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Expenditures on Children by Families: U.S. Department of Agriculture Estimates and Alternative Estimators¹

Data on expenditures on children are used in a variety of ways. These child-rearing expense estimates are most often used in determining state child support guidelines and foster care payments. In 1998, 52% of children lived with their original two parents; the remaining 48% of children lived with either a single parent, a parent and stepparent, or in some other arrangement (The University of Chicago News 1999). Because so many children make their primary residence with only one of their biological parents, child support has become important. The Family Support Act of 1988 required States to implement numeric child support guidelines that are to be followed and to consider economic data on the cost of raising children in these guidelines. In 1982, about 262,000 children were in foster care. By 1998, about 520,000 children were in foster care (U.S. Department of Health and Human Services 1999). Most children in foster care live in with a relative or nonrelative who is monetarily compensated by the State to help cover the cost of the children living with them.

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There are many other uses of estimates of child-rearing expenses. Courts use the estimates to determine damages in malpractice cases, especially for women who give birth after undergoing surgical procedures to prevent pregnancy. These women are compensated on the cost of the child they did not expect.

Since 1960, the United States Department of Agriculture (USDA) has provided annual figures of expenditures on children. USDA is the only government department providing these estimates on an annual basis. This paper reviews the USDA methodology for estimating child-rearing expenses and discusses overall findings. Alternative methods for estimating child-rearing expenses also are reviewed and compared to the USDA figures. This should give the reader a better understanding of the USDA child-rearing expense estimates as well as how they compare to alternative estimates.

USDA Estimates of Expenditures on Children by Families

Methodology

The USDA provides annual estimates of expenditures on children from birth through age 17 by married-couple and single-parent families. (For a detailed description of the USDA methodology to estimate child-rearing expenses, see Lino 2001.) These expenditures on children are for the major budgetary components: housing, food, transportation, clothing, health care, child care and education, and miscellaneous goods and services. Items in each expenditure category are described below.

Housing expenses consist of shelter (mortgage interest, property taxes, or rent; maintenance and repairs; and insurance), utilities (gas, electricity, fuel, telephone, and water), and house furnishings and equipment (furniture, floor coverings, major appliances, and small appliances). For homeowners, housing expenses do not include mortgage principal payments; in the data used, such payments are considered to be part of savings.

Food expenses consist of food and nonalcoholic beverages purchased at grocery, convenience, and specialty stores, including purchases with food stamps; dining at restaurants; and household expenditures on school meals.

Transportation expense consists of the net outlay on purchase of

new and used vehicles, vehicle finance charges, gasoline and motor oil, maintenance and repairs, insurance, and public transportation.

Clothing expenses consist of children's apparel such as diapers, shirts, pants, dresses, and suits; footwear; and clothing services such as dry cleaning, alterations and repair, and storage.

Health care expenses consists of medical and dental services not covered by insurance, prescription drugs and medical supplies not covered by insurance, and health insurance premiums not paid by the employer or other organization.

Child care and education expenses consist of day care tuition and supplies; baby-sitting; and elementary and high school tuition, books, and supplies.

Miscellaneous expenses consist of personal care items, entertainment, and reading materials.

The latest child-rearing expenses are based on the 1990-92 Consumer Expenditure Survey (CE) updated to 2000 dollars using the Consumer Price Index (CPI). (Expenditure and income data for 1990 and 1991 were first converted to 1992 dollars; then all 3 years of data were updated to 2000 dollars.) The CE, administered by the Bureau of Labor Statistics (BLS), United States Department of Labor, is the only Federal survey of household expenditures collected nationwide. It collects information on sociodemographic characteristics, income, and expenditures of a nationally representative sample of households.

The CE interviews about 5,000 households each quarter over a one-year period. Each quarter is deemed an independent sample by BLS and may be annualized; thus, the total number of households in the 1990-92 survey is about 60,000. Husband-wife and single-parent families were selected if they were complete income reporters. Complete income reporters are households that provide values for major sources of income, such as wages and salaries, self-employment income, and Social Security income. Quarterly expenditures were annualized. The sample consisted of 12,850 husband-wife households and 3,395 single-parent households. BLS weighting methods were used to weight the sample to reflect the U.S. population of interest.

Child-rearing estimates are provided for the overall United States. The child-rearing expense estimates for husband-wife families are also provided for urban areas in four regions (Northeast, South, Midwest, and West) and rural areas throughout the United States. For single-parent families, estimates are provided only for the overall United States because of limitations in the sample size.

The methodology employed by the USDA in determining child-rearing expenses specifically examines the intrahousehold distribution of expenditures using data for each budgetary component. The CE contains child-specific expenditure data for some budgetary components (clothing, child care, and education) and household level data for the other budgetary components (housing, food, transportation, health care, and miscellaneous goods and services). Multivariate analysis was used to estimate household and child-specific expenditures, controlling for income level, family size, and age of the child so expenses can be determined for families with these varying characteristics (regional expenses were also derived by controlling for region).

Child-rearing expense estimates are provided for three income groups of husband-wife families. These income groups were determined by dividing the sample for the overall United States into equal thirds. Income groups of single-parent households were selected to correspond with the income groups used in estimating Child-rearing expenditures in husband-wife households. However, the two higher income groups of two-parent families were combined because a small percentage of single-parent families were in the higher income group.

For each income level, the estimates are for the younger child in families with two children. The younger child is in one of six age categories: 0-2, 3-5, 6-8, 9-11, 12-14, and 15-17. Households with two children were selected as the standard because in 1990-92 this was the average household size. The focus was on the younger child in a household because the older child was sometimes over age 17.

The estimates are based on CE interviews of households with and without specific expenses; so for some families, expenditures may be higher or lower than the mean estimates, depending on whether they incur the expense. This particularly applies to child care and education for which about 50% of families in the study had no expenditure. Also, the estimates only cover out-of-pocket expenditures on children made by the parents and not by others, such as grandparents or friends. For example, the value of clothing gifts to children from grandparents would not be included in clothing expenses.

After the various overall household and child-specific expenditures were estimated, these total amounts were allocated among family members (i.e., in a married-couple, two-child family: the husband, wife, older child, and younger child). Since the

expenditures for clothing, child care, and education apply only to children, allocations of these expenses were made by dividing them equally among the children. Because the CE does not collect expenditures on food and health care by family member, data from other Federal studies were used to apportion these budgetary components to a child by age. The 1994 USDA food plans were used to allocate food expenses among family members. These plans, derived from a national food consumption survey, show the share of food expenses attributable to individual family members by age and household income level. These member food budget shares were applied to household food expenditures to determine food expenses on a child. Health care expenses were allocated to each family member based on data from the 1987 National Medical Expenditure Survey. This survey contains data on the proportion of health care expenses attributable to individual family members. These member budget shares for health care were applied to household health care expenditures to determine expenses on a child.

Unlike food and health care, no authoritative base exists for allocating household expenditures on housing, transportation, and other miscellaneous goods and services among family members. Two common approaches used in allocating these expenses are the per capita method and the marginal cost method. The marginal cost method measures expenditures on children as the difference in expenses between couples with children and equivalent childless couples. The method depends on development of an equivalency measure; however, there is no standard accepted measure. Various measures have been proposed, each yielding different estimates of expenditures on children. Also, the marginal cost approach assumes that the difference in total expenditures between couples with and without children can be attributed solely to the children in a family. This assumption is questionable. In addition, couples without children often buy homes larger than they need at the time of purchase in anticipation of children. Comparing the expenditures of these couples to similar couples with children could lead to underestimates of expenditures on children.

For these reasons, USDA uses the per capita method to allocate expenses on housing, transportation, and miscellaneous goods and services among household members. This method allocates expenses among household members in equal proportions. Although the per capita method has its limitations, these limitations are considered less severe than those of the marginal cost approach. It should be noted

Table 1. Estimated Annual Expenditures* on a Child by Husband-Wife Families, Overall United States, 2000

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child Care & Education	Misc.†	
				Before-Tax Income: Less Than \$38,000 (Average=\$23,800)					
0 - 2	\$6,280	\$2,400	\$880	\$770	\$380	\$440	\$800	\$610	
3 - 5	6,420	2,370	980	750	370	420	900	630	
6 - 8	6,520	2,290	1,260	870	410	490	530	670	
9 - 11	6,530	2,070	1,510	950	450	530	320	700	
12 - 14	7,380	2,310	1,590	1,070	760	540	230	880	
15 - 17	7,280	1,860	1,720	1,440	670	570	380	640	
Total	\$121,2300	\$39,900	\$23,820	\$17,550	\$9,120	\$8,970	\$9,480	\$12,390	
				Before-Tax Income: \$38,000 to \$64,000 (Average=\$50,600)					
0 - 2	\$8,740	\$3,250	\$1,060	\$1,150	\$440	\$580	\$1,310	\$950	
3 - 5	8,980	3,220	1,220	1,130	430	560	1,450	970	
6 - 8	8,990	3,140	1,550	1,250	480	630	930	1,010	
9 - 11	8,950	2,920	1,830	1,330	530	690	610	1,040	
12 - 14	9,690	3,150	1,840	1,450	890	690	450	1,220	

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child Care & Education	Misc. [†]
15 - 17	9,860	2,710	2,050	1,830	790	730	770	980
Total	\$165,630	\$55,170	\$28,650	\$24,420	\$10,680	\$11,640	\$16,560	\$18,510
Before-Tax Income: More Than \$64,000 (Average=\$95,800)								
0 - 2	\$13,000	\$5,160	\$1,400	\$1,610	\$580	\$670	\$1,980	\$1,600
3 - 5	13,280	5,130	1,580	1,590	570	640	2,160	1,610
6 - 8	13,160	5,050	1,910	1,710	620	730	1,490	1,650
9 - 11	13,020	4,830	2,220	1,790	680	790	1,030	1,680
12 - 14	13,870	5,070	2,330	1,910	1,120	790	790	1,860
15 - 17	14,260	4,620	2,450	2,310	1,020	840	1,390	1,630
Total	\$241,770	\$89,580	\$35,670	\$32,760	\$13,770	\$13,380	\$26,520	\$30,090

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 2000 dollars using the Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

[†]Miscellaneous expenses include personal care items, entertainment, and reading materials.

that for homeowners, housing expenses do not include mortgage principal payments; such payments are considered in the CE to be part of savings. Also, because transportation expenses resulting from work activities are not directly related to expenses on a child, these costs were excluded when determining children's transportation expenses. Based on data from a 1990 study by the U.S. Department of Transportation, employment-related transportation activities accounted for 38 to 40% of travel for households with children of various ages (U.S. Department of Transportation 1994).

Findings

Estimates of 2000 family expenditures on the younger child in husband-wife households with two children for the overall United States are presented in table 1. As the table shows, expenses on children vary considerably by household income level (income levels are for the bottom, middle, and upper third of the income distribution). Depending on age of the child, the annual expenses range from \$6,280 to \$7,380 for families in the lowest income group (2000 before-tax income less than \$38,000), from \$8,740 to \$9,860 for families in the middle-income group (2000 before-tax income between \$38,000 and \$64,000), and from \$13,000 to \$14,260 for families in the highest income group (2000 before-tax income more than \$64,000). On average, households in the lowest income group spend 28% of their before-tax income per year on a child; those in the middle-income group, 18%; and those in the highest income group, 14%.

As a proportion of total child-rearing expenses, housing accounts for the largest share. Based on an average for the six age groups, housing accounts for 33 to 37% of child-rearing expenses, depending on income. Food is the second largest average expense on a child for families regardless of income level, accounting for 15 to 20% of child-rearing expenses. Transportation is the third largest child-rearing expense, making up 14 to 15% of child-rearing expenses across income levels. Expenditures on a child are lower in the younger age categories and higher in the older age categories. This held across income groups. Expenses for the various budgetary components vary by each age group. Food expenses are highest for teenagers, whereas child care expenses are one of the largest expenses for preschoolers.

Adjustments for Older Children and Household Size

The expense estimates on a child represent expenditures on the younger child at various ages in a husband-wife household with two children. It cannot be assumed that expenses on the older child are the same at these various ages. Expenses may vary by birth order. The methodology for estimating expenses on the younger child was essentially repeated to determine whether a difference exists, the extent of this difference, and how the expenditures may be adjusted to estimate expenses on an older child. The focus was on the older child in each of the same age categories as those used with the younger child. A two-child family was again used as the standard. Household income and region of residence were not held constant, so findings are applicable to all families.

On average, for husband-wife households with two children, it was found that expenditures do not vary by birth order. So, the expenditures in table 1 reflect those on either a younger or older child in a two-child family. Thus, annual expenditures on children in a husband-wife, two-child family may be estimated by summing the expenses for the two appropriate age categories. For example, annual expenditures on children ages 9-11 and 15-17 in a husband-wife family in the middle-income group would be \$18,810 (\$8,950 + \$9,860).

The estimates should also be adjusted if a household has only one child or more than two children. Families will spend more or less on a child depending on the number of other children in the household and economies of scale. The methodology previously described was repeated, this time focusing on families with one child, and families with three or more children. Compared with expenditures for each child in a husband-wife, two-child family, husband-wife households with one child spend an average of 24% more on the single child, and those with three or more children spend an average of 23% less on each child. This is due to family income being spread over fewer or more children, and diseconomies or economies of scale. In larger size families, children may share a bedroom, clothing and toys may be handed down, and food may be purchased in larger, lower per-unit-cost packages.

Therefore, to adjust the figures in table 1 to estimate annual overall expenditures on an only child, 24% should be added to the total expense for the child's age category. To estimate expenditures on three or more children, 23% should be subtracted from the total

expenses for each child's age category and the totals should then be summed. For example, on average, a middle-income family with one child age 6-8 spends \$11,150 on the child ($\$8,990 \times 1.24$); a middle-income family with two children ages 6-8 and 15-17 spends \$18,850 on the children ($\$8,990 + 9,860$); and a middle-income family with three children ages 6-8, 12-14, and 15-17 spends \$21,980 on the children ($(\$8,990 + 9,690 + 9,860) \times 0.77$). (For child-rearing expense estimates by region, see Lino 2001.)

Single-parent Families

The estimates of expenditures on children by husband-wife families do not apply to single-parent families, a group that accounts for an increasing percentage of families with children. Separate estimates of child-rearing expenses in single-parent households were

Table 2. A Comparison of Estimated 2000 Expenditures on a Child by Lower Income Single-Parent and Husband-Wife Families

Age of Child	Single-Parent Households	Husband-Wife Households
0-2	\$5,270	\$6,280
3-5	\$5,950	\$6,420
6-8	\$6,710	\$6,520
9-11	\$6,260	\$6,530
12-14	\$6,730	\$7,380
15-17	\$7,460	\$7,280
Total (0-17)	\$115,140	\$121,230

Note: Estimates are for the younger child in two-child families in the overall United States with 2000 before-tax income less than \$38,000.

thus made by using the CE data. The method used in determining child-rearing expenses for two-parent households was followed. It was found that child-rearing expenses for single-parent families are similar to those of husband-wife families. For the lower income group (2000 before-tax income less than \$38,000), a comparison of

estimated expenditures on the younger child in a single-parent family with two children with those of the younger child in a husband-wife family with two children is presented in table 2. Most (83%) single-parent families and 33% of husband-wife families were in this lower income group. More single-parent than husband-wife families were in the bottom range of this lower income group. However, total expenditures on a child through age 17 are, on average, only 5% lower in single-parent households than in two-parent households. Single-parent families in this lower income group, therefore, spend a larger proportion of their income on children than do two-parent families.

For the higher income group of single-parent families (2000 before-tax income of \$38,000 and over), child-rearing expense estimates are about the same as those for two-parent households in the before-tax income group of over \$64,000. Total expenses, in 2000 dollars, for the younger child through age 17 are \$242,910 for single-parent families versus \$241,770 for husband-wife families. Child-rearing expenses for the higher income group of single-parent families, therefore, also are a larger proportion of income than they are in husband-wife families. Thus, expenditures on children do not differ much between single-parent and husband-wife households. What differs is household income levels. Because single-parent families have one less potential earner than do husband-wife families, on average, their total household income is lower, and child-rearing expenses are a greater percentage of this income.

USDA Child-Rearing Expense Estimates Compared With Other Estimators

There are other estimators to determine child-rearing expenses. (For more information, see Lino 2001.) Two of the most commonly used are the Engel and Rothbarth estimators. The Engel estimator is based on the work of Ernst Engel in the 19th century (see U.S. Department of Health and Human Services 1990 for a description of Engel's work as the original is in German), and the Rothbarth estimator is based on the work of Erwin Rothbarth in the 1940's (Rothbarth 1943). Both of these estimators are marginal cost approaches that are applied to overall expenses: expenses on children are measured as the difference between overall expenses of couples with children and equivalent childless couples. This difference is thought to represent additional or marginal expenditures couples

make on a child.

It should be noted that almost all studies applying the marginal cost method apply it to overall expenses, for to apply it to individual expenses may produce illogical results. For example, couples with children often have lower food expenses than couples without children as the former group eats out less often, uses coupons, and purchases larger sizes of food products that cost less per unit. In such cases, the marginal cost method, which would measure food expenses on children as the difference in food expenses between couples with children and those without children, would yield the improbable results that children have negative food expenses.

The Engel and Rothbarth estimators differ in the equivalency scale they use to compare couples with and without children. The Engel estimator assumes that if two families spend an equal percentage of their total expenditures on food, they are equally well-off. The Rothbarth estimator uses the level of excess income available to people after necessary expenditures on family members are made as the equivalency measure. Rothbarth defined excess income to include expenses on luxuries (alcohol, tobacco, entertainment, and sweets) and savings.

Table 3. Average Percentage of Household Expenditures Attributable to Children in Husband-Wife Families: A Comparison of Estimators

	Engel	Rothbarth	USDA
Number of children			
One	33	25	26
Two	49	35	42
Three	59	39	48
Household expenditure level			
Low	49	36	45
Average	49	36	42
High	49	35	39

Note: Percentages by number of children are based on average expenditures of all families. Percentages by household expenditure level are for a family with two children.

Both estimators have their limitations, as previously explained. Each assumes a “true” equivalency measure. Neither of the equivalency measures, however, has been validated as the “true” measure in the economics literature. More importantly, the marginal cost estimators do not provide direct estimates of how much is spent on a child. They estimate how much money families with children must be compensated to bring the parents to the same utility level (as gauged by an equivalence scale) of couples without children. This is a different question than “how much do parents spend on children?”

According to Burt Barnow, an economist who has studied the issue of estimating expenditures on children, “While they (the Engel and Rothbarth estimators) undoubtedly yield biased estimates of the true level of expenditures made on behalf of children, the direction of the bias is believed to be known.” He makes the argument that “the Rothbarth estimator is likely to provide a lower bound estimate of actual expenditures on children, while the Engel estimator is likely to provide an upper bound”(Barnow 1994).

How do child-rearing expenses derived from the Engel and Rothbarth estimators compare with USDA estimates? This comparison is shown in table 3 by number of children and total household expenditures. The results for the Engel and Rothbarth estimators are from a 1990 study that estimated husband-wife child-rearing expenses based on the 1980-87 CE; this study contains the most recent child-rearing expense estimates using the Engel and Rothbarth approaches (this study is summarized in U.S. Department of Health and Human Services 1990). USDA expenses are based on the 1995 study. The comparison is based on child-rearing expense estimates as a percentage of total family expenditures; hence, the estimates did not have to be converted into real dollars. For the USDA estimates, average expenditures of families in each income group (as derived from the CE data) were used to determine the percentages. It should be noted that total expenditures for the USDA study includes personal insurance and pension contributions (these budgetary components are considered expenses by BLS and are included in their definition of total expenditures), whereas the study implementing the Engel and Rothbarth techniques did not include these budgetary components in total expenditures. The USDA figures would likely be slightly higher if total expenditures minus personal insurance and pension contributions were used.

The Engel and Rothbarth techniques yield varying child-rearing expenses, which differ as much as 20 percentage points for a family

with three children. Thus, when using the marginal cost method in estimating expenditures on children, the choice of an equivalency measure is obviously critical since different measures yield different results. If Barnow is correct in that the Rothbarth technique is a lower-bound estimator of child-rearing expenses and the Engel technique is an upper-bound estimator, this gives credence to USDA child-rearing expenses because they are between those produced by the Engel and Rothbarth techniques. For families with one child and for families with a high expenditure level, USDA child-rearing expenses are closer to the Rothbarth estimates, whereas for families with a low expenditure level, USDA child-rearing expenses are closer to the Engel estimates. For families with two or more children and for families with an average household expenditure level, USDA child-rearing expenses are about in the middle of the Rothbarth and Engel estimates.

A preliminary report contains updates of the Engel and Rothbarth estimates using 1996-97 CE data. By number of children, the Rothbarth estimates are similar to the earlier estimates, whereas the Engel estimates are generally lower but above the USDA estimates listed in table 3.

It is sometimes argued that the USDA method overestimates child-rearing expenses because the per capita method is used to allocate housing, transportation, and miscellaneous expenses among household members. It is argued that child-related housing expenses should be measured as the difference in rent between one- and two-bedroom apartments. This argument assumes all children will reside in rental property. Housing expenses on an only child in a lower income and middle-income family for the overall United States were estimated by USDA to be about \$205 and \$285 per month, respectively, in 1996. This includes the cost of shelter as well as utilities, furnishings, home insurance, and appliances. According to the Census Bureau, the difference in median rental price between an efficiency/one-bedroom housing unit and a two-bedroom housing unit was about \$100 per month in 1996 dollars (U.S. Department of Commerce 1997). This does not include the cost for utilities for many units, furnishings, insurance, or appliances. Also, the USDA child-rearing housing expense includes the expenditures of homeowners and renters; housing costs for homeowners are typically higher than the costs for renters, as owned housing usually has more space than rental housing. The alternative, using a marginal cost procedure, could lead to severe underestimates of housing expenses

on a child, for as previously explained, many couples without children purchase a home in anticipation of having children. Hence, these couples without children would have housing expenses similar to couples with children.

As for transportation expenses, USDA child-rearing expenses do not include the 38 to 40% of total transportation expenses deemed to be work-related. Miscellaneous expenses include expenditures on personal care (toothpaste, haircuts, etc.), entertainment (video cassettes, toys, etc.), and reading material (books, magazines, etc.). Many of the goods and services in this category are child-oriented, so a per capita approach seems reasonable in allocating these expenses. Based on some of the goods and services that are included in this category, it could be argued that children consume more than a per capita share of these expenses. Therefore, it is not likely that USDA child-rearing expenses provide gross overestimates of expenditures on children for housing, transportation, and miscellaneous goods and services.

Conclusion

In summary, the USDA child-rearing expense estimates are a reasonable approximation of actual expenditures on children. They are based on methods that do not have the severe limitations of a marginal cost analysis. The child-rearing expense estimates may be used in determining child support payments, foster care rates, and in appraising damages from malpractice cases.

The figures provided by USDA are composed of direct parental expenses made on children through age 17. These expenditures do not include costs related to childbirth and prenatal health care, the cost of a college education, other parental expenses on children after age 17, and indirect costs involved in Child-rearing. Such indirect costs include the time allocated to child-rearing and decreases in earnings because of reduced time in the labor force for one or both parents. Studies that have examined these indirect costs typically have found that indirect costs exceed the direct costs of Child-rearing (Spalter-Roth and Hartmann 1990; Bryant et al. 1992; Ireland and Ward 1995).

Endnotes

1. More detailed information on the methodology to estimate child-rearing expenses and alternative estimators can be found in the administrative report “Expenditures on Children by Families, 2000 Annual Report” (Lino 2001).

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