calcium in American diets, survey data concerning grams of calcium as well as amount of milk present in menus were useful as background for the present study. Comparisons of amount of this mineral in the food intake of Georgia and Ohio farm families showed slight increases in calcium with rising income.¹⁴ Rising income of United States farm families was found to be associated with a calcium intake of 1.2 g, 1.3 g, and 1.4 g.¹² With increasing income among an Iowa group, no consistent tendency was found for a greater proportion of diets to be satisfactory in milk (Ref. 4, p. 886). The middle and upper income levels in Gallup's study were similar in consumption of milk and cheese, and a smaller percentage of their diets lacked these foods than occurred in the lowest income class.¹⁵ Results similar to the Georgia and Ohio study were found with respect to milk available for drinking among Tennessee families, where those spending more for food than others used more milk.¹³

The relationship between income and calcium intake for the Michigan farmers was significant and nonlinear.

The number of different foods present in a food record has not often been used as a measure of diet. In one of two studies in which this was considered, it was observed that amount and quality of family food depended on income, with those having a greater income able to have more kinds and a greater quantity of food.¹⁷ Lewis found the correlation between diet and wealth to be a positive one in the village of Tepoztlan, in that all wealthier families had larger meals with a greater variety of foods throughout the year than was noted in other families (Ref. 18, p. 189).

Although it was expected that among the 184 men having higher incomes the number of foods would be greater, no significant existence of linear relationship was found.

Diet and Schooling

As with the comparisons of life-situation factors and diets just discussed, there was no plethora of similar studies to draw upon as a basis for hypothesis formulation and discussion concerning relationship of schooling and food intake. In three surveys in which education was considered in relation to diet, the results were suggestive, but not similar to each other. Education and the degree of acculturation were reported as beginning to create real differences in the diet of the Tepoztlan population in terms of eating new and out-of-season foods (Ref. 18, p. 9). Use of multiple correlation in her study showed Mack that one-half of the variation in dietary choice by families was determined by a combination of education and food expenditures, with family education having twice as much influence as the other in food selection.¹⁹ In Groton Township, however, no apparent relationship was found between average nutrient availability and formal education of either husband or wife (Ref. 16, p. 873).

The only significant relationship between diet and schooling for the Michigan farm operators was that as the number of years of schooling rose, the calcium intake of the men increased.

Diet and Size of Household

The basic assumption in comparing household size to the diet of the father is that the content of his meal may be affected by how many there are for whom food must be purchased and prepared. A wife cooking for two may not use the same type of foods and methods of preparation that cooking for three or more might require, especially if the additional household members are children. In addition to exerting a possible influence on meal preparation, household size is associated with position in the social structure. Although not stated in this fashion, the findings in a number of diet studies of changing food intake with different family size reflect, in part



at least, what would happen to an American primary family as it had less and less to spend for food.^{14,20,21} In other words, it may not be family size *per se* which is of significance, but rather the association of family size with other factors in the social milieu which are important in determining the food reaching the table.

Findings from the present study indicated that the relationship of diet and household size was not a linear one, although the r of minus 0.144 for household size and number of foods approached the five per cent level of significance. Instead, two highly significant η 's showed that differences in household size were related in a curvilinear fashion to changes in calcium intake, as well as to number of foods in the diet of the head of the household.

Diet and Age

Differences in diet according to age level have been reported in a number of investigations. In the Groton Township study, as the age of the men increased from 21 to 69 years, the caloric content of their diets tended to decrease, but in the 70 years and over age range, there was a slight increase. Ascorbic acid intake showed a decrease with age except in the 50-59 years category, in which there was a slight increase. The amount of calcium in the diet, highest in the 21-29 year class, became irregularly less in the succeeding age groups, the men 70 and over having an intake almost as high as the youngest group.²² It has been reported that male aircraft workers under age 25 tended to eat more citrus fruit and to drink more milk than those who were older.²³ Iowans of age 17 to 19, and 46 to 58 ate similar amounts of citrus fruits and tomatoes, but the proportion of the younger age group having diets satisfactory with respect to milk was almost three times that of the older age group (Ref. 4, p. 886). In a study of women in Michigan, calcium intake was found to decrease in successive age decades.²⁴

For the 184 men studied, the amounts of calories and calcium in their diets decreased as age increased, which parallels the results of investigations just cited. The lack of a significant relationship of age and intake of ascorbic acid is also similar to the other findings.

Diet and Health

Although health is usually defined in physiological terms, in a real sense it is tied in with a person's general way of life. The physical well-being of an individual is a cumulative result of many environmental factors such as occupation, values, and knowledge centered on health practices, social stress, availability of medical and dental care, and behavior concerning diet. In this study, with the factors of occupation and availability of health care more or less similar for all the men, the comparison of health to dietary practices is a meaningful one. It was found that farm operators having the "best health" (smallest number of symptoms) had the highest amounts of calcium in their meals. This result has to be interpreted in the light of the significant relationship of calcium and age. The younger men, who also might be expected to be healthier, had higher intakes of calcium than the others. The factors of age and relative health are probably not unrelated for this group. The data can also be compared with those from Iowa where no significant differences were found in the type of menus among people having many or few health complaints (Ref. 4, p. 959).

SUMMARY AND CONCLUSIONS

In this study of 184 Michigan farmers, the 24-hour recall record of diet was translated into number of calories, milligrams of ascorbic acid, grams of calcium, and number of different foods, for comparison with each of eight measures of their social milieu. In 12 of the 32 comparisons, statistical support was given to the general hypothesis that an association exists between food intake and social environment.

It was found that men who participated more in organized community activities had higher intakes of calcium and a greater variety of foods in their meals than those who were less active. Significant linear relationships were also found for calcium and schooling, age, and health, which meant that the more schooling the men had, and the younger and more healthy they were, the greater was the amount of calcium in their diets. Younger men also had diets of higher energy value than the older men.



The tests indicated that as level of living and income for the group changed, this was accompanied by differences in the amount of calories in their food. The ascorbic acid content of diet also changed with different levels of living. Variations in income were associated with changes in caloric and calcium intake, and variations in household size with changes in calcium and number of foods appearing in the records.

The lack of any linear correlation between ascorbic acid and the eight social factors may reflect the availability of fresh foods high in vitamin C to all of these men in the summer months when they were interviewed. Such availability seemed to be true whether they were young or old, active in organizations or not, living in large or small households, and the like. It is possible that further significant correlations between dietary and social factors would exist in other groups of men and that they did not show up here because this group was relatively homogeneous.

ACKNOWLEDGMENT

The suggestions of Dr. Margaret A. Ohlson, Head of the Department of Foods and Nutrition, and Dr. Charles P. Loomis, Head of the Department of Sociology and Anthropology, Michigan State University, are appreciated. Dr. Duane L. Gibson, Professor of Sociology and Anthropology, Michigan State University, gave important help during the course of the work which is gratefully acknowledged.

REFERENCES

1. OHLSON, M. A., ROBERTS, P. H., JOSEPH, S. A., and NELSON, P. M.: Dietary practices of 100 women from 40 to 75 years of age. *J. Am. Dietet. A.* 24: 287, 1948.
2. YOUNG, C. M., CHALMERS, F. W., CHURCH, H. N., CLAYTON, M. M., GATES, L. O., HAGAN, G. C., STEELE, B. F., TUCKER, R. E., WERTZ, A. W., and FOSTER, W. D.: Cooperative nutritional status studies in the Northeast region. III. Contributions to dietary methodology studies. *Univ. of Mass. Agr. Exper. Sta. Bull.* No. 469, 1952.
3. HOFFER, C. R., GIBSON, D. L., LOOMIS, C. P., MILLER, P. A., SCHULER, E. A., and THADEN, J. F.: Health needs and health care in Michigan. *Mich. State Coll. Agr. Exper. Sta. Spec. Bull.* No. 365: 86-88, 1950.
4. EPPRIGHT, E. S.: Food habits and preferences. A study of Iowa people of two age groups. *Iowa State Coll. Agr. Exper. Sta. Res. Bull.* No. 376, 1950.
5. WATT, B. K., MERRILL, A. L., ET AL.: Composition of foods—raw, processed, prepared. *U. S. D. A. Agr. Handbook* No. 8, 1950, Table 3.
6. CROXTON, F. E., and COWDEN, D. J.: *Applied General Statistics*, Prentice-Hall, Inc., New York, 1939.
7. EDWARDS, A. L.: *Statistical Analysis*, Rinehart and Co., Inc., New York, 1946.
8. CUSSLER, M., and DEGIVE, M. L.: *'Twiixt the Cup and the Lip. Psychological and Socio-cultural Factors Affecting Food Habits*, Twayne Publishers, New York, 1952, pp. 62; 68-70; 82; 125.
9. DICKENS, D.: Food preparation of owner and cropper farm families in the Shortleaf Pine area of Mississippi. *Social Forces* 22: 61, 1943.
10. Family food consumption in three types of farming areas of the South. II. An analysis of weekly food records, late winter and early spring, 1948: *Southern Coop. Series Bull.* No. 20: 126, 1951.
11. TRÉMOLIÈRES, J., ET AL.: Enquête sur l'alimentation des familles nombreuses à Marseille en rapport avec le niveau socioéconomique. *Bull. Inst. nat. Hygiène* 8: 89, 1953.
12. Family food consumption in the United States, spring 1942: Washington, D. C., *U. S. D. A. Misc. Pub.* No. 550: 130, 1944.
13. BONSER, H. J., and TONTZ, R. L.: Food consumption by farm families near Douglas Reservoir. *Agr. Exper. Sta. Rural Res. Series Monograph* No. 160 (mimeo): iii, 1943.
14. ADELSON, S. F., and BLAKE, E. C.: Diets of families in the open country. A Georgia and an Ohio county, summer 1945. *U. S. D. A. Misc. Pub.* No. 704: 35, 1950.
15. GALLUP, G.: Average American eats unwisely according to a survey by Gallup. (Report from Am. Inst. Public Opinion.) *New York Times* 16, February 8, 1943.
16. WILHELMY, O., JR., YOUNG, C. M., and PILCHER, H. L.: Nutritional status survey, Groton Township, New York. III. Nutrient usage as related to certain social and economic factors. *J. Am. Dietet. A.* 26: 868, 1950.
17. HERSKOVITS, M. J., and HERSKOVITS, F. D.: *Trinidad Village*, Alfred A. Knopf, New York, 1947, pp. 37-42.
18. LEWIS, O.: *Life in a Mexican Village: Tepoztlan Restudied*, Univ. of Ill. Press, Urbana, 1951.
19. MACK, P. B., SMITH, J. M., LOGAN, C. H., O'BRIEN, A. T., and SMITH, O. S.: Human nutrition research and improvement in mass nutrition status. *Penn. State Coll. Bull.* No. 36. *E. H. Richards Inst. Res. Ser. Pub.* 1: 9, 1942.
20. TRULSON, M., OGLE, J., and STARE, F. J.: New York State nutrition survey. III. A study of one week's food purchases of 135 families. *J. Am. Dietet. A.* 25: 768, 1949.



21. STRAUSS, M. D., and REYNOLDS, M. S.: Dietary practices versus food expenditures in families receiving public assistance. *J. Am. Dietet. A.* 24: 491, 1948.
22. YOUNG, C. M., and PILCHER, H. L.: Nutritional status survey, Groton Township, New York. II. Nutrient usage of families and individuals. *J. Am. Dietet. A.* 26: 779, 1950.
23. WIEHL, D. G.: Diets of a group of aircraft workers in southern California. *Milbank Mem. Fund Quart.* 20: 364, 1942.
24. OHLSON, M. A., JACKSON, L., BEEGLE, R. M., DUNSING, D., and BROWN, E. C.: Utilization of an improved diet by older women. *J. Am. Dietet. A.* 28: 1142, 1952.

Human Ecology

“... Unlike our ancestors who had to consider only one problem, we in the medical profession must now recognise that developments in the preventive and curative fields can no longer be worked out in isolation. They must be considered in the broad perspective of the economic and human resources of the area, country or continent; the physical resources, including power and water; the level of education of the people concerned; and, above all, the ability to feed the people and maintain a high standard of nutrition.

“In all of these subjects basic research is required, for we know relatively little about soil and soil fertility, and next to nothing about the long-term availability of natural resources. Indeed, we do not yet really know the true facts about the population of the world and its mortality and morbidity. We are also, as yet, grossly ignorant of the factors which make for human happiness and peace of mind, and it is in this field of mental health and well-being that the greatest contribution remains to be made.

“Human ecology is regarded by some people as a way of thinking or a philosophy of life, but I would prefer that it should also be a method of approach whereby a number of experts combine to work out problems which would otherwise remain unsolved. Many of the basic problems relating to disease in the individual have now been solved, and in their place have come the problems of the community.”

—A. Leslie Banks. *Med. Press* 234: 229, 1955.

