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DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

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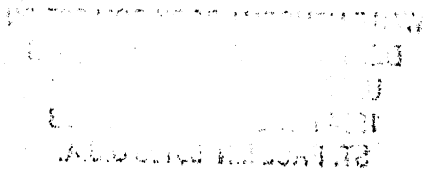

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by

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Young Children's Egg Consumption: Determinants and Policy Implications

ABSTRACT: Widespread concerns about cholesterol have resulted in lowering consumers' egg consumption. Children one to five years of age consume more eggs if their mother/caretakers eat more eggs, and they consume fewer eggs if their mother/caretakers have higher levels of education or if the children attend a child-care facility serving meals. Older children eat fewer eggs than younger children. Mother/caretakers' egg consumption is negatively affected by income levels and educational levels and positively affected by being non-Caucasian. Children's egg consumption is less responsive to factors that increase egg consumption than are adults' intakes. Children's mean cholesterol intake levels are higher than recommended levels for non-Caucasians, as opposed to Caucasians, and for all of those in low-income groups—the same groups whose egg consumption is highest when compared with those of other groups. The study's results indicate that there is a clear unmet need for nutrition education for mother/caretakers (and notably for Food Stamp Program participants), who are in lower-income and frequently less-educated groups and who, under the existing programs, receive very little or no education focused on healthful nutrition for young children. WIC is an appropriate vehicle for lessening cholesterol intake of young children in the highest-risk cordons for succumbing to premature arteriosclerosis.

Young Children's Egg Consumption: Determinants and Policy Implications

The purpose of this research effort is to assess and analyze the implications of the considered determinants of young children's egg consumption, including information about cholesterol, and draw policy applications therefrom. Concerns about cholesterol have been blamed for a steady decrease in total egg consumption since 1969 (Putler, 1987 and 1988; Brown and Schrader, 1990; Putler & Frazao, 1991; Senauer, Asp, & Kinsey, 1991; Lutz *et al.*, 1992). These concerns may also be partly responsible for eggs' status as an inferior good, meaning that the quantity consumed is lower for higher-income households [Continuing Survey of Food Intakes by Individuals (CSFII), 1985]. Table 1 shows this pattern holding for children's egg consumption as well. On the other hand, eggs contain almost perfect protein, and they are viewed by authorities on child nutrition as "good for children" (Department of Health, 1981; McWilliams, 1986a and 1986b; Maryland Buttriss, 1987). Further, they are an important part of young children's diets in the United States no matter what their cultural backgrounds (CSFII, 1985 and 1986).

Cholesterol

There is apparently a widespread awareness among people in the United States in regard to cholesterol intake and heart disease. In the 1985 National Health Institute Survey, 80% of the respondents stated that "high cholesterol" increases a person's chances of "getting heart disease." In the Health and Diet Survey conducted in 1986, 40% named cholesterol as a cause of heart disease and more than 60% identified dietary changes (eating less cholesterol) as a way to reduce serum cholesterol [U.S. Department of Health and Human Services (USDHHS) & U.S. Department of Agriculture (USDA), 1989].

The U.S. Senate, USDHHS & USDA, the American Heart Association, and the National Research Council have all recommended that an individual's cholesterol intake in one day be less than 300 milligrams (mg). These recommendations have been widely promulgated in the media and in numerous government publications (U.S. Senate Select Committee on Nutrition and Human Needs, 1977a and b; American Heart Association, Nutrition Committee, 1988; Federal Register, 1990; National Cholesterol Education Program, 1990). The "Daily Reference Value" (DRV)[1] of 300 mg is now used by the FDA as the allowable limit in calculating the percentages used in food labeling. This is also the amount recommended by the American Academy of Pediatrics (1992b) as the upper bound for daily cholesterol intake for young people 1 to 19 years of age. The widespread awareness of higher than recommended cholesterol intakes as health hazards on the part of the population in the United States is partially a consequence of the wide dissemination of these recommendations, as well as their reinforcement by physicians' recommendations and the cholesterol percentages on food labels. Brown and Schrader (1990) and Putnam (1990) found significant correlations between the decrease in the consumption of eggs and the dissemination of consumer information concerning cholesterol.

Furthermore, there is general agreement in the literature that dietary cholesterol intake has a small but definite effect on serum cholesterol levels (USDHHS & USDA, 1989). One large white shell egg contains 213 mg of cholesterol (USDA Human Nutrition Information Service, 1989; Bowes, 1994). Children are held to be at risk for diseases associated with cholesterol and atherosclerosis when their total blood cholesterol level is over 200 mg per liter of blood (Barma, 1992).[2] The average cholesterol intake for young people 1 to 19 years of age, according to the American Academy of Pediatrics (1992a), is 193 mg per day, which is less than the cited 300 mg limit. Barma, however, further states that, "When children of today grow up in 90% of them arteriosclerosis will develop and more than 50% will die of

hypertension and arteriosclerosis." Also, "Prevention should be started in childhood when vessel alterations are only at an early stage." Garcia and Moodie (1989) wrote "Coronary heart disease is the leading cause of death in the United States, and there is reason to believe that [what causes] it happens in childhood." In their cholesterol surveillance study, which used data from blood samples of 6,500 children between 3 and 18 years of age, 1,251 children (19%) exceeded the recommended limit of 200 mg per liter of blood, and they recommended that all children older than 3 years of age should have a cholesterol test. Harmon (1992) maintains that the highest at risk groups of premature arteriosclerosis disease in the United States are African Americans, those with less education, and those in lower socioeconomic groups often found in inner cities and rural areas.

Comparing USDA data for 1977-78 and 1986, the percent of children one to five years of age reported as eating eggs on the surveyed day fell from 33% in 1977 to 28.5% in 1985 (Nationwide Food Consumption Survey, 1977-78; CSFII, 1986). Still, 56.6% of the surveyed children ate eggs at least once in four nonconsecutive days of the CSFII in 1986. This is important to note in the context of cholesterol intake levels which remained high for some groups.

Table 2 shows the mean cholesterol intake and intake of selected percentiles among children one to five years of age in the United States in 1985 and 1986. Additional breakdowns are given for age, ethnic group, income, education of mother/caretaker, region, and urbanization. Mean intake levels for all children and for all subgroups were below the recommended limit of 300 mg per day. Several subgroups in the 75th percentile, however, exceeded a 300 mg intake per day. They were children three to five years of age, children living below 131% of the poverty level, those with mother/caretakers with less than a high school education, those living in the northeastern or western regions of the United States, and those living in nonmetropolitan areas. All subgroups exceeded 300 mg daily intake in the 90th

percentile, although the variance of intake estimates is much higher for the upper percentiles due to a smaller number of individuals.

Methods

In CSFII 1985 and 1986, data for 1,503 women (19 to 50 years of age) and 548 of their children (1 to 5 years of age) living in the 48 conterminous states of the United States were collected first by personal contact and, subsequently, for 91% of the sample, by phone, in six separate interviews. Then 1,451 women and 509 of their children in the same states and age groups as those surveyed in 1985 provided data in the first day of the interviews in 1986, and 1,102 women and 347 of their children provided data in all six interviews in the 1986 survey, the last of which was in March, 1987. Informants were asked to provide six separate days of dietary data, relying upon 24-hour recall, at intervals of approximately two months, over a one-year period. The household informant was the "female head of the household" if she was between 19 and 50 years of age. If the female head was not age eligible, the age-eligible woman, who was the meal preparer or who could best answer the questions in the survey concerning herself and her children, was questioned. Each woman interviewed, appropriately termed "mother/caretaker" in this study, provided information on her own food intake and that of her children for food eaten at home and/or away from home, and on salt and fat intake, as well as information on her age, race, physiological status (especially pregnancy and lactation), employment, occupation, education, and household income. Interviews were scheduled so that food intake would be representative of eating patterns in different seasons and on different days of the week. The surveys were designed to provide a multistage, stratified probability sample representative of the population in the 48 conterminous states and its degree of urbanization and geographic distribution. (The descriptions of the sample design, the sampling procedures, and the assignments of sample weights appear in CSFII,

1985 and 1986, Appendices A, B, and C.) Tobit analyses were used in this inquiry in the attempt to find the significant variables explaining egg consumption for young children (Maddala, 1983; SHAZAM, 1993, p. 269).

Model

Children's egg consumption was modeled as a function of the mother/caretaker's egg consumption, the child's age, the child's sex, and whether the child attends a child-care facility that provides meals. The mother/caretaker's egg consumption was modeled in a separate analysis as a function of household characteristics, the mother/caretaker's characteristics, and the consumer price indices of eggs and several possible substitutes and complements—variables found to influence egg consumption, in general, in previous studies (Burk, 1968, Chapter 9; Buse & Salathe, 1979; Davis, 1982; Haidacher *et al.*, 1982; Putler & Frazao, 1994). The two equations used were

C = f(M, A, S, CC) and

M = f(y, y^2, wic, numfs, ed, agefp, nw, s, r, cpie, cpic, cpich, cpiba, cpib, cpigb, cpip, cpicf, cpiff, cpichi).

Variables in the equation using those associated with egg consumption by children were

C = Child's egg consumption,

M = Mother/caretaker's egg consumption,

A = Child's age,

S = Child's sex, and

CC = Child attends a child-care facility serving meals (dummy variable).

For the equation modeling mother/caretaker's egg consumption,

y = Income,

y^2 = Income square,

wic = Household participates in Women, Infants, and Children (WIC) supplementary food program (dummy variable),

numfs = Number of household members receiving food stamps,[3]

ed = Mother/caretaker's education, years,

agefp = Mother/caretaker's age,

nw = Mother/caretaker is non-Caucasian (dummy variable),

s = Size of household,

r = Household is rural (dummy variable),

cpie = Consumer Price Index (CPI) for eggs during interview month,

cpic = CPI for cereal during interview month,

cpich = CPI for cheese during interview month,

cpiba = CPI for bacon during interview month,

cpib = CPI for beef and veal during interview month,

cpigb = CPI for ground beef during interview month,

cpip = CPI for pork during interview month,

cpicf = CPI for canned fish during interview month,

cpiff = CPI for fresh fish during interview month, and

cpichi = CPI for chicken during interview month.

Egg consumption was expressed in grams of eggs consumed during each meal on the day reported in the interview.[4]

The ages of the mother/caretaker and her child were calculated from the date of birth.

Income was the mother/caretaker's estimate of the previous month's income and the total income of all household members from all sources, before taxes, in the previous year before the interview.

The mother/caretaker's education was reported as the highest year of formal schooling. Formal schooling did not include educational efforts unless credit was given that was acceptable at a regular school or college.

Household size included all individuals who regularly occupied the housing unit.

Race was self-reported by adult respondents as Caucasian, African American, Asian/Pacific Islander, or Aleut/Eskimo/American Indian. Children were assigned the race of their mother/caretakers. Caucasian or non-Caucasian was used as the variable in this study in order to have sufficiently larger cells.

The consumer price indices for eggs, cereal, cheese, bacon, beef and veal, ground beef, pork, canned fish, fresh fish, and chicken, during the interview month, appeared in the January issue of the monthly labor review of the U.S. Department of Labor (1986 and 1987).

Findings

Estimated coefficients and t-ratios for the children's egg consumption equation appear in Table 3. Egg consumption by mother/caretakers was a highly significant variable (significant at the 99% level) in the estimation for children's egg consumption for any meal as well as in estimations for breakfast and other eating occasions combined. The elasticities, however, for mother/caretakers' egg consumption, with respect to children's egg consumption, are all less than one: The elasticities were 0.43 for any meal; 0.37 for breakfast; and 0.18 for lunch, dinner, and snacks combined.[5] This suggests that children's egg consumption may not be as responsive as mother/caretakers' egg consumption to factors acting to decrease egg consumption. The lower responsiveness suggests a possible need for nutrition education with greater emphasis on healthy diets for children.

The child's age was negative and highly significant in the equations for any meal; somewhat less but still significant for breakfast; and significant only at the 90% level for lunch, dinner, and snacks. Thus, younger children appear to be consuming more eggs at all meals than older children. The gender of the child was not significant in any equation. The child's attendance at a child-care facility with meals was negative and significant at the 90% level for the children's egg consumption for any meal and negative and significant at the 95% level for breakfast. This variable had a positive but insignificant effect on egg consumption at other eating occasions. The results suggest that this variable may be capturing effects of the mother/caretaker's employment. Egg consumption in the morning may be lower for children attending child-care facilities, because eggs require more labor to prepare than some other breakfast foods. A supplemental explanation is that child-care facilities serving breakfast are less likely to serve eggs. This appears not to be the case for lunch, however, since the dummy variable for child care with meals was positive and insignificant.

Coefficient values and t-ratios for mother/caretakers' egg consumption appear in Table 4. Income, an explanatory variable for children, as indicated earlier in Table 1, was also negatively significant at the 99% level in estimations explaining mother/caretakers' egg consumption for any meal; at the 95% level for breakfast; and at the 99% level for lunch, dinner, and snacks (Table 4). The variable for income squared for mother/caretakers was positive and significant at the 95% level for any meal, lunch, dinner, and snacks, suggesting that the negative effect of income declines as income increases. The clear negative effect of income suggests that eggs are an inferior good.

The participation in the WIC program was also a negative indicator, significant at the 95% level for any meal and breakfast, even though shell eggs were part of the WIC package. The number of people in a household receiving food stamps was

negatively significant at the 95% level for lunch, dinner, and snacks. The significantly negative effect of WIC participation is consistent with the negative income effect. The same implication applies to the negative effect of food stamps on egg consumption for lunch, dinner, and snacks. As income increases through WIC benefits and food stamp income, it appears that households substitute other preferred protein sources for eggs.

The mother/caretaker's educational level was negative and significant at the 99% level for any meal, breakfast, lunch, dinner, and snacks. Education was the most statistically significant variable explaining the mother/caretaker's egg consumption for breakfast. The coefficient for being non-Caucasian was positive for all equations and significant at the 95% level for any meal and breakfast, though not significant for lunch, dinner, and snacks. The coefficient for household size was positive and significant at the 95% level for any meal and at the 99% level for breakfast but, again, not significant for lunch, dinner, and snacks. The dummy variable for rural households was negative but only significant at the 90% level for any meal. None of the price variables was significant (Table 4).

The effects of income, education, ethnic group, household size, and rural location may also be capturing some effects of the mother/caretaker's employment, which is not included herein. Mother/caretakers working outside of the home may choose foods requiring less preparation time.

Summary and Conclusions

Widespread concerns about cholesterol resulted in notable decreases in the quantity of shell eggs sold to consumers between 1977 and 1990. Still, as noted earlier, over half of the children in households surveyed were reported as having eaten eggs in four nonconsecutive days of the survey in 1986. Mother/caretakers' egg consumption was the most significant variable explaining children's egg consumption, yet elasticities of children's egg consumption with respect to mother/caretakers' egg

consumption are less than one, suggesting that children's egg consumption is less responsive to factors decreasing egg consumption in adults. The child's age significantly affected the child's egg consumption negatively (except for dinner), leading to the surmise that older children eat fewer eggs than younger children in the age group studied. Children who attend child-care facilities that serve meals apparently ate fewer eggs at home for breakfast.

Income significantly and negatively affected the mother/caretakers' egg consumption for any meal. Eggs are an inferior good for mother/caretakers. Measures increasing income and the educational level of mother/caretakers in poor households with children would affect the egg consumption of children in those groups found to have an intake of more than 300 mg per day.[6] The household's participation in the WIC program significantly decreased mother/caretakers' egg consumption for breakfast. The number in the household receiving food stamps was negative for lunch, dinner, and snacks. Apparently, the negative income effect of the programs was significant. This was clearly an inferior good. The highly significant negative effect of education on mother/caretakers' consumption of eggs reflects the increased concern about cholesterol among educated consumers—a previously noted finding (Putler, 1987; Senauer, Asp, & Kinsey, 1991). Lower egg consumption of rural mother/caretakers for any meal has no rationale that we could find in the literature. Higher egg consumption by non-Caucasian mother/caretakers and mother/caretakers in larger families for breakfast suggests that these households and the children of these households may still be the largest consumers of more traditional "American" breakfasts (Senauer, Asp, & Kinsey, 1991). Mother/caretakers in the larger-sized households may also be less likely to be working outside of the home and have less pressure to choose foods with lower preparation time.

This study, and the many referred to by Harmon (1992), points to the need to both increase and broaden the information available to mother/caretakers of young

children concerning the relationship between cholesterol intake and egg consumption. Egg cartons in food retail outlets carry information on labels required by the FDA on the percentages of nutrients and of cholesterol that each egg provides (Feick, Herrmann, & Warland, 1986; Federal Register, 1990). The information, while adding to awareness of mother/caretakers regarding healthy diets for young children, may not, however, be sufficient if the components of the diets are to change (Lenahan *et al.*, 1972; Richardson *et al.*, 1987; U.S. Congress, House of Representatives Committee on Agriculture, 1992; Putler & Frazao, 1994). That appears to require effective nutrition education, such as that provided in connection with WIC or under the Expanded Food and Nutrition Education Program (EFNEP) of the Agricultural Extension Service of the USDA programs, that will reach households where children have the highest probabilities of being at risk for arteriosclerosis in later life, according to the analyses in this study and in Harmon (1992) and the studies to which she refers [USDA Food and Nutrition Service, 1986; Del Tredici *et al.*, 1988; Randall, Brink, & Joy, 1989; General Accounting Office (GAO), 1992]. Both the WIC and EFNEP program activities should be expanded. But it would also be well to reach a much higher proportion of mother/caretakers of young children in the United States who, it would appear from examining their children's diets as reported in CSFII (1985 and 1986), are not being reached.

The low elasticity of children's egg consumption with respect to mother/caretakers' egg consumption has an important implication. Children's egg consumption appears to be less responsive to factors which decrease egg consumption for adults. Children's cholesterol intake levels are higher than recommended levels for several population groups, and some of these appear to be the same groups with higher egg consumption. These results indicate a need for nutrition education focused on healthy diets for children.

In particular, lower income mother/caretakers, especially those with lower education levels, those who are non-Caucasian, and those with larger-sized families have higher egg consumption, and children from these households have higher than recommended levels of cholesterol intake. Appropriate nutrition education might be channeled through the media or in connection with food-assistance program benefit delivery, especially for Food Stamp Program participants, who are in low-income groups. It also appears to be desirable to widely disseminate dietary guidelines for young children that take into consideration the probabilities of dietary related diseases to which they will be prone in later life.

WIC eligibility requirements restrict participation to expectant mothers, lactating mothers, and children under five years of age, who all have household incomes below the poverty level and are, therefore, in the highest at risk population groups for succumbing to heart disease due to arteriosclerosis. Consequently, WIC is an appropriate vehicle for the lowering of cholesterol intake among participants. The required physical examination by a medical professional for applicants and their children could include a test for excess blood cholesterol. The prescription for the package containing suitable foods, which the participants receive, could, for expectant mothers and mother/caretakers and their children, whose blood contains more than 200 mg of blood cholesterol, specify cholesterol-free but nutritionally desirable available substitutes for both eggs and milk. (Milk also contains cholesterol.)

Still, the results of this study do not lead to the conclusion that mother/caretakers and their children should not consume any eggs, which are still recommended sources of protein. They mean that, unless the mother/caretakers and/or their children have been diagnosed as having a level of blood cholesterol above 200 mg per liter of blood, the number of eggs eaten in a 24-hour period should not exceed the number above which over 300 mg of cholesterol is being ingested thus

increasing the probabilities of mother/caretakers and their children suffering from arteriosclerosis or atherosclerosis in later life.

Notes

1. The DRVs appear on labels of legally specified packages and cans of food, and on labels of beverage containers, sold at retail in the United States. They provide consumers with information on the quantities and percentages of fat, fatty acids (saturated and unsaturated), cholesterol, carbohydrates, fiber, sodium, and potassium contained in a serving size shown on the label and the appropriate quantities for diets containing 2,000 calories and, generally, 2,500 calories—the standards used by the Food and Drug Administration (FDA), 2,000 for women and 2,500 for men, as typifying daily dietary intakes for many persons in the United States or one that the bulk of the population can use when estimating their requirements based on their own dietary intakes (Federal Register, 1990).
2. Since low-density lipoprotein (LDL), one form of serum cholesterol, increases the risk of atherosclerosis and high-density lipoprotein decreases that risk, the quantity of each is significant and the ratio of high-density lipoprotein to total cholesterol is a better predictor of risk. Still, there is no disagreement in the literature regarding the association between higher levels of cholesterol intake and the increased risk of heart disease (Willet, 1994). Estimates derived from epidemiological data indicate that more than half of the people in western industrial societies (including the United States) has a level of circulating LDL that puts them at high risk of developing a disease associated with excessive intake of cholesterol, particularly arteriosclerosis. Arteriosclerosis is defined, according to the Interagency Committee on Nutrition (with members from USDHHS & USDA), as a progressive process that begins in childhood with the appearance of lesions in the form of fatty streaks in the lining of the arteries. Atherosclerosis refers to only the coronary arteries or aorta, according to the American Academy of Pediatrics

(1992a). The lining of the arteries, the endothelium, is the first defense against the formation of fatty streaks in the arteries. Monocytes, a kind of platelet, penetrate injured or weak arterial linings (lesions appear) and become foam cells. Foam cells gather up LDL from the endothelium and cause fatty streaks to become fatty fibrous (eventually bone-like) plaque. Relatively high dietary intakes of cholesterol (and saturated fat derived from animal tissue) deleteriously limit LDL receptor manufacture—the second defense against the formation of fatty streaks in the arteries (Brown & Goldstein, 1984; Perry, 1995). Accumulated plaque narrows the arteries, reducing blood flow to the heart and leading, when it becomes sufficiently extensive, to the occurrence of angina pectoris (chest pain), myocardial infarction (heart attack), or sudden death. These are the most common manifestations of coronary heart disease (USDHHS & USDA, 1989; Perry, 1995).

3. The number in the household receiving food stamps was used as a variable instead of whether or not the household was receiving food stamps to avoid the collinearity problem caused by also using the variable "income." This was not a problem in the case of participation in WIC.
4. Consumption of eggs for breakfast, lunch, dinner, and snacks are included in the analysis, because customary meal patterns are among determinants of what will be eaten (Burk, 1968; Glazer, 1988).
5. Elasticities were reported in the SHAZAM output for the Tobit estimation. They are estimated as $\beta_{FPE} \bullet \text{Prob}(CE > 0) \bullet FPE/E(CE)$, where β_{FPE} is the coefficient on the mother/caretaker's egg consumption, CE is children's egg consumption, and FPE is the mother/caretaker's egg consumption. The probability that the child's egg consumption is greater than zero for given values of the independent variables is $\Phi(\beta' X/\sigma)$, where Φ is the normal cumulative density function, β is the vector of

all normalized coefficients for children's egg consumption, X is the matrix of independent variables, and σ is the standard deviation of the residuals.

6. This would not necessarily mean eliminating egg yolks (only the yolks contain cholesterol in eggs) completely from these children's diets. If they drank more than four glasses of whole milk a day, since a glass of whole milk has 33 grams of cholesterol (Bowes, 1994), and ingested more than 168 grams of cholesterol from other foods and/or beverages in their daily diets, it would.

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TABLE 1

Percentage of children aged one to five years old, eating eggs at least once, four non-consecutive days, 1986

Income level	
Under 131% of poverty	67.0
131-300% of poverty	54.6
Over 300% of poverty	47.3

Note: The 1986 poverty threshold for a household of four was $11,000. It ranged from $5,360 for a one-person household to $18,520 for an eight-person household. For larger households, $1,880 was added for each additional member. To calculate the percent of poverty level, each household's income before taxes was divided by the federal inter-agency poverty guideline for that year for a household of the appropriate size .

Source: CSFII (1985 and 1986).

TABLE 2

Cholesterol: Mean intake in milligrams, children one to five years of age, four nonconsecutive days: Continuing survey of food intakes by individuals, 1985-86

Characteristics	Mean intake			Intakes at selected percentiles						
	n	Mean	SEM[a]	5	10	25	50	75	90	95
All children[b]	647	228	5.7	87	108	147	201	292	378	445
Age										
1-2 years	224	219	8.9	75	100	143	195	276	364	429
3-5 years	423	233	6.4	94	114	148	204	300	382	449
Race[d]										
Caucasian	559	222	6.2	86	103	145	195	292	365	426
African American	53	260	20.6	[c]		179	236	285		
Other	26	296	36.5				295			
Poverty status[d]										
< 100	140	269	15.2	105	124	169	236	330	458	564
≥ 100	471	220	6.5	94	106	145	194	285	358	419
< 131	192	257	12.2	103	124	168	229	318	415	533
≥ 131	419	219	6.9	90	103	143	194	285	358	422
Education[d]										
< High school	99	273	18.6		140	180	243	328	523	
High school	252	234	7.9	95	115	165	211	299	382	426
> High school	295	211	7.6	87	100	137	183	266	350	418

(Continued on next page.)

TABLE 2—continued.

Characteristics	Mean intake			Intakes at selected percentiles						
	n	Mean	SEM[a]	5	10	25	50	75	90	95
Region										
Northeast	111	238	15.6		94	131	205	313	429	
Midwest	199	215	11.3	89	100	140	199	268	342	380
South	187	225	9.3	98	114	154	194	287	365	416
West	150	238	9.9	94	117	151	206	303	415	477
Urbanization										
Central city	171	239	12.4	108	124	165	217	292	416	458
Suburban	310	214	8.0	87	99	138	188	264	358	414
Nonmetropolitan	166	249	8.9	94	114	173	228	307	407	445

[a]SEM is standard error of the mean.

[b]Excludes two breast-fed children.

[c]Blanks indicate that data are not available.

[d]Race, poverty status, and education were not reported for all children. Therefore, the number of children in each category does not sum to the number of all children.

Source: USDHHS and USDA, 1989.

TABLE 3

Children's egg consumption

	Any meal	Breakfast	Lunch, dinner, and snacks
Mother's egg consumption	0.015[a] (24.64)	0.014[a] (22.09)	0.022[a] (16.82)
Child's age	-0.053[a] (-3.14)	-0. 044[c] (-2.50)	-0.047[b] (-1.67)
Child's sex	0.013 (0.27)	-0.002 (-0.04)	-0.030 (-0.38)
Attends child care with meals	-0.124[b] (-1.75)	-0. 177[c] (-2.32)	0.083 (0.76)
Constant	-0.774[a] (-8.81)	-0.883[a] (-9.59)	-1.630[a] (-11.55)
Total observations	3236	3236	3236
Total eating eggs	839	691	176
Squared correlation between observed and expected values	0.17	0.16	0.10
Log-likelihood	-5706.7693	-4810.6428	-1453.5775

[a]Significant at alpha = 0.01.

[b]Significant at alpha = 0.10.

[c]Significant at alpha = 0.05.

TABLE 4

Food preparer's egg consumption

	Any meal	Breakfast	Lunch, dinner, and snacks
Full income (in thousands)	-0.031[a] (-3.82)	-0.021[b] (-2.39)	-0.039[a] (-3.22)
Full income squared	4.0×10^{-4}[b] (2.29)	2.1×10^{-4} (1.13)	6.3×10^{4}[b] (2.54)
Receives WIC (dummy)	-0.068[b] (-2.17)	-0.083[b] (-2.32)	-0.004 (-0.10)
Number of household members receiving food stamps	-0.012 (-1.23)	-3.4×10^{4} (-0.03)	-0.044[b] (-2.54)
Food preparer's education	-0.048[a] (-5.92)	-0.038[a] (-4.37)	-0.047[a] (-3.82)
Food preparer's age	-0.004 (-1.18)	-0.003 (-0.93)	-0.002 (-0.39)
Food preparer is non-Caucasian (dummy)	0.106[b] (2.13)	0.127[b] (2.44)	-8.4×10^{4} (-0.01)
Household size	0.036[b] (2.23)	0.049[a] (2.87)	-0.045 (-1.60)
Household is rural (dummy)	-0.104[c] (-1.87)	-0.070 (-1.20)	-0.125 (-1.34)
Egg CPI	0.010 (0.77)	0.015 (1.11)	5.8×10^{4} (0.03)
Cereals CPI	-0.018 (-0.20)	0.010 (0.10)	-0.100 (-0.71)
Cheese CPI	-0.224 (-0.55)	-0.350 (-0.80)	0.384 (0.60)

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TABLE 4—continued.

	Any meal	Breakfast	Lunch, dinner, and snacks
Bacon CPI	-0.028 (-0.27)	-0.017 (-0.16)	0.014 (0.09)
Beef and veal CPI	-0.087 (-0.38)	-0.10 (-0.42)	-0.008 (-0.02)
Ground beef CPI	-0.049 (-0.39)	-0.073 (-0.53)	-0.024 (-0.12)
Pork CPI	0.068 (0.49)	0.056 (0.38)	0.004 (0.02)
Canned fish CPI	-0.079 (-0.26)	-0.056 (-0.17)	0.132 (0.28)
Fresh fish CPI	0.060 (0.67)	0.089 (0.92)	-0.072 (0.51)
Chicken CPI	-0.035 (-1.31)	-0.039 (-1.42)	-0.006 (-0.13)
Constant	38.22 (0.71)	45.664 (0.79)	-31.4 (-0.38)
Total observations	3236	3236	3236
Number eating eggs	783	634	166
Squared correlation between observed and expected values	0.04	0.03	0.02
Log-likelihood	-5767.1121	-4830.9517	-1473.4095

[a]Significant at alpha = 0.01.

[b]Significant at alpha = 0.05.

[c]Significant at alpha = 0.10.