

NUTRITIONAL STATUS OF SELECTED POPULATION GROUPS IN OREGON

I. FOOD HABITS OF NATIVE BORN AND REARED SCHOOL CHILDREN IN TWO REGIONS¹

CLARA A. STORVICK, BERNICE SCHAAD, RUTH E. COFFEY
AND MARY B. DEARDORFF²

NUMEROUS studies have been made on the food habits of various population groups. These have led to the accumulation of valuable data which have revealed racial, national, and regional dietary patterns as well as dietary excesses and deficiencies. Reference will be made to the reports of some of the studies in the discussion of the results of the investigation to be reported in this paper.

From February 15 to May 4, 1948, an investigation was made of the nutritional status of population groups in selected areas of Oregon. This investigation included the following phases: studies on dietary habits, examination of the teeth (Hadjimarkos and Storvick) (1), bacteriological and chemical tests on the saliva (Sullivan and Storvick) (2), biochemical tests on the blood, physical inspections for signs of nutritional deficiencies (not yet published), and analyses of public water supplies for fluorine and total hardness (Storvick and Sullivan) (3).

This paper is a report of dietary studies on population groups in the Coast and Central Oregon Regions. Two counties

¹ From the Oregon Agricultural Experiment Station and the School of Home Economics, Oregon State College.

This study was a part of the Western Regional Research Project on Nutritional Status of Population Groups in Selected Areas of Oregon with the cooperation of the Oregon Agricultural Experiment Station. It was financed in part from funds appropriated under the Research and Marketing Act of 1946. The cooperation and assistance of the Bureau of Human Nutrition and Home Economics, United States Department of Agriculture and the United States Public Health Service is acknowledged.

² Dr. Clara A. Storvick, Department of Foods and Nutrition, Oregon State College; Bernice Schaad, Dietary Department, Emanuel Hospital, Portland, Oregon; Ruth E. Coffey, Food Service, University of Oregon; and Mary B. Deardorff, Portland, Oregon.

were selected in each Region: Clatsop and Coos in the Coast Region and Deschutes and Klamath in the Central Oregon Region. These counties, which represent two widely different agricultural and climatic areas in Oregon (Hadjimarkos, Storvick and Sullivan) (4), were chosen because they were more densely populated than the others in those regions as well as the fact that they had well-organized County Health Departments.

MATERIAL AND METHODS

The subjects selected for this study were 14, 15 and 16 year old school children. Since one of the aims of the investigation was to determine whether or not geographic location was a factor in the nutritional status of the children, only those children who were native born and reared were included in the study. The method of Dean and coworkers (5) was followed closely for the acceptance of a child in this classification. He was so classified if, during the first eight years of his life, no break had occurred in continuity of residence within his native county which totaled more than one month in any calendar year, and also if after his eighth birthday and up to the time of the study he had not been absent from the county for a length of time which totaled more than three months in any calendar year.

The school nurses and/or teachers assisted in determining the eligibility of the children for the study, and each child who met the requirements was given a printed form with a brief statement regarding the nature of the study and a place for the parent's signature if he was willing to give consent for his child to participate in the study. The final arrangements and examination schedules were made by a public health nurse who was on the Regional staff. Children were scheduled for examinations at the rate of twenty-four per day and each child was at the research center for a period of two to two and one-half hours.

Three hospital-trained dietitians were responsible for col-

lecting and evaluating the data on food habits. They collaborated with the Regional Committee³ on Dietary Studies in the preparation of a form for recording dietary information and in the discussion of methods by which such information could best be obtained and evaluated under the conditions of this study.

A combination of the record of a 24-hour food intake and dietary history based on a check list, was used to obtain information on food habits. Each child was given a form (Fig. 1, Appendix I) which included instructions and space for him to record his food intake for a 24-hour period. This also made him aware of the dietary aspect of the study. The dietary history (Fig. 2, Appendix I) was taken by one of the dietitians the next day, and was an attempt to obtain an overall picture of the child's eating habits by asking him what his customary consumption was in terms of servings per day or week, of the foods included on the check list. The 24-hour food intake as recorded by the child was used by the dietitian only as a guide and check on the information obtained during the interview; e.g., on the consumption of individual foods as well as such items as candy, carbonated beverages and supplements.

All diet evaluations were based on the information obtained through the use of the check list but vitamin supplements were not included. The diets were evaluated for the following nutrients: calcium, iron, protein, vitamin A value, ascorbic acid, thiamine, riboflavin and niacin using the Food Value Tables for the Calculation of Diet Records (United States Public Health Service) (6), Food Sources of Seven Nutrients (Boyd and Eads) (7) and Food Values of Portions Commonly Used (Bowes and Church) (8). Levels of adequacy were those recommended by the Food and Nutrition Board of the National Research Council (9). The standards used for judging the dietaries, with the classification according to level of intake of each nutrient expressed as adequate = 1, borderline

³ Appreciation is expressed to Miss Helen Walsh, Nutritionist, California State Department of Health for serving on this Committee.

= 2 and deficient = 3, are shown in Table 1. A score of 1 in-

Table 1. Standards for judging dietaries.

SCORE	1 (Adequate)	2 (Borderline)	3 (Deficient)
<i>Protein</i>			
Girls 13-15	80 gms.	79-50	less than 50
Girls 16-20	75	74-50	less than 50
Boys 13-15	85	84-55	less than 55
Boys 16-20	100	99-65	less than 65
<i>Calcium</i>			
Girls 13-15	1.3 gms.	1.2 -0.8	less than 0.8
Girls 16-20	1.0	0.99-0.6	less than 0.6
Boys 13-20	1.4	1.3 -0.9	less than 0.9
<i>Iron</i>			
All	15 mg.	14-10	less than 10
<i>Vitamin A Value</i> —Judgment needed as to whether main supply is as carotene or vitamin A. ¹			
Girls 13-20	5,000 I.U.	4,999-3,300	less than 3,300
Boys 13-15	5,000	4,999-3,300	less than 3,300
Boys 16-20	6,000	5,999-4,000	less than 4,000
<i>Thiamine</i>			
Girls 13-15	1.3 mg.	1.2-0.8	less than 0.8
Girls 16-20	1.2	1.1-0.8	less than 0.8
Boys 13-15	1.5	1.4-1.0	less than 1.0
Boys 16-20	1.7	1.6-1.2	less than 1.2
<i>Riboflavin</i>			
Girls 13-15	2.0 mg.	1.9-1.3	less than 1.3
Girls 16-20	1.8	1.7-1.2	less than 1.2
Boys 13-15	2.0	1.9-1.3	less than 1.3
Boys 16-20	2.5	2.4-1.7	less than 1.7
<i>Niacin</i>			
Girls 13-15	13 mg.	12-8	less than 8
Girls 16-20	12	11-8	less than 8
Boys 13-15	15	14-10	less than 10
Boys 16-20	17	16-12	less than 12
<i>Ascorbic Acid</i>			
Girls 13-15	80 mg.	79-53	less than 53
Girls 16-20	80	79-53	less than 53
Boys 13-15	90	89-60	less than 60
Boys 16-20	100	99-66	less than 66

¹ See Recommended Dietary Allowances, National Research Council Reprint and Circular Series, No. 129, October 1948, p. 10-11. (9)

indicated that the recommended allowances of the National Research Council were met, a score of 2, that approximately 67 through 99 per cent of those allowances were met and a score of 3, that less than 67 per cent of those allowances were met.

Other information obtained by the dietitian was the use of medicines, laxatives and vitamin preparations. The consumption of candy and carbonated beverages was of interest not only to the dietitian but also to the dentist since concentrated sweets and carbonated beverages have been reported to be conducive to dental decay (Michigan Workshop) (10). Since school lunch programs were active in all four counties, each child was asked what type of lunch he had, i.e., whether he carried his lunch from home, went home for it, ate in a commercial restaurant or in the school cafeteria. To facilitate the taking of the dietary histories, each child was asked whether or not his family had a garden or frozen food locker.

RESULTS

In the four counties selected there was a total of 4,410 children between the ages of 14 through 16, of whom 1,225, or 27.7 per cent, were eligible for the study. All of the children who obtained parental consent were included in this investigation, i.e., 766, or 62.7 per cent of those eligible.

For the sake of homogeneity of the sample the results on white children, only, are included, or 756 of the 766 children examined. Dietary histories on 17 of the children were excluded since they were not considered valid. Therefore, this discussion will be based on the results obtained on 739 children.

Table 2 shows for each county and region the per cent of children eligible for the examination and the per cent by sex, in the three age groups combined, for the 739 children whose dietary histories will be discussed in this paper.

The distribution, by age and sex, of the children examined in the four counties is shown in Table 3.

Table 4 presents the mean weekly food consumption, by sex, of 739 Oregon school children. For the preparation of this

table, certain items were omitted from the check list because (1) they could not be interpreted uniformly in terms of servings, e.g., prepared meat, butter and peanut butter, or (2) because there was insufficient information about them (strawberries, tomatoes, and cantaloupe were out of season and the youngsters could not estimate their consumption of these foods).

An inspection of the table reveals that the most outstanding differences in food intake were the greater quantities con-

Table 5. Per cent of children in the two regions with corresponding scores for each of eight nutrients.

NUTRIENT	SCORE ¹	COAST REGION Per Cent	CENTRAL OREGON REGION Per Cent	BOTH REGIONS Per Cent
Calcium	1	65.3	65.4	65.4
	2	21.1	20.2	20.7
	3	13.6	14.4	13.9
Iron	1	41.0	40.1	40.6
	2	36.2	40.7	38.2
	3	22.8	19.3	21.2
Protein	1	70.2	71.6	70.8
	2	26.9	23.9	25.6
	3	2.9	4.6	3.7
Vitamin A Value	1	82.8	80.4	81.7
	2	13.8	15.9	14.7
	3	3.4	3.7	3.5
Ascorbic Acid	1	45.4	40.1	43.0
	2	29.9	35.8	32.5
	3	24.5	24.2	24.5
Thiamine	1	66.0	69.4	67.5
	2	28.9	24.8	27.1
	3	5.1	5.8	5.4
Riboflavin	1	78.2	74.9	76.7
	2	15.3	15.9	15.6
	3	6.7	9.2	7.7
Niacin	1	65.5	63.3	64.5
	2	29.4	28.4	29.0
	3	5.1	8.3	6.5

¹ 1 = adequate, 2 = borderline, 3 = deficient.

sumed by the boys of milk, eggs, potatoes, bread, cereals in general, pies, cakes and cookies, and sweets. The girls, on the other hand, ate slightly more vegetables and fruits than did the boys.

To meet the higher requirements of the National Research Council recommended allowances (Table 1), boys would, of necessity, need to consume more foods than would girls of comparable age to maintain an optimum nutritional level. Though the above-mentioned differences in food consumption would indicate that, on the whole, the boys might be expected to be in a better state of nutrition than the girls, it was desirable to evaluate the food intake in terms of nutrients for a more complete picture of the probable adequacy of the diet.

A general picture of the nutritive value of the diets, in terms of eight nutrients: calcium, iron, protein, vitamin A value, ascorbic acid, thiamine, riboflavin and niacin, for the children studied in both regions is shown in Table 5. It is apparent that over 60 per cent of the children had diets which were adequate in all of the nutrients except iron and ascorbic acid. For the last mentioned nutrients, 40.6 and 43.0 per cent, respectively, of the children had adequate intakes. Less than 10 per cent of the children had diets which were classified as inadequate in five of the eight nutrients. For the other three nutrients, calcium, iron and ascorbic acid, 13.9, 21.2, and 24.5 per cent, respectively, had diets which were rated inadequate.

Table 5 also shows the per cent of the children in each of the two regions with corresponding scores for eight nutrients. Without exception, a striking similarity in the distribution of the scores in the two regions is noted.

When the data on level of intake of each nutrient were classified according to age and county, no consistent differences were noted. Likewise, when the data were classified according to level of intake of each nutrient for each county for the three ages combined, no differences were noted.

Sex differences in nutrient score are very marked (Table 6). A higher per cent of boys had dietaries which scored 1 in all

Table 6. Per cent of boys and girls in each county with corresponding scores for each nutrient.

NUTRIENT	SCORE	CLATSOP COUNTY		COOS COUNTY		DESCHUTES COUNTY		KLAMATH COUNTY	
		Boys Per Cent	Girls Per Cent	Boys Per Cent	Girls Per Cent	Boys Per Cent	Girls Per Cent	Boys Per Cent	Girls Per Cent
Calcium	1	80.9	59.3	71.5	50.9	83.8	54.1	73.3	60.0
	2	11.2	22.1	15.4	34.2	10.8	27.0	18.8	20.0
	3	7.9	18.6	13.0	14.9	5.4	18.9	7.9	20.0
Iron	1	46.1	18.6	71.5	21.1	70.3	27.0	61.4	20.0
	2	28.1	43.0	22.0	52.6	21.6	44.6	31.7	52.2
	3	25.8	38.4	6.5	26.3	8.1	28.4	6.9	27.8
Protein	1	77.5	65.1	80.5	57.0	89.2	62.2	81.2	63.5
	2	21.3	31.4	18.7	36.8	5.4	32.4	17.8	29.6
	3	1.1	3.5	0.8	6.1	5.4	5.4	1.0	7.0
Vitamin A Value	1	80.9	79.1	90.2	78.9	86.5	78.4	84.2	76.5
	2	12.4	15.1	9.8	18.4	13.5	18.9	15.8	14.8
	3	6.7	5.8	0.0	2.6	0.0	2.7	0.0	8.7
Ascorbic Acid	1	28.1	54.7	42.3	55.3	37.8	50.0	33.7	40.0
	2	37.1	30.2	28.5	25.4	37.8	32.4	38.6	34.8
	3	34.8	15.1	29.3	19.3	24.3	17.6	27.7	25.2
Thiamine	1	70.8	55.8	81.3	53.5	86.5	67.6	74.3	60.9
	2	27.0	39.5	16.3	36.0	10.8	24.3	20.8	33.0
	3	2.2	4.7	2.4	10.5	2.7	8.1	5.0	6.1
Riboflavin	1	88.8	74.4	87.8	62.3	91.9	66.2	83.2	67.8
	2	7.9	18.6	8.1	26.3	5.4	18.9	10.9	21.7
	3	3.4	7.0	4.1	11.4	2.7	14.9	5.9	10.4
Niacin	1	64.0	59.3	79.7	56.1	86.5	58.1	72.3	51.3
	2	31.5	33.7	17.1	37.7	10.8	31.1	18.8	40.9
	3	4.5	7.0	3.3	6.1	2.7	10.8	8.9	7.8

	COAST		CENTRAL OREGON	
	Clatsop	Coos Per Cent	Deschutes Per Cent	Klamath Per Cent
Gardens	— ¹	75.9	73.9	69.0
Frozen food lockers	— ¹	45.6	67.6	70.4

¹ Data for Clatsop County were not obtained.

Table 7. Per cent of children in three counties in two regions whose families had gardens and lockers.¹

of the nutrients except for ascorbic acid, in which case a higher per cent of girls had dietaries which scored 1. As the dietitians were interviewing the children they were very aware that the girls had a greater interest in fruits and vegetables than did the boys. The sex differences in vitamin A value were not as marked as for the other nutrients but in three of the counties none of the boys had dietaries which scored 3 in vitamin A value.

The data obtained regarding gardens are shown in Table 7 and reveal that a remarkably high per cent of the children came from families who had gardens. The common use of frozen food lockers is apparent in the same table.

Information regarding the types of lunches which the children had is summarized in Table 8. The data show that the highest per cent of children in Coos County carried their lunches, whereas in Deschutes County the majority of them

Table 8. Per cent of children in three counties in two regions classified according to type of lunch.¹

TYPE OF LUNCH	COAST		CENTRAL OREGON	
	Clatsop	Coos Per Cent	Deschutes Per Cent	Klamath Per Cent
Carry	— ¹	48.5	30.6	23.6
Home	— ¹	16.0	53.2	16.7
School Cafeteria	— ¹	13.5	1.8	36.6
Downtown	— ¹	5.1	6.3	9.3

¹ Data for Clatsop County were not obtained.

COUNTY	CANDY ¹				
	Mean Consumption Serv/Week	Range Serv/Week	Distribution of Consumption		
			Less than 1 Serv/Day Per Cent	One Serv/Day Per Cent	More than 1 Serv/Day Per Cent
Clatsop	4.4	0-32	75	15	10
Coos	4.8	0-23	65	20	14
Deschutes	3.5	0-17	81	11	8
Klamath	4.2	0-23	78	12	10
CARBONATED BEVERAGES ²					
Clatsop	3.4	0-14	82	15	3
Coos	3.7	0-42	81	11	8
Deschutes	2.9	0-14	85	13	3
Klamath	2.7	0-21	88	9	3

¹ One candy bar constitutes one serving.

² 6 oz. constitutes one serving.

Table 9. Mean consumption of candy bars and carbonated beverages together with their ranges and distribution of consumption for 739 school children of Oregon.

went home for lunch and in Klamath County the highest per cent of the children ate in the school cafeteria. In all counties, the per cent of the children who ate their lunches downtown was small.

The mean weekly consumption of candy bars and carbonated beverages together with their ranges and the distribution of consumption, are shown in Table 9. Although the data show

Table 10. Per cent of children in each region who took vitamin preparations, laxatives and/or medicines.

SUPPLEMENTS	COAST Per Cent	CENTRAL OREGON Per Cent
Vitamin Preparations	32.0	19.0
Laxatives	7.5	11.9
Medicines	23.1	19.9

that the consumption of these items was higher in the Coast Region than in the Central Oregon Region, it is doubtful whether the differences in the mean consumption can be considered physiologically significant.

The information obtained on the use of vitamin preparations, laxatives and medicines for all children for the two regions is shown in Table 10. The Coast Region had a higher per cent

Table 11. Per cent of Oregon and Tennessee children whose dietaries contained less than the recommended allowances of the National Research Council.

NUTRIENT	OREGON Per Cent	TENNESSEE ¹ Per Cent
Calcium	35	87
Iron	59	84
Protein	29	78
Vitamin A Value	18	60
Ascorbic Acid	57	68
Thiamine	33	93
Riboflavin	23	85
Niacin	36	*

* Dietaries not evaluated for niacin.

¹ Data for 113 white adolescents aged 13 to 20 years.

of children taking vitamin preparations and a lower per cent of children taking laxatives. The use of medicines by the children was nearly the same for the two regions.

COMMENTS

The results of a study by Youmans (11) on Tennessee children ranging in age from 13 to 20 revealed that the dietaries of a

high per cent of them did not meet the 1943 Recommended Allowances of the National Research Council (12). Although the Recommended Allowances of 1948 were used in judging the adequacy of the dietaries of the Oregon children, a much smaller per cent of them than of the Tennessee children had dietaries which contained less than the Recommended Allowances (Table 11). The Recommended Allowances of 1943 and 1948 for protein, calcium, iron, vitamin A value and ascorbic acid were the same for these age groups; small reductions were made in 1948 in the Recommended Allowances for thiamine, riboflavin, and niacin for the age group 13 to 20.⁴ If the Tennessee data had been calculated using the 1948 Recommended Allowances, perhaps a smaller per cent of the dietaries might have been below the amounts recommended for these vitamins but there still would be a marked difference in the adequacy of the dietaries of the children of the two states.

⁴ Recommended allowances in 1943 and 1948, respectively, are: thiamine, 1.6 mg. and 1.4 mg.; riboflavin, 2.3 mg. and 2.1 mg.; niacin, 16 mg. and 14 mg.

FOOD	TEXAS		OREGON	
	White Children Serv/Wk	Clatsop County Serv/Wk	Coos County Serv/Wk	Deschutes County Serv/Wk
Cereals (All Kinds)	28.00	52.10	58.89	54.75
Pie, Cake, etc.	5.00	5.97	6.78	6.55
Oats ²	1.67	—	—	—
Milk	15.91	24.50	24.35	24.63
Meat	8.14	7.22	8.37	8.23
Butter ²	5.38	—	—	—
Eggs	3.50	5.31	7.05	5.90
Vegetables				
Irish Potatoes	3.50	6.33	8.25	9.50
Beans (Dry) ³	1.63	1.21	1.51	1.08
Lettuce	1.04	1.28	2.38	2.49
Peas (All Kinds) ²	0.86	—	—	—
Tomato ²	0.85	—	—	—
Sweet Potatoes ⁴	0.74 ¹	2.87	2.48	2.21
Cabbage and Kraut ⁵	—	1.32	1.53	1.44
Greens	—	1.09	0.84	0.96
Fruits				
Apple	2.41	1.89	3.16	2.53
Jam, Jelly, Preserves	1.27	2.02	2.94	4.04
Orange	1.21	3.97	4.50	4.36
Banana	0.89	1.04	1.95	1.70
Grapefruit	0.69 ¹	1.22	0.74	1.04
Citrus Juices ⁶	—	1.90	2.70	2.64
Yellow Fruit ⁶	—	1.32	1.82	1.79
Sweets and Beverages				
Candy	1.79	4.42	4.77	3.49
Syrup and Molasses ⁷	1.25	1.49	1.73	2.11
Cocoa	1.08	3.11	2.53	2.22
Coffee	0.95	3.00	2.05	1.07
Carbonated Beverages ⁶	—	3.36	3.72	2.89

¹ Winter only.² No data available for Oregon children.³ Legumes of all kinds for Oregon children.⁴ Yellow vegetables of all kinds for Oregon children.⁵ Almost no kraut for Oregon children.⁶ No data given for Texas children.⁷ Almost no molasses for Oregon children.

Table 12. Comparison of foods most frequently eaten by Texas school children and Oregon school children. Foods are expressed as average number of servings per week.

	All four Counties Serv/Wk
	54.67
	6.39
	—
	24.86
	7.82
	—
	6.30
	7.70
	1.28
	2.14
	—
	2.48
	1.43
	0.95
	2.61
	2.89
	4.14
	1.73
	0.95
	2.53
	1.63
	4.32
	1.62
	2.54
	2.02
	3.22

The results of the study on the dietary habits of a selected group of Oregon children showed that, on the whole, the nutrient scores of the dietaries for the boys were higher than those for the girls. Trulson, Hegsted and Stare (13) in their studies on adolescent children in New York and Young and Storvick (14) in their study on college freshmen, also observed that the dietaries of the boys were superior to those of the girls as far as nutritive value was concerned. Whitacre (15) on the other hand, in a report of her study on Texas school children, stated that the girls' dietaries were better than those of the boys.

Based on the results of her study on the dietary habits of school children in three regions in Texas, Whitacre (15) reported that there were no pronounced regional differences in dietary habits. Likewise, in this study on Oregon children no regional differences were observed, (Table 12). Surprisingly, the foods which were most commonly eaten by the Texas children were essentially the same for those of Oregon, so that little difference is indicated in the dietary habits between the children of the two states when selection of food items alone is considered. However, as it is shown in Table 12, the average consumption of individual food items by the

white children of the two states was considerably different. Though the average consumption of meat, generally, was about equal for the two groups (no prepared meats were included in the calculations for the Oregon children), Oregon children included more milk, eggs, Irish potatoes, cabbage, fruit, candy, and cereals of all kinds in their diets than did the children of Texas.

When a comparison was made of the results of a study (Moser) (16) on South Carolina children with those obtained in Oregon, it was found that cornmeal and pork were among the most commonly consumed foods in South Carolina. In Oregon pork was regularly included in the diets of the children, but the meat most commonly eaten was beef. Cornmeal was not used to any appreciable extent by Oregon children.

In comparing the results of the studies of Adamson et al., (17) Metcuff et al., (18) and Aykroyd et al., (19) in Newfoundland with those in Oregon the differences in the food intake were both qualitative and quantitative. The children of Newfoundland consumed more fish and potatoes but less milk, meat, fruits, and vegetables than did those of Oregon.

Dietary studies, in spite of all the problems they present, yield valuable information regarding the food habits of population groups and the nutritive value of the dietaries characteristic of certain groups. There is probably no method of obtaining information concerning food habits which is entirely satisfactory for all people under different circumstances and which can be used equally well by all interviewers.

The method which involves weighing every serving of food for a given length of time and analyzing aliquots of those foods for nutritive value give very exact data for that period of study. There is no assurance, however, that such a record is indicative of the customary food intake habits of the individual. The study on Oregon children reported in this paper was an attempt to obtain information on customary food habits. Though it is not as quantitative as the method described above, the results on 739 children gave indications of dietary trends and the per cent of children whose dietaries were adequate, borderline or inadequate in each of eight nutrients for selected population groups in geographic areas on county and regional bases.

The relationship of the results of the dietary studies to the data obtained from physical inspections for signs of nutritional deficiencies, biochemical tests on the blood and dental examinations will be discussed in another paper.

SUMMARY

Native born and reared white school children, in four counties of Oregon representing two geographic regions, were included in a study on food habits. The methods which were used to obtain information regarding the food habits of 739 children, 14, 15 and 16 years of age are described.

The records of food intake were evaluated for each of eight nutrients: calcium, iron, protein, vitamin A value, ascorbic acid, thiamine, riboflavin and niacin. Levels of intake were classified as adequate, borderline or inadequate when compared to the National Research Council recommended dietary allowances. Over 60 per cent of the children had dietaries which were adequate in all of the nutrients except iron and ascorbic acid. Less than 10 per cent of the children had diets which were classified as inadequate in protein, vitamin A value, thiamine, riboflavin and niacin.

No regional, county or age differences in the nutritive values of the dietaries were observed. Sex differences in nutrient score were very marked. The boys' dietaries were, in general, superior to those of the girls' with respect to all nutrients except ascorbic acid.

The families of over 45 per cent of the children had frozen food lockers and 69 per cent or more had gardens.

Marked differences in the quantities of foods commonly consumed by the Oregon children and those consumed by the children of Texas, South Carolina, Tennessee and Newfoundland were observed.

The authors express their appreciation to Evelyn L. Warren and Clara Young for their assistance in the preparation of this paper.

REFERENCES

1. Hadjimarkos, D. M. and Storvick, C. A.: Geographic Variations of Dental Caries in Oregon. I. Dental Status of Native Born and Reared School Children in Two Regions. *Journal of Dental Research*, 1949, 28: pp. 415-423.

2. Sullivan, J. H. and Storvick, C. A.: Statistical Interpretation of Salivary Analyses on 555 School Children in Two Geographic Regions in Oregon. *Journal of Dental Research*, 1950, 29: pp. 173-176.
3. Storvick, C. A. and Sullivan, J. H.: Total Hardness and Fluoride Content of Oregon Public Water Supplies. *Journal of American Water Works Assn.*, 1950, 42: pp. 589-592.
4. Hadjimarkos, D. M.; Storvick, C. A.; and Sullivan, J. H.: Geographic Variations of Dental Caries in Oregon. III. A Consideration of the Influence of Some Environmental Factors on the Caries Experience of Native Born and Reared School Children in Two Regions. *Oral Surgery, Oral Medicine and Oral Pathology*, 1950, 3: pp. 481-491.
5. Dean, H. T.: Epidemiological Studies in the United States. Dental Caries and Fluorine. Washington, D. C., 1946 American Association for the Advancement of Science, pp. 5-31.
6. U. S. Public Health Service: Food Value Tables for Calculation of Diet Records. Washington, D. C., 1947.
7. Boyd, E. F. and Eads, M. E.: Food Sources of Seven Nutrients. Washington, D. C., U. S. Public Health Service, 1947.
8. Bowes, A. D. and Church, C. F.: Food Values of Portions Commonly Used. 6th Ed., Philadelphia, 1946, College Offset Press.
9. National Research Council, Food and Nutrition Board: Recommended Dietary Allowances, Revised. National Research Council Reprint and Circular Series, 1948, No. 129, pp. 16-17.
10. Michigan Workshop: (Michigan University, School of Public Health): The Michigan Workshop on the Evaluation of Dental Caries Control Technics. *Journal of American Dental Association*, 1948, 36: pp. 3-27.
11. Kruse, H. D.; Bessey, O. A.; McLester, J. S.; Jolliffe, N.; Tisdall, F. F.; and Wilder, R. M.: Inadequate Diets and Nutritional Deficiencies in the United States. Bulletin 109, Washington, D. C., National Research Council, 1943, p. 8.
12. National Research Council, Food and Nutrition Board: Recommended Dietary Allowances, Revised. National Research Council Reprint and Circular Series, 1943, No. 115, pp. 2-3.
13. Trulson, M.; Hegsted, D. M.; and Stare, F. J.: New York State Nutrition Survey. I. A Nutrition Survey of Public School Children. *Journal of the American Dietetic Association*, 1949, 25: pp. 595-605.
14. Young, C. B. and Storvick, C. A.: Food Habits of Freshmen at Oregon State College. *Journal of the American Dietetic Association*, 1949, 25: pp. 318-321.
15. Whitacre, J.: The Diet of Texas School Children. Texas Agricultural Experiment Station, 1934, Bull. No. 489.
16. Moser, A. M.: Nutritional Condition of Children in Relation to School Lunches in Two South Carolina Rural Communities. South Carolina Agricultural Experiment Station, Clemson, South Carolina, 1945, Bull. No. 359.
17. Adamson, J. D.; Jolliffe, N.; Kruse, H. D.; Lowry, O. H.; Moore, P. E.; Platt, B. S.; Sebrell, W. H.; Tice, J. W.; Tisdall, F. F.; Wilder, R. M.; and Zamecnik, P. C.: Medical Survey of Nutrition in Newfoundland. *Canadian Medical Association Journal*, 1945, 52: pp. 227-250.
18. Metcoff, J.; Goldsmith, G. A.; McQueeney, A. J.; Dove, R. F.; McDevitt, E.; Dove, M. A.; and Stare, F. J.: Nutritional Survey in Norris Point, Newfoundland. *Journal of Laboratory and Clinical Medicine*, 1945, 30: pp. 475-487.

19. Aykroyd, W. R.; Jolliffe, N.; Lowry, O. H.; Moore, P. E.; Sebrell, W. H.; Shank, R. E.; Tisdall, F. F.; Wilder, R. M.; and Zamecnik, P. C.: Medical Re-survey of Nutrition in Newfoundland, 1948. *Canadian Medical Association Journal*, 1949, 60: pp. 1-24.

APPENDIX I

Figure 1

Instructions to Child Western Regional Research Project Oregon

FOOD RECORD

We would like a record of what you ate for one day. Space for recording this information is provided on page two of this form. Write *only* on page two. Please read carefully the following instructions before you start to list the foods you have eaten.

1. WRITE DOWN EVERYTHING YOU PUT IN YOUR MOUTH AND SWALLOWED. If you miss a meal, write the word NOTHING in the space for that meal.
2. TELL HOW FOOD IS COOKED—FOR EXAMPLE, FRIED OR SCRAMBLED EGG, BAKED OR MASHED POTATO, CREAMED OR BUTTERED CARROTS. IF FOOD IS NOT COOKED BUT EATEN RAW, WRITE "RAW" AFTER IT.
3. WHEN YOU EAT TWO FOODS TOGETHER, WRITE DOWN BOTH OF THEM—like this:
 1 white roll with 1 teaspoon jelly.
 ½ cup mashed potato with 1 tablespoon gravy.
4. WRITE DOWN HOW MUCH YOU EAT OF EACH FOOD. Tell how many teaspoonfuls or tablespoonfuls you eat; tell whether you eat ¼ or ½ or 1 cupful, tell how many slices of bread.
5. BE SURE TO WRITE THE *KIND* OF FOOD YOU EAT. If you eat cereal, write oatmeal, shredded wheat biscuit or whatever kind of cereal it is. BE SURE TO TELL THE *KIND* if you eat any of these foods: bread, meat, peas, beans, potatoes, soups, salads, or sandwiches—like this:
 Soups—cream of tomato, navy bean, split pea, vegetable
 Salads—mixed vegetable (raw), fruit (cooked), tuna
 Sandwiches—2 slices of whole wheat bread, butter, peanut butter
 2 slices white enriched bread, mayonaise, American cheese
6. IF YOU TAKE WHEAT GERM, YEAST, COD LIVER OIL, VITAMIN PILLS, MEDICINE, ETC., PLEASE LIST UNDER SUPPLEMENTS AT THE BOTTOM OF THE PAGE—Otherwise write the word NOTHING.

After you finish writing your record, see if you did these things:

1. Did you write down only the foods you put in your mouth and swallowed?
2. Did you write down HOW MUCH you ate or drank?
3. Did you miss a meal? If so, did you write the word NOTHING in the space for that meal? If you didn't eat between meals, did you write the word NOTHING in the space for between-meal food?
4. Do you take wheat germ, yeast, cod liver oil, etc.? If so, did you list under supplements? If not did you write the word NOTHING under supplements?

Record Number W.I.C.M.O.X. Group

Place Rural Urban
Town County

-
- R—
P—
1. Milk whole skim buttermilk
 2. Cheese—cottage American other
 3. Egg
 4. Meat—pork beef, veal, lamb liver
 - Prepared meat poultry fish
 5. Legumes
 6. Nuts peanut butter
 7. Fruits—citrus (canned or fresh) tomatoes (canned or fresh).....
 - cantaloupe strawberries
 - yellow fruit
 - other raw
 - other cooked
 8. Vegetables—potatoes (white) cabbage (raw) (cooked)
 - green
 - yellow
 - other raw
 - other cooked
 9. Fats—butter margarine cream
 10. Cereal—cooked
 - prepared
 - macaroni, rice, etc.
 - Bread—whole grain enriched other
 11. Desserts—pies cakes cookies
 - milk puddings ice cream
 12. Sweets—candy sugar gum
 - jelly, jam syrup molasses
 13. Beverages—cocoa coffee tea soft drinks
 - alcoholic water
 14. Salt—iodized plain
 15. Supplements—Vitamins
 - Laxatives
 - Medicines

Calcium	1 2 3	Ascorbic Acid	1 2 3
Iron	1 2 3	Thiamine	1 2 3
Protein	1 2 3	Riboflavin	1 2 3
Vitamin A value	1 2 3	Niacin	1 2 3
