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DIETARY LEVELS FOR TRI-CITY ELEMENTARY SCHOOL CHILDREN

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J. K. Soldat and J. F. Honstead

Environmental Studies Section
ENVIRONMENTAL HEALTH DEPARTMENT

February 26, 1968

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DIETARY LEVELS FOR TRI-CITY ELEMENTARY SCHOOL CHILDREN

J. K. Soldat and J. F. Honstead

As part of the study of Mechanisms of Environmental Exposure for the Division of Production of the Atomic Energy Commission, a program is underway to investigate dietary pathways affecting school-age children^[1]. The program is conducted in cooperation with school systems in the Tri-City Area. Primarily "elementary school" children are approached with this study, including ages 6 through 12. A much smaller number of children aged 13 and 14 have also been contacted in the course of this study. The research includes measurements of the body burdens of radioactive materials in children and a study of the children's diets. This report presents a partial compilation of the dietary levels obtained for children of different ages. These data are tabulated here for reference purposes.

The program conducted in elementary schools is entitled "Influence of Diet on Radioactivity in People". The study is conducted in three phases: (1) The children are provided with information about radioactivity and radiation measurements in a 45 minute classroom presentation. They are encouraged at this time to participate in the study. (2) For a seven-day period the children obtain diet statistics on a special form provided them. (3) Upon presenting their completed diet record and parent's approval at school the students are invited to visit the mobile whole-body counter parked on the school grounds where their body burden of radioactivity is measured. The diet record provided by the children in this way includes a compilation of general diet information elicited by questions concerning frequency of consumption of seafood, Columbia River fish and game birds. In addition, the questions investigate the source

of certain kinds of foodstuffs in the children's diet, e.g., drinking water and milk supplies. Finally, the children are asked to complete an accurate record of the consumption of those kinds of foods believed to contribute to radio-activity in their bodies for a period of seven consecutive days.

DRINKING WATER

Table 1 gives the reported consumption levels of drinking water by Tri-City school children on the basis of age. Water consumption is reported in "cups per day". The children are carefully instructed concerning the meaning of a "cup". It is identified as an 8 oz. standard measuring cup such as is used in cooking and baking. The children are instructed to keep track of their water consumption and to estimate it in terms of 8 oz. cups if the container they normally drink out of is less than 8 oz. In addition, the children are asked to estimate their water consumption from drinking fountains in terms of cups by assuming 15 swallows to be equivalent to one cup. It was further estimated that a typical visit to the drinking fountain by children results in the consumption of about one-third cup.

MILK

The tabulated milk consumption information for Tri-City school children is shown in Table 2. There appears to be a consistently higher milk consumption for boys than for girls from these numbers. The data are again reported in terms of cups per day, having the same definition as that used for water.

OTHER LIQUIDS

The children were instructed to include in their "other liquids" record (Table 3) all liquids consumed that were not mixed at home with drinking water.

For example, Kool-Aid and frozen orange juice would be reported in the water consumption table. Examples of "other liquids" would be bottled soft drinks and canned juices. The liquid consumption is again reported in terms of a standard 8 oz. measuring cup.

TOTAL LIQUIDS

Table 4 is a compilation of data which sums the liquid consumption for each child. The data are again reported in standard 8 oz. cups. The total liquid consumption for children of ages 6 through 14 is remarkably similar, little age difference being found. There is a consistent, significant difference in liquid consumption between boys and girls at all of the ages studied.

BREAD

Table 5 shows the reported consumption of bread for the various age groups studied. The diet record heading was "Slices of Bread or Rolls". The children were instructed to include all types of bread and bread-type foods consumed in this column. For example, children included hot cakes and waffles as bread in making this report.

COLUMBIA RIVER FISH

Table 6 reports the consumption level data obtained from children for fish caught from the Columbia River downstream from the Hanford plant. The question asked on the diet record form is "Do you ever eat fish caught in the Columbia River? If so, about how frequently?" The children are given the option of selecting an answer from the following multiple choice statements: None, two or three times a week, once a week, twice a month, once a month, twice a year, very seldom. The currently used diet record card is a revised form of an

earlier questionnaire in which children were asked to provide a numerical estimate of their Columbia River fish consumption. The new form directs the children's answers to guide them in making more objective answers to this question. However, it also directs their answers into a limited number of categories which become evident when one examines the results. In their instructions the children were asked to estimate the consumption level only of fish actually taken from the Columbia River. However, they were told to include fish that had been frozen for a period of time as well as those consumed fresh. A casual observation from children's response leads one to the conclusion that a sizable fraction of Columbia River fish are frozen before being eaten.

GAME BIRDS

Table 7 reports the consumption level data obtained from Tri-City school children concerning meals per year of locally harvested game birds. The question asked on the diet record form is: "Do you occasionally eat game birds taken in the vicinity (quail, ducks, pheasants)? If so, how frequently?". The children are then given the same options for multiple choice answers as those reported above in the case of Columbia River fish. Again the earlier version of this diet record provided for a quantitative reply, so that part of the answers obtained did not fit into the multiple choice categories. This survey revealed a slightly higher consumption rate for game birds than Columbia River fish, confirming observations made from adult dietary records^{[2][3]}.

BEEF

Table 8 gives the tabulated beef consumption record for Tri-City school children of different ages. The results show a remarkable degree of consistency

in all age groups. The one or two reports revealing average meat consumption of greater than six servings per day may be fliers. The children were instructed to include in their reports of meat consumption only fresh meat meals. This was defined for them as being meat that was purchased as uncooked meat locally and then cooked or frozen after purchase. The question of identifying the source of meat supplies found is not dealt with here but some evidence is available that will permit better selection of those children whose meat supplies are probably from local farms. The children are asked to report meat consumption data in terms of "servings", with a serving defined on the diet form as 3-5 oz. of meat. Part of the uniformity observed in the meat consumption reports may be the result of difference in the size of servings for different aged children. A study of typical serving sizes actually consumed by children of different ages remains to be made.

PORK

Table 9 shows the reported pork consumption data for Tri-City school children. Again only fresh uncooked meat was requested in this tabulation. A problem was encountered in defining the word "fresh" for the children. We attempted to assure that this meat was uncooked or unprocessed meat but many forms of pork that are popular in the Tri-City Area are difficult to categorize in this way. For example, uncooked ham or bacon could be considered by the children as "fresh pork". One should assume that this data may be biased by this confusion of definitions. Again the pork consumption data are reported in terms of "servings per day", with the same problem with serving size as discussed for beef.

SEA FOOD

Table 10 tabulates the reported consumption of sea food by Tri-City elementary school children. The question asked of the children on their diet record card is: "Do you ever eat fresh crab meat, shrimp, oysters or clams (other than canned or frozen)? If so, how frequently?". In discussions with the children the purpose of this study was described and some detail was given concerning the kinds of foods of interest. We pointed out that we were trying to ascertain consumption levels of sea foods that may be obtained from the Pacific Coast near the mouth of the Columbia River. The majority of the children clearly understood the intent of the question and probably gave the best answers that they could. However, the complexity of the sea food marketing situation would tend to bias the results upward. The children's reports of sea food consumption are consistent with those obtained in a similar way for adults in the Tri-City Area^{[2][3]}. In the revised diet form the children respond to the question concerning sea food by selecting an appropriate diet frequency from a multiple choice list such as that used in reporting Columbia River fish consumption. Again, the earlier record card provided for a quantitative estimate by the children on their annual consumption. Thus, some of the data fit the multiple choice categories and the rest are more randomly distributed. The quantity that represents a "meal" of sea food, Columbia River fish or game birds remains to be evaluated in further studies.

CONCLUSIONS

Valid dietary information for population groups is useful in assisting with calculations of dose received by people living in the vicinity of nuclear installations. These data for elementary school children should assist with

such calculations. In particular, the data are most applicable to the Hanford environmental dose evaluation. On an international level scientists in the field of health physics have long felt the need for the definition of a "standard child" - the counterpart of the "standard man" that has been used for establishing permissible levels of radioactivity in various environments. The dietary information being obtained at Hanford with this elementary school children survey should assist with the development of this model.

REFERENCES

- [1] Honstead, J. F., "A Program for Evaluating Environmental Radiation Dose to Children". Submitted for publication in Radiological Health Data and Reports, in press.
- [2] Honstead, J. F., "Dietary Sources of Radioactivity for Richland Residents", BNWL-CC-926, November 10, 1966.
- [3] Honstead, J. F., "Radionuclide Burden-Diet Relationships Near a Nuclear Facility". Proceedings of the Symposium on Diagnosis and Treatment of Deposited Radionuclides, in press.

TABLE 1

DRINKING WATER

Age	6		7		8		9		10		11		12		13		14	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Cups/Day	3.3	2.7	2.7	2.5	2.8	2.8	3.1	3.0	3.4	3.1	3.4	3.0	3.3	3.3	3.5	3.2	3.5	2.4
	Percent of Total Cases																	
Cups/Day																		
0	0.0	6.3	4.8	3.4	3.7	2.0	2.6	3.8	1.4	2.3	1.4	2.9	2.6	2.8	1.4	0.0	0.0	0.0
1	11.1	25.0	12.9	20.2	15.9	14.9	12.0	15.3	10.6	18.3	11.6	17.0	15.4	14.2	8.3	20.3	6.7	22.2
2	11.1	21.9	30.7	29.4	30.7	28.4	27.6	23.8	19.5	25.1	22.2	21.6	20.2	21.6	22.2	17.0	13.3	44.4
3	33.3	15.6	31.5	22.7	20.1	30.4	20.3	25.1	22.3	17.1	23.9	23.5	19.8	19.9	22.2	22.0	40.0	11.1
4	25.9	15.6	9.7	19.3	13.8	13.9	17.7	12.8	19.9	16.4	17.8	17.0	17.2	20.2	20.8	20.3	20.0	11.1
5	14.8	9.4	8.1	2.5	11.1	6.0	9.9	12.8	16.7	10.3	11.6	11.1	11.7	10.3	12.5	11.9	6.7	11.1
6	3.7	3.1	1.6	0.8	3.2	2.5	6.8	4.7	6.4	6.1	6.1	3.6	8.4	6.0	6.9	5.1	13.3	
7		3.1	0.8	1.7	0.5	1.5	2.1	0.9	1.4	4.2	3.1	1.6	2.2	2.1	5.6	1.7		
8					0.5	0.0	0.5	0.9	1.1	0.0	1.0	1.3	1.1	1.8		0.0		
9					0.5	0.5	0.5		0.4	0.0	0.7	0.3	1.1	0.4		1.7		
10									0.4	0.4	0.3		0.0	0.0				
11											0.3		0.4	0.7				

WATER CONSUMPTION BY CHILDREN

This Table contains the results of diet records provided by 2973 Tri-City school children. They maintained the record for seven consecutive days, the tabulated numbers representing the average for the period. They were asked to report all water consumption, including that used to mix powdered milk, soup, etc., in terms of standard 8 oz. cups.

TABLE 2

MILK

Age	6		7		8		9		10		11		12		13		14	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Cups/Day	2.9	2.7	2.8	2.6	2.8	2.5	2.9	2.6	2.8	2.6	2.9	2.6	2.9	2.6	2.7	2.6	2.4	2.4

Cups/Day	Percent of Total Cases																	
	6		7		8		9		10		11		12		13		14	
0	3.7	0.0	0.0	0.0	0.5	0.5	1.0	2.1	0.4	1.5	0.7	1.0	0.0	0.7	2.8	1.7	0.0	0.0
1	3.7	3.1	6.5	9.2	6.9	11.4	7.8	8.9	9.6	12.2	8.9	11.4	7.7	13.1	12.5	11.9	13.3	11.1
2	18.5	43.8	29.8	37.8	29.1	35.8	23.4	33.6	30.9	36.1	28.7	35.0	27.1	36.9	31.9	30.5	40.0	44.4
3	48.2	40.6	48.4	42.0	41.8	39.8	43.2	43.0	39.7	32.7	35.5	39.5	38.5	33.7	31.9	42.4	33.3	33.3
4	22.2	9.4	12.9	10.1	19.1	11.0	18.8	9.4	14.2	15.2	20.1	9.5	19.8	10.6	11.1	10.2	13.3	11.1
5	3.7	3.1	2.4	0.8	1.1	1.5	3.1	3.0	3.2	1.1	4.8	2.3	5.1	3.9	6.9	3.4		
6					0.5		2.6		1.8	0.8	1.4	1.0	1.1	1.1	2.8			
7					1.1				0.4	0.0		0.0	0.7					
8										0.0		0.3						
9										0.4								

MILK CONSUMPTION BY CHILDREN

This Table contains the results of diet records provided by 2973 Tri-City school children. They maintained the record for seven consecutive days, the tabulated numbers representing the average for the period. They were asked to report fresh milk consumption (excluding powdered or canned milk) in terms of standard 8 oz. cups.

TABLE 3

"OTHER" LIQUIDS

Age	6		7		8		9		10		11		12		13		14	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Cups/Day	1.0	1.0	1.0	0.8	1.0	0.8	0.9	0.8	1.0	0.9	1.0	0.9	1.1	1.0	1.2	1.0	1.1	1.1

Cups/Day	Percent of Total Cases																	
0	29.6	21.9	22.6	31.1	25.9	33.3	34.4	42.1	32.6	30.8	25.9	34.0	24.2	30.9	23.6	33.9	20.0	33.3
1	48.2	59.4	59.7	57.1	54.5	55.7	50.5	45.1	46.8	54.8	53.2	52.9	50.9	50.4	47.2	45.8	53.3	44.4
2	22.2	12.5	16.1	9.2	15.9	11.0	12.0	11.1	14.9	11.4	18.4	10.8	18.3	15.3	20.8	15.3	26.7	11.1
3		6.3	1.6	1.7	3.2		2.6	1.3	3.9	2.7	2.1	2.0	4.8	2.5	2.8	3.4		11.1
4				0.8	0.5		0.0	0.4	0.4	0.4	0.0	0.3	1.1	0.4	2.8	0.0		
5							0.5		0.0		0.3		0.4	0.4	1.4	1.7		
6									0.7				0.0	0.4	0.0			
7									0.4				0.0		1.4			
8									0.0				0.4					
9									0.0									
10									0.4									

CONSUMPTION OF LIQUIDS OTHER THAN WATER OR MILK BY CHILDREN

This Table contains the results of diet records provided by 2973 Tri-City school children. They maintained the record for seven consecutive days, the tabulated numbers representing the average for the period. "Other" liquids include bottled beverages, fruit juice, etc. The children were asked to report liquid consumption in terms of standard 8 oz. cups.

TABLE 4

TOTAL LIQUIDS (WATER + MILK + OTHER LIQUIDS)

Age	6		7		8		9		10		11		12		13		14	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Cups/Day	7.2	6.4	6.4	5.9	6.6	6.1	6.9	6.3	7.2	6.5	7.2	6.4	7.4	6.8	7.4	6.8	7.0	5.8
Cups/Day	Percent of Total Cases																	
0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	3.3	4.0	3.4	0.0	0.5	0.5	1.3	0.7	1.5	0.3	0.7	0.0	1.1	1.4	0.0	0.0	0.0
3	0.0	6.3	8.9	4.2	4.8	6.5	3.1	5.5	3.6	6.1	1.7	4.6	1.8	4.3	4.2	3.4	0.0	0.0
4	14.8	9.4	14.5	16.0	10.1	14.4	7.3	14.9	7.5	12.9	6.8	11.1	8.1	8.2	9.7	11.9	6.7	44.4
5	11.1	21.9	29.8	18.5	20.6	17.4	19.8	17.9	11.4	18.6	14.7	19.6	12.8	17.4	9.7	20.3	13.3	11.1
6	7.4	9.4	21.8	23.5	17.5	22.9	16.2	19.2	17.4	15.2	14.7	22.6	18.7	19.5	11.1	20.3	26.7	22.2
7	14.8	9.4	8.1	21.0	19.1	17.4	15.6	14.0	19.9	14.1	22.5	14.7	17.6	18.1	20.8	13.6	13.3	0.0
8	33.3	21.9	6.5	5.9	14.3	9.5	15.6	11.5	18.1	12.6	14.0	13.1	13.6	12.4	16.7	10.2	33.3	11.1
9	7.4	12.5	3.2	4.2	5.3	6.0	9.4	8.5	8.2	9.5	10.9	5.6	11.0	7.5	11.1	8.5	0.0	0.0
10	7.4	3.1	3.2	2.5	2.1	4.0	4.7	3.0	5.7	3.8	6.1	2.3	5.9	5.7	6.9	6.8	0.0	11.1
11	0.0	3.1		0.0	4.2	0.5	2.6	2.6	3.2	3.4	3.1	2.3	4.0	2.8	2.8	1.7	6.7	
12	3.7			0.8	0.5	0.0	2.6	1.3	1.4	0.4	3.1	2.0	2.2	1.1	1.4	1.7		
13					1.6	0.5	1.6		0.7	0.4	1.0	0.3	2.2	0.7	2.8	0.0		
14						0.5	0.0		0.7	0.4	0.7	0.3	0.4	0.4	0.0	1.7		
15							0.5		0.7	0.4		0.3	1.1	0.4	0.0			
16									0.4	0.0			0.4	0.4	0.0			
17									0.0	0.0			0.0	0.0	0.0			
18									0.0	0.0			0.4	0.0	1.4			
19									0.0	0.0				0.0				
20									0.4	0.0				0.4				
> 20									0.4	0.4								

TOTAL LIQUID CONSUMPTION BY CHILDREN

This Table contains the results of individual summations of water, milk, and other liquids consumed. The data were taken from diet records maintained by 2973 Tri-City children for seven consecutive days. The tabulated numbers represent the average for the period and report consumption of standard 8 cz. cups of liquids.

TABLE 5

BREAD

Age	6		7		8		9		10		11		12		13		14	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Serv/Day	2.67	2.24	2.61	2.26	2.66	2.49	2.82	2.49	3.10	2.74	3.11	2.82	3.44	3.07	3.74	3.28	3.27	2.34
Servings/Day	Percent of Total Cases																	
0	0.0	0.0	1.6	1.7	1.6	0.0	1.6	1.3	1.1	0.8	0.0	0.3	0.7	0.4	1.4	0.0	0.0	0.0
1	14.8	15.6	8.9	17.7	11.1	14.9	7.8	12.3	6.7	11.4	6.8	11.4	4.8	11.0	2.8	3.4	6.7	11.1
2	25.9	46.9	35.5	44.5	36.0	36.8	31.3	38.3	24.1	30.4	29.0	37.3	25.6	29.4	13.9	23.7	13.3	44.4
3	37.0	31.3	40.3	27.7	32.8	33.8	32.8	35.7	34.4	37.6	32.8	27.5	30.0	34.4	26.4	33.9	46.7	44.4
4	14.8	3.1	11.3	6.7	12.2	12.9	18.8	10.2	22.0	13.3	20.1	16.0	19.1	14.5	30.6	22.0	20.0	
5	7.4	3.1	2.4	0.8	5.8	1.5	5.2	1.3	8.2	4.2	7.5	6.2	12.5	6.4	11.1	17.0	6.7	
6				0.8	0.5		2.1	0.9	2.5	1.1	2.7	0.7	4.4	1.8	9.7		6.7	
7							0.5		0.7	0.8	0.0	0.0	1.5	0.7	2.8			
8									0.0	0.4	0.3	0.0	0.7	0.4	1.4			
9									0.4		0.3	0.3	0.4					
10																		
11																		
12																		
13																		
14																		
15																		
16											0.3			0.4				
17																		
18																		
19															0.4			
20																		
> 20												0.3	0.4	0.4				

CONSUMPTION OF BREAD BY CHILDREN

This Table contains the results of diet records provided by 2973 Tri-City school children. They maintained the record for seven consecutive days, the tabulated numbers representing the average for the period. Children were asked to record all forms of bread, rolls, pancakes, etc., in this category. Servings are defined as slices of loaf bread, single rolls or buns, or single pancakes.

TABLE 6

COLUMBIA RIVER FISH

Age	6		7		8		9		10		11		12		13		14	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Meals/Year	2.52	1.78	1.61	2.18	2.11	2.03	2.50	2.30	2.79	2.62	2.18	2.66	3.11	2.60	3.07	2.12	2.93	2.56

Meals/Year	Percent of Total Cases																	
0	37.0	78.1	62.9	62.2	61.9	60.7	53.1	60.9	56.4	62.4	60.4	61.1	59.0	58.2	51.4	66.1	60.0	55.6
1	3.7	0.0	8.1	5.9	7.9	8.0	9.9	9.4	8.2	7.6	10.6	9.5	8.1	9.9	15.3	8.5	0.0	0.0
2	22.2	9.4	8.9	10.1	10.1	11.0	14.1	6.4	11.0	9.5	8.5	7.5	7.7	11.0	5.6	6.8	13.3	11.1
3	18.5		4.8	2.5	4.2	4.0	4.2	3.8	4.3	2.3	4.1	4.6	4.4	3.2	2.8	5.1	0.0	0.0
4	3.7		5.7	3.4	4.2	4.0	3.1	3.0	3.2	3.4	2.1	2.6	4.4	2.1	4.2	0.0	0.0	0.0
5	0.0		0.8	5.0	3.2	5.0	3.1	3.4	2.5	2.3	2.7	4.3	2.9	4.3	8.3	1.7	0.0	11.1
6	3.7		3.2	1.7	2.7	2.0	3.1	4.7	3.2	3.4	2.7	2.3	1.5	1.8	4.2	6.8	13.3	11.1
7	0.0		0.0	0.8	0.5	0.5	1.0	0.4	0.4	0.8	1.0	0.0	1.1	0.4	0.0	0.0	6.7	
8	0.0		1.6	0.8	0.5	0.5	0.0	0.9	1.1	0.0	0.3	0.3	0.7	1.1	1.4	0.0		
9	0.0	3.1	0.0	0.0	0.0	0.0	0.5	0.0	0.4	0.0	0.3	0.0	0.0	0.4				
10	11.1	3.1	1.6	3.4	1.1	2.0	3.1	3.0	2.5	1.9	1.4	1.3	2.6	1.4				11.1
11		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
12		3.1	0.8	0.8		0.5	0.5	1.7	1.4	1.5	1.7	2.0	1.5	1.8	2.8			
13								0.0	0.0	0.4	0.3	0.7	0.0					
14								0.4	0.4	0.0	0.3		0.4					
15			0.8	0.8	0.5	0.5	1.0		0.0	1.5	0.7		1.5	0.7				
16									0.4									
17									0.0									
18									0.4									
19									0.4									
20		3.1		0.8	0.5		0.5	0.9	2.1		1.0	1.0	1.1	2.1		1.7		
21																		6.7
22														0.4				
23																		
24					0.5		1.0		0.4	0.4	0.3		0.7	0.4	1.4	1.7		
25					0.5	0.5			0.4	0.8	0.3	1.0	0.7	0.4				
--																		
28									0.4									

Continued

TABLE 6 (continued)

COLUMBIA RIVER FISH (continued)

Age	6		7		8		9		10		11		12		13		13	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Meals/Year	2.52	1.78	1.61	2.18	2.11	2.03	2.50	2.30	2.79	2.62	2.18	2.66	3.11	2.60	3.07	2.12	2.93	2.56
Meals/Year	Percent of Total Cases																	
29												0.3						
30			0.8	1.7	1.1		1.0	0.4	0.4	0.8	0.3	0.3	0.4		1.4	1.7		
--																		
36-40							0.5		0.4			0.3	0.4	0.4				
46-50					0.5			0.4	0.4	0.4	0.3	0.7						
51-55						0.5		0.4		0.4		0.3	0.7		1.4			
56-60						0.5				0.4		0.3						
--																		
71-75													0.4					
--																		
96-100														0.4				

CONSUMPTION OF COLUMBIA RIVER FISH BY CHILDREN

This Table contains the results of diet questionnaires completed by 2973 Tri-City school children. The early form used in the study asked for a numerical estimate of the children's consumption of Columbia River fish in terms of meals per year. The form was later revised to provide them with multiple choices that guided their answers, i.e., "two or three times a week, once a week, twice a month, once a month, twice a year, very seldom, or never".

TABLE 7

GAME BIRDS

Age	6		7		8		9		10		11		12		13		14	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Meals/Year	1.81	2.9	2.1	3.39	2.78	2.01	3.04	2.77	2.89	2.68	3.41	3.15	3.53	2.97	4.92	2.97	3.67	4.44
Meals/Year	Percent of Total Cases																	
0	55.6	65.6	63.7	47.9	58.7	62.2	57.8	60.4	56.7	57.8	55.3	57.8	50.6	56.7	47.2	55.9	53.3	44.4
1	7.4	0.0	4.8	10.9	9.5	8.0	9.4	6.0	8.9	8.4	7.2	8.5	11.0	11.0	13.9	13.6	0.0	0.0
2	7.4	6.3	7.3	15.1	11.1	8.0	10.9	9.4	9.6	10.7	10.2	8.2	11.4	8.5	8.3	8.5	6.7	11.1
3	11.1	3.1	6.5	4.2	2.1	2.5	4.2	3.4	3.9	4.2	3.1	4.3	4.0	4.6	4.2	5.1	0.0	11.1
4	11.1	3.1	3.2	2.5	1.1	2.0	0.5	3.4	3.9	3.4	3.4	4.3	2.2	2.5	2.8	1.7	6.7	11.1
5	0.0	6.3	1.6	2.5	3.7	2.0	3.7	1.3	2.8	1.9	3.4	0.7	4.0	1.4	1.4	0.0	6.7	
6	3.7	3.1	3.2	0.8	1.6	1.5	3.1	2.6	5.0	3.0	3.8	1.6	1.5	2.1	5.6	6.8	13.3	
7			0.8	0.8	1.1	1.5	0.0	1.3	0.0	0.4	1.4	0.0	1.1	0.7	1.4		0.0	
8			1.6	0.8	0.0	0.5	0.5	1.7	0.4	0.8	0.0	0.7	0.7	1.4	1.4		6.7	
9			0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.3	0.0	0.7				
10		3.1	3.2	3.4	3.2	2.5	3.1	2.1	1.4	1.5	2.1	3.9	4.4	2.1				
11			0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.3	0.0	0.0				
12			1.6	3.4	3.7	2.0	1.0	3.0	1.4	2.3	2.4	2.0	2.2	3.2	2.8	1.7		
13												0.3	0.0	0.4	0.0			
14												0.0	0.3	0.0	0.0			
15		3.1	0.8	0.8	0.5	1.0	1.0	0.9	1.4	1.1	1.7	1.0	1.1	1.1				11.1
16	3.7											0.3	0.3	0.0	0.4			11.1
17												0.0	0.3					
18					0.5							0.3						
19							0.5					0.0						
20		6.3		1.7	1.1	2.5	0.5	2.1	1.1	1.5	2.4	2.0	2.2	1.1	2.8			
21																		
22						0.5			0.4									
23																		
24			0.8	0.8		1.0		0.9		0.8	0.7	1.0	0.7	0.4	2.8	3.4	6.7	

Continued

TABLE 7 (continued)

GAME BIRDS (continued)

Age	6		7		8		9		10		11		12		13		14	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Meals/Year	1.81	2.9	2.1	3.39	2.78	3.01	3.04	2.77	2.89	2.68	3.41	3.15	3.53	2.97	4.92	2.97	3.67	4.44
Meals/Year	Percent of Total Cases																	
25			0.8		1.0	1.6	0.9	0.7				1.3		0.4	1.4			
30			2.5	1.1	1.0	0.5	0.4	0.7	0.4	0.3	0.7	0.7	0.7	1.4	3.4			
31												0.3						
32								0.4										
35								0.4										
36						0.5			0.4	0.7								
40			0.8		0.5		0.4		0.4									
41													1.1					
50								0.4	0.4				0.7					
52						0.5				0.3				0.4	2.8			
55												0.3						
59								0.4										
60														0.4				
> 60					0.5		1.0							0.4				

CONSUMPTION OF GAME BIRDS BY CHILDREN

This Table contains the results of diet questionnaires completed by 2973 Tri-City school children. The early form used in the study asked for a numerical estimate of the children's consumption of game birds taken in this vicinity (quail, ducks, pheasants), in terms of meals per year. The form was later revised to provide them with multiple choices that guided their answers, i.e., "Two or three times a week, once a week, twice a month, once a month, twice a year, very seldom, or never".

TABLE 8

BEEF																		
Age	6		7		8		9		10		11		12		13		14	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Serv/Day	0.70	0.65	0.70	0.57	0.63	0.65	0.66	0.60	0.64	0.64	0.73	0.68	0.75	0.63	0.72	0.65	0.74	0.74
Servings/Day	Percent of Total Cases																	
0	22.2	25.0	27.4	49.6	39.7	35.8	35.9	38.3	39.7	38.0	34.1	37.9	35.5	42.2	37.5	42.4	46.7	33.3
1	77.8	71.9	69.4	49.6	58.2	62.2	61.5	60.9	55.3	59.3	57.7	58.5	58.2	54.6	52.8	49.2	40.0	55.6
2		3.1	3.2	0.8	2.1	2.0	2.6	0.4	5.0	2.3	7.5	2.9	5.9	3.2	9.7	8.5	13.3	11.1
3								0.4		0.4	0.7	0.3						
4												0.0						
5												0.0						
6												0.3						
7																		
8																		
9																		
10																		
> 10													0.4					

CONSUMPTION OF BEEF BY CHILDREN

This Table contains the results of diet records provided by 2973 Tri-City school children. They maintained the record for seven consecutive days, the tabulated numbers representing the average for the period.

TABLE 9

PORK

Age	6		7		8		9		10		11		12		13		14	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Serv/Day	0.23	0.18	0.22	0.16	0.23	0.24	0.30	0.22	0.23	0.20	0.23	0.24	0.28	0.27	0.33	0.28	0.27	0.51

Servings/Day	Percent of Total Cases																	
	6		7		8		9		10		11		12		13		14	
0	85.2	93.8	90.3	90.8	88.9	83.1	81.3	89.4	87.6	89.7	84.0	83.3	82.1	83.0	73.6	81.4	80.0	77.8
1	14.8	6.3	8.9	9.2	9.5	16.4	17.2	9.8	10.6	9.9	15.7	16.0	16.5	16.3	25.0	18.6	20.0	11.1
2			0.0		1.1	0.5	1.0	0.4	1.8	0.0	0.3	0.7	1.5	0.4	1.4			11.1
3			0.8		0.5		0.5	0.4		0.4				0.0				
4														0.4				

CONSUMPTION OF PORK BY CHILDREN

This Table contains the results of diet records provided by 2973 Tri-City school children. They maintained the record for seven consecutive days; the tabulated numbers representing the average for the period.

TABLE 10

SEAFOOD

Age	6		7		8		9		10		11		12		13		14	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total Cases	27	32	124	119	189	201	192	235	282	263	293	306	273	282	72	59	15	9
Avg. Meals/Year	3.48	1.41	1.80	2.32	2.04	2.39	2.32	2.28	2.85	2.65	2.31	2.87	3.52	3.24	2.58	2.08	3.87	1.78

Meals/Year	Percent of Total Cases																												
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	22	24	25	26	30	36	37	40	> 40			
0	48.2	75.0	59.7	57.1	64.6	62.2	59.4	58.3	62.1	60.5	60.4	58.8	50.9	54.3	61.1	61.0	66.7	66.7											
1	0.0	0.0	5.7	12.6	6.9	6.0	7.3	7.7	5.7	8.0	8.5	8.5	8.8	11.4	12.5	10.2	0.0	0.0											
2	22.2	6.3	11.3	5.9	9.0	9.0	9.4	10.2	7.8	5.7	8.9	7.5	9.2	8.9	6.9	10.2	0.0	11.1											
3	3.7	0.0	4.8	5.0	2.1	4.0	6.3	3.8	2.1	4.9	3.4	4.6	3.3	5.3	4.2	3.4	13.3	0.0											
4	0.0	6.3	6.5	3.4	2.7	2.0	2.1	2.1	2.8	2.3	2.1	1.3	3.3	3.6	1.4	1.7	0.0	11.1											
5	0.0	3.1	3.2	3.4	2.7	1.5	1.6	1.7	2.8	3.0	2.1	3.3	4.4	3.2	2.8	5.1	6.7												
6	7.4	3.1	0.8	0.0	3.7	3.5	3.7	6.8	2.8	3.0	2.7	2.9	4.0	1.8	1.4	6.7													
7				2.5	0.5	0.5	0.5	0.9	1.1	0.8	0.3	1.0	0.7	0.4															
8				0.8	0.0	0.0	0.5	0.9	0.4	1.1	1.4	0.7	0.7	0.4															
9				0.0	0.5	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.4	0.0															
10	7.4	3.1	3.2	5.0	2.1	4.5	3.1	3.0	3.6	3.4	3.8	4.3	5.5	0.4	2.8														
11					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4															
12	3.7	3.1	4.8	1.7	1.6	2.5	3.1	2.6	3.6	1.9	3.4	2.0	2.2	1.4	4.2	5.1													
13					0.5	0.5	0.0				0.0		0.0	0.4															
14					0.0	0.0	0.0				0.3		0.4	0.0															
15	3.7				0.5	1.5	1.0	0.4	0.4	1.9	0.7	1.6	0.7	2.1															
--																													
20	3.7				1.1	2.0	0.5		1.1	1.5	1.0	1.3	2.2	1.4															
--																													
22										0.4																			
--																													
24								0.4	0.7	0.4	0.3		1.5	1.8															
25				1.7	1.1			0.4	0.4				0.4	1.8															
26										0.4																			
--																													
30					0.5			0.4	0.7		0.3	1.0	0.4																
--																													
36												0.3																	
37														0.4															
--																													
40										0.4			0.4																
> 40					0.5		0.4	1.1	0.4	0.3	1.0	0.7	1.1	2.8	6.7														

Continued

TABLE 10 (continued)

CONSUMPTION OF SEAFOOD BY CHILDREN

This Table contains the results of diet questionnaires completed by 2973 Tri-City school children. "Seafood" was defined as fresh crab meat, shrimp, oysters, or clams (other than canned or frozen). The early form used in the study asked for a numerical estimate of the children's consumption of seafood in terms of meals per year. The form was later revised to provide them with multiple choices that guided their answers, i.e., "Two or three times a week, once a week, twice a month, once a month, twice a year, very seldom, or never".