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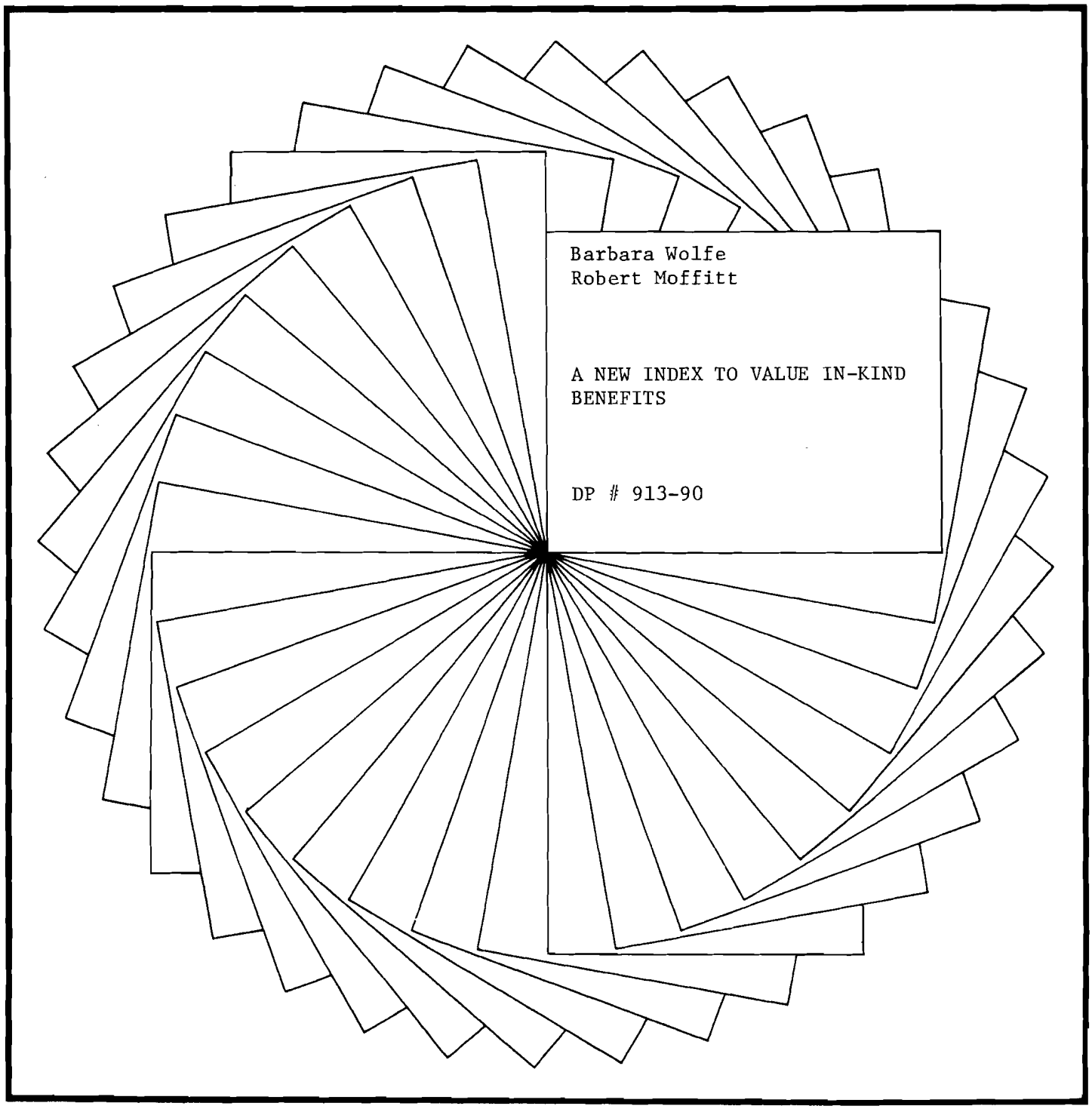

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A New Index to Value In-Kind Benefits

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Abstract

This paper presents a new approach to valuing in-kind benefits and a new index for that valuation. This approach is both individual (or family) specific and assigns a value to benefits for all those eligible for them, whether or not the benefits are actually used. The value is based on observed characteristics of the individual (and family) and location-specific factors likely to influence the value. The index is created for individuals and can be aggregated to obtain a family-specific value. An example of health insurance is used to demonstrate the approach. It is found that the value that single women with children place on health insurance depends on their own health status, the health status of their children, and their poverty status, among other factors.

A New Index to Value In-Kind Benefits

Valuing in-kind benefits such as those for medical care, food, and pensions is a difficult task. Many problems arise even in the valuation of fringe benefits in the private sector, and the problems are multiplied in the public sector. For example, in the private sector most medical insurance benefits are provided through the workplace and are valued differently from their cost to individuals on the open market because of differences in tax treatment, risk pooling, overhead, and coverage options.

In the case of public coverage, the valuation task is even more difficult because recipients do not pay for coverage. Three methods for valuing such coverage, especially medical coverage, have been suggested (Smeeding and Moon, 1980; Smeeding, 1982). The first, and most common, is the method of "government cost." Here a value of Medicaid benefits, for example, is obtained by dividing government expenditures, including administrative costs, by the number of recipients. This method overvalues benefits because it fails to address their in-kind nature--that is, the recipients cannot sell the coverage--and because it includes expenditures other than for medical care. A variant of this method divides expenditures by the number of eligibles rather than the number of users, for presumably even nonrecipient eligibles receive an implicit insurance benefit from the program. The second method calculates a cash-equivalent value of in-kind care by assuming a particular utility function and then imputing to broad groups of individuals--by income, for example--an average amount they would be willing to pay for the care. The second method is preferable but requires estimation of the parameters of the utility function, a difficult task. A third method values in-kind benefits by the amount of funds released for the purchase of other goods should the in-kind program be eliminated, and undervalues such benefits.

An alternative valuation approach is proposed here whose main objective is to address a major difficulty with all three approaches, which is their use of average values over large groups

when calculating benefit values. While none of the approaches requires such large-group averaging in theory, the available data usually dictate such averaging. For example, in the first method, available statistics for Medicaid expenditures are only available by state and sometimes for the aged and nonaged, and in the second and third methods, values can be generally calculated for only two or so demographic characteristics. For private sector fringe benefits, values may be available on a firm or union level or a more aggregated level. The values so obtained miss many important interfamily differences that affect valuations--for health insurance these include health status, the number of persons covered, expected utilization of medical care, the cost of medical care in the community (and to those with particular forms of coverage), and intensity of coverage; for life insurance, these include marital status, number and ages of children, assets, and health status.

These concerns are particularly important for valuing health insurance, since such valuation depends on expected utilization (expected loss), which differs substantially across the population.[1] In the sections below we first present our methodology for valuing in-kind or fringe benefits using health insurance as our example. Second we present empirical estimates of public health insurance and of private insurance for a particular population--single mothers and their children. They are a unique group, since they are potentially eligible for public coverage, if they meet the income/asset test, or for private coverage, should they secure a job at a firm offering such coverage or buy it directly. This is a particularly interesting group in that their potential eligibility for public coverage--Medicaid--may influence their welfare and labor force participation.

The basic idea of this Index is to create an expected value of benefits based on observed characteristics of an individual and of location-specific factors likely to influence utilization and costs of care. The index is created for individuals and can also be aggregated to a family specific value. The basic underlying equation is

$$(1) \qquad V = X\beta_1 + Z\delta_1 + S\xi_1 + L_i\gamma_1 + L_2\phi, + \epsilon$$

where V = the value of health insurance for an individual (defined below); X is a vector of health characteristics, Z is a vector of other individual characteristics such as education, number of children, race; S is a vector of location-specific variables such as per capita health expenditures in the area and eligibility standards for Medicaid; L_i are dummy variables for type of insurance coverage (L_1 for Medicaid, L_2 for private coverage) while β, δ, ξ, γ, ϕ are vectors of coefficients to be estimated and ϵ is the error term.

This equation could be estimated directly if there were a data set with appropriate information on V, X, Z, and S, and if type of insurance coverage (L_i) could be treated as exogenous. Evidence suggests, however, that the decision on type of insurance coverage purchased, if any, is endogenous (see, for example, Feldman, et al., 1989). Therefore, as a first step an equation for type of coverage should be estimated.

$$(2) \qquad L = X\beta + Z\delta + S\xi + \epsilon,$$

and (1) is thus modified to include predicted probabilities of types of insurance coverage $\hat{L}$ rather than actual coverage (L):

$$(1') \qquad V = X\beta_1 + Z\delta_1 + \hat{L}_1\gamma_1 + \hat{L}_2\phi, + \epsilon.$$

The coefficients from equation (1') can be used along with the individual's characteristics and those of the state to obtain a predicted value for each individual.

An advantage to this index, in addition to its capturing individual heterogeneity, is that it predicts a positive value even for those who happen not to have had care in the past (for example, those eligible for Medicaid but who are not current recipients). It is undesirable to assume that a person with no medical care utilization in the past assigns zero value to health

insurance; this proposed index assigns to an individual an expected value dependent upon his or her characteristics. Another advantage is that the index is a function of state Medicaid and medical-supply characteristics, and so will be partly state-specific and partly individual-specific.

It should be stressed that this index is not equal to an insurance value for many reasons. It does not include loading factors and other administrative costs; it does not represent an attempt to gauge the open-market price of the bundle of services provided by Medicaid or private insurance; and it does not attempt to gauge the cash-equivalent value of the care. Among the three traditional methods of valuation mentioned above, it comes closest to the method of government cost, using eligibles rather than recipients as the population base; there are as well important conceptual differences between that measure and the one proposed here.

Our measure should be thought of as a proxy for the true value of in-kind benefits, a proxy that should be highly positively correlated with that true value. Because it captures interfamily heterogeneity to a much greater extent than have past measures, we believe that it is a better proxy than those measures.[2]

ESTIMATION

The data used for the analysis are drawn from the 1984 panel of the Survey of Income and Program Participation (SIPP). The 1984 SIPP panel began in October 1983 by interviewing a nationally representative sample of the civilian noninstitutional population of approximately 20,000 households. The sample was divided into four rotation groups, each of which was interviewed every four months thereafter until July 1986, the last interview month. At each interview, respondents were asked retrospective questions covering information for each month since the last interview, so that in principle a fairly long monthly time series of information could be obtained.

Aside from its monthly nature, the primary advantages of SIPP for our purposes are that it was designed to collect detailed information on program recipiency, and it contained a special set of questions on health status and medical utilization. The collection of data on program recipiency is important because it allows us to determine whether the family was or was not receiving AFDC and Food Stamps, and whether it was covered by the Medicaid program or by private health insurance. (All were asked these questions in every interview.) The health-status data allow us to construct the family-specific medical heterogeneity index. The health information was collected from a set of special questions administered in the first SIPP topical module, which took place in the third wave of interviewing, from May to August 1984. A series of questions were asked of all individuals, ages 15 and over at an address--including information not only on health status but also on medical utilization in the form of inpatient and outpatient days over the prior 12-month period. Parents provided information on their children.

Unfortunately, only utilization data are available, rather than the associated medical expenditures, including charges (bills) and the patient's own expenditures (out-of-pocket payments). Therefore, in conjunction with SIPP, data are employed from the 1980 National Medical Care Utilization and Expenditure Survey (NMCUES), which contains better information on medical expenditures than SIPP. The NMCUES is also used to provide estimates of medical expenditures for children and to convert the SIPP utilization measures into values of Medicaid and private insurance expenditures (see below). Finally, certain state variables from published sources, including medical supply (beds per 1000 persons, physicians per 1000 persons, hospital occupancy rates), relative cost (average per diem cost for a hospital day) and welfare program characteristics (whether a state has a Medically Needy Program and the AFDC basic needs standard for a family of four) are also utilized.

We employ several different components of Wave 3 of the SIPP. We use the Wave 3 topical module Part B, administered in the late spring and summer of 1984 to all four rotation groups, to obtain information on health status and medical usage. Second, we use the core data and the topical modules to obtain work and welfare histories, respectively, in order to construct right-hand-side variables for the analysis.

NMCUES is based on interviews of 6000 randomly selected households who were interviewed five times at approximately 3-month intervals during 1980-81 to obtain information on health, use of medical services, charges and sources of payment for services, and health insurance coverage.

From the SIPP Wave 3 we draw our main sample, all single mothers with children under 18. The sample includes 1701 mothers and 3016 children. Of the mothers, 644 are on Medicaid one to four months over months 1 through 4 (January to July, 1984, depending on the rotation group), while 520 are on AFDC from one to four months during the same period. Tables 1 and 2 provide more information on the SIPP sample, describing the variables and their means and standard deviations for mothers and children. Appendix Tables A-1 and A-2 do the same for the NMCUES data. The NMCUES data set is defined to include the same subpopulation as SIPP. We use single mothers with at least one child under 18 and their children as our sample. They number 554 and 1033 respectively. Several variables are included in the tables to allow comparison of the samples. These means suggest that the samples are similar in regard to mean age of the mother (33), proportion white (.6), proportion head of household (.8), proportion divorced-widowed (.5), and proportion never married (.2-.3). The SIPP sample has a somewhat higher percentage on Medicaid (.4 vs. .32) than the NMCUES data. In general the samples appear quite similar.

Table 1

Variable Definitions and Means
SIPP Data

Mothers
N=1701

Variable	Definition	Mean	Standard Deviation
Dependent Variables			
Nights	Nights in hospital in last 12 months (inpatient utilization)	1.4	5.0
Visits	Outpatient visits in last 12 months (outpatient utilization)	4.5	9.0
Medicaid	1 = Covered by Medicaid	0.4	0.5
Private	1 = Covered by private insurance	0.5	0.5
Health Variables			
Needs help	Needs help--housework	0	0.1
Poor or fair health	1 = poor or fair health	0.5	0.5
No. days ill in last 4 months	Reported days ill during last 4 months	2.8	11.3
Socioeconomic Variables			
Mean income	Mean personal income	830.7	744.3
Coeff. of variation	Coefficient of variation of mean personal income	0.1	0.1
Relative income	Family income divided by poverty line	3.0	2.8
Income ratio	Ratio of mean personal income to mean household income	0.7	0.3
Age	Age	32.8	9.1
Education	Years of education	11.9	2.6
Training	1 = Ever in vocational training program	0.3	0.4
No. children < 18	No. children younger than 18	1.8	1.0
Disabled child	1 = disabled child	0.1	0.3
Own home	1 = owns home	0.4	0.5
Rents home	1 = rents home	0.6	0.5
Divorced-widowed	1 = divorced or widowed	0.5	0.5
Never married	1 = never married	0.3	0.4
Child support	1 = receives child support	0.3	0.4

- Table Continued -

Table 1, Continued

Variable	Definition	Mean	Standard Deviation
White	1 = white	0.6	0.5
Head	1 = head	0.8	0.4
State Variables - 1984			
Health expenditures	Per capita expenditures on health	1215.9	192.1
Has Med. Needy Prog.	1 = has Medically Needy Program	0.2	2.2
AFDC standard	AFDC Basic Needs Standard, 4 persons, divided by maximum AFDC Basic Need Standard in U.S.	0.6	0.2
Regions			
Northeast	1 = Northeast	0.2	0.4
Midwest	1 = Midwest	0.3	0.4
South	1 = South	0.4	0.5
West	1 = West	0.2	0.4

Table 2

Variable Definitions and Means
SIPP Data

Children
(N=3016)

Variable	Mean	Standard Deviation
Age of child	8.8	5.2
Medicaid = 1 for child	0.4	0.5
Private = 1 for child	0.5	0.5
Disabled = 1	0.1	0.2
White = 1	0.6	0.5
Child lives below poverty line = 1	0.5	0.5
Age of mother	33.0	8.2
No. children < 18	2.4	1.4
Family income/poverty line	2.8	2.7

The SIPP data from the third wave contain an extensive battery of health information, as well as data on the number of outpatient and inpatient days of the female head over a twelve-month period. We initially stratify the sample into the uninsured, those covered by private health insurance, and those covered by Medicaid, as of the fourth month, and estimate a multinomial logit regression for the type of coverage as required by equation (2) (above). We use the estimates of this equation to create instrumental (i.e., predicted) variables for the probability of medical insurance coverage, $\hat{L}_1$(Medicaid) and $\hat{L}_2$(private health insurance). We use these variables to estimate equations for the two measures of utilization we have for the mother:

$$(3) \qquad I_1 = X\beta_1 + Z\delta_1 + S\xi_1 + \hat{L}_1\gamma_1 + \hat{L}_2\phi_1 + \epsilon_1$$

$$(4) \qquad I_2 = X\beta_2 + Z\delta_2 + S\xi_2 + \hat{L}_1\gamma 2 + \hat{L}_2\phi_2 + \epsilon_2$$

where I_1 is her number of inpatient days (nights in hospital), I_2 is her number of outpatient days (outpatient visits), X is the same as in equation (1), and Z is a subset of Z in equation (1), as is the S vector.

The NMCUES data are then used to convert utilization into expenditures. The NMCUES contains information on medical expenditures over calendar year 1980, which we group into three types of medical care: expenditures for inpatient care (hospital stays), outpatient care, and other medical care. The expenditure variable obtained from NMCUES is total medical charges incurred minus out-of-pocket costs.[3] Using these three expenditure variables for each NMCUES observation, plus NMCUES data on utilization (hospital nights, outpatient visits, etc., over the year), we estimate the following three "value" equations in place of equation (1'):

$$(5) \qquad V_1 = a_1I_1 + b_{11}L_1 + b_{12}L_2 + c_1S$$

$$(6) \qquad V_2 = a_2I_2 + b_{21}L_1 + b_{22}L_2 + c_2S$$

$$(7) \qquad V_3 = a_3 I_1 + a_4 I_2 + b_{31} L_1 + b_{32} L_2 + c_3 S,$$

where V_1 is value of inpatient care, V_2 is value of outpatient care, and V_3 is value of other medical care. Expenditures of each type are thus assumed to be affected by actual matched utilization (I_1 and I_2--both are entered for V_3), the type of coverage (L)--included to capture the influence of insurance coverage on value of care via the coinsurance rates for inpatient and outpatient care, respectively, as well as differential charges to Medicaid, private, and uninsured patients--and S, regional variables included to reflect differential prices by region.

Using the results from the estimation of equations (5)-(7), a "total" value amount is predicted for each mother by inserting her predicted values of I_1 and I_2 into equations (5)-(7) and by summing the resulting predicted values of $\hat{V}_1$, $\hat{V}_2$, and $\hat{V}_3$. By setting $L_1 = 1$ and then $L_2 = 1$ in both (3) and (4) and (5)-(7), we obtain an "expected" total value of Medicaid and private insurance, respectively, for each mother.

For the children, no utilization data are available in SIPP, although information is provided on whether the children are covered by private health insurance or Medicaid. Therefore, we use NMCUES data on children of single mothers to directly estimate the value of Medicaid and private coverage, which is again defined as total charges minus out-of-pocket costs. The independent variables in these equations are health insurance, health status and age of the child, and those characteristics of the mother available in both the SIPP and NMCUES data--region, age, health status, headship, marital status, education, income relative to the poverty line, utilization of medical care, and family size.[4] We use the results of this equation to assign expected values of coverage under Medicaid or private insurance to each child in our SIPP data on the basis of his or her characteristics.[5] We aggregate across children and the head to obtain a

family-specific index of the value of medical care coverage for each of the three insurance categories.

RESULTS

The first step in creating the indexes or values of Medicaid and private insurance is to estimate equation (2), a multinomial logit equation on the type of insurance coverage among single woman with children younger than 18. The results are presented in Table 3. "No medical insurance coverage" is normalized to zero. The results suggest that younger women are more likely to be participating in Medicaid than to be uninsured or privately covered while older women are more likely to be covered by private insurance. Race is significantly associated only with private coverage, holding all other variables constant; white women appear less likely to have private coverage than to be uninsured or covered by Medicaid. Education is significantly associated with type of coverage; more years of education negatively with Medicaid participation and positively with private coverage. Having received job training programs, frequently associated with AFDC, is also associated positively with Medicaid participation. Being a head of household is positively and significantly associated with having private insurance coverage; being never married is positively associated with participating in Medicaid. Perhaps surprisingly, own health status, as captured by two indicators (poor or fair health, and needs help doing household) has only limited significant association with type of coverage; women who report they are in fair or poor health are less likely to be covered by private insurance. In comparison, number of children and children's health are both significantly associated with mother's type of insurance coverage--having more children is positively associated with Medicaid participation and negatively with private coverage, while having a disabled child (physical or mental disability) is also positively associated with Medicaid participation; but not statistically associated with private coverage.

Table 3

Multinomial Logit Estimation of Insurance Coverage
(Mothers with No Insurance Normalized to Zero)

Independent Variables	Medicaid		Private Insurance	
Personal Characteristics				
Age	-.02	(1.9)*	.002	(2.0)**
White	.02	(.1)	-.56	(3.0)**
Education	-.09	(2.4)**	.07	(12.0)**
Training	.62	(2.5)**	.26	(1.3)
Head	-.31	(1.1)	.67	(2.7)**
Poor or fair health	-.15	(.8)	-.34	(2.0)**
Needs help	11.00	(.3)	10.5	(0.2)
Never married	.63	(2.5)**	.21	(0.8)
Divorced or widowed	-.28	(1.3)	-.31	(1.6)
Child Characteristics				
No. children < 18	.24	(2.6)**	-.25	(2.8)**
Disabled child	.64	(2.0)**	.33	(1.1)
Income				
Mean income	-.003	(8.9)**	.002	(10.3)**
Income ratio	1.81	(5.3)**	-.38	(1.2)
Coeff. of variation	-2.64	(3.2)**	1.37	(1.9)*
Child support	-1.92	(6.6)**	-.02	(.1)
Owns home	.57	(1.1)	.64	(1.3)
Rents home	1.31	(2.7)**	.60	(1.3)
State Characteristics				
Has Medically Needy Program	.77	(3.9)**	-.19	(1.1)
Health expenditures	.0003	(1.0)	-.0004	(1.2)
AFDC standard	1.30	(2.9)**	-.08	(.2)
Constant	-.09	(.1)	-1.56	(1.9)

Notes: t-statistics in parentheses.
2x log likelihood = 2028.
No. of observations = 1598.
*Significant at 10% level.
**Significant at 5% level.

Turning to income and related measures, the pattern is as expected, given the income requirements for AFDC-Medicaid: greater personal income is negatively associated with Medicaid participation and positively associated with private coverage; the larger the share a woman's income is as a percentage of household income, the more likely she is to be a Medicaid participant; the more a woman's income varies over four interviewing months, the less likely she is to be a Medicaid participant and more likely to have private coverage; if the woman receives child support, she is less likely to be a Medicaid participant; and if the woman rents rather than owns a place to live, she is more likely to be a Medicaid participant.

Finally, the results for state characteristics suggest that women living in states which have a Medically Needy Program are more likely to be Medicaid participants, as are women living in states with higher AFDC basic needs standards.[6] None of the included state characteristics are significantly associated with private insurance coverage. Health expenditures per capita are not significantly associated with type of coverage, although the results suggest women in states with higher expenditures are somewhat more likely to be Medicaid participants than to have private coverage. These results then are generally consistent with expectations.

These results are used to create predicted values for Medicaid coverage, private coverage, and no coverage for each woman in the sample. For those women who are Medicaid participants, the mean predicted coverage of such participation is .74 (and .11 for private coverage). For those women with private insurance coverage, the predicted probability of such coverage is .69 (and .13 for Medicaid participation). For those with both types of coverage over the four waves, the predicted probabilities are .47 for Medicaid and .29 for private, whereas the uninsured have .33 and .38 probabilities, respectively (see Table 6). These predicted values are used in the utilization equations discussed below. Their use avoids the potential endogeneity of type of coverage and utilization.

The equations to be estimated are (3) and (4) for inpatient and outpatient utilization respectively. The results are reported in Table 4.[7] The most significant determinant of both inpatient and outpatient utilization is health status. Health status is captured by two indicators: poor-or-fair-health and needs-help-doing-housework--both indicators work in the expected direction, increasing utilization of medical care. The coefficient on "needs help doing housework" implies that women with such needs on average have 15 more visits per year and nearly 4 more hospital nights per year than women who do not require such help. Women in fair or poor health have 2.7 more visits and 1.7 more hospital nights than women with good or excellent health, controlling for the many other factors in the equation. Having a disabled child (and the associated stress) is also significant and positively associated with both measures of medical care utilization. The only other variable that is significant in both equations is average health expenditures per capita in the state, which is positively associated with utilization.[8] The positive and significant coefficients on the instruments for insurance coverage in the outpatient equation suggest greatest use for those with private coverage and least use for those without coverage (the omitted category). The finding of no significance for type of coverage in the inpatient equation is of interest for it suggests no substitution of inpatient for outpatient care (except possibly, indirectly through health status).[9] The small negative coefficient on mean income in the outpatient equation is consistent with expectations of low income elasticity (since insurance is controlled for) and suggests that this variable may partly proxy for work--and a higher value of time.

These equations are used to create four predicted utilization values for each woman in the sample; $\hat{I}_{1M}$, $\hat{I}_{2M}$, $\hat{I}_{1P}$, $\hat{I}_{2P}$, where the subscripts 1 and 2 refer to inpatient and outpatient care while M and P refer to Medicaid and private coverage, respectively. For comparison purposes they are also created for no coverage ($\hat{I}_{1N}$ and $\hat{I}_{2N}$).

Table 4

Mother's Utilization Equations

Outpatient Visits per Year--Mother ("Visits")		
Independent Variables		
Constant	-4.81	(2.0)
Personal Characteristics		
Age	-.005	(.2)
White	-.10	(.2)
Education	.15	(1.6)*
Head	.68	(.9)
Poor or fair health	2.69	(5.8)**
Needs help	15.01	(9.3)**
Never married	-.34	(.5)
Divorced-widowed	.33	(.6)
Child Characteristics		
No. children < 18	-.21	(.9)
Disabled child	3.34	(4.6)**
Income		
Mean income	-.001	(2.1)**
Coeff. of variation	3.96	(1.8)*
Income ratio	-1.14	(1.3)
Insurance		
Medicaid[a]	3.67	(1.93)*
Private[a]	4.48	(1.94)**
State Characteristics		
Health expenditures	.003	(2.8)**
R squared	.12	
N	1701	

- Table Continued -

Table 4, Continued

Nights in Hospital per Year--Mother ("Nights")		
Independent Variables		
Constant	-1.07	(.8)
Personal Characteristics		
Age	-.02	(1.1)
White	-.35	(1.3)
Education	.03	(.6)
Head	-.06	(.2)
Poor or fair health	1.68	(6.5)**
Needs help	3.74	(4.1)**
Never married	-.03	(.1)
Divorced or widowed	.38	(1.2)
Child Characteristics		
No. children < 18	-.002	(.0)
Disabled child	1.11	(2.7)**
Income		
Mean income	-.0003	(1.1)
Coeff. of variation	-.92	(.7)
Income ratio	-.20	(.4)
Insurance		
Medicaid[a]	.34	(.3)
Private[a]	.65	(.3)
State Characteristics		
Health expenditures	.002	(2.3)**
R squared	.6	
N	1701	

Notes: t-statistics in parentheses.
**Significant at 5% level.

[a]Probabilities or instrumental variables; see Table 3.

To obtain some idea of the variation in these predictions, the predicted values are presented by actual insurance coverage, by health status, and by income relative to the poverty line in Table 6. (Table 5 is discussed below.) The most striking patterns are the much lower predicted number of visits for these women if they were to have no insurance; the relatively high use of those with both types of coverage (see last column) (suggestive that many of these women receive Medicaid under the Medically Needy Program), the much higher use of women in poor or fair health, and the inverse relationship between both measures of predicted utilization and income relative to the poverty line.

The next step in creating the indices is to use the NMCUES data set to estimate a set of coefficients that will convert the expected utilization measures into dollar values. This is performed separately for outpatient visits and inpatient nights and also for other medical care (expenditures other than outpatient or inpatient stays such as pharmaceuticals, equipment, etc.). As discussed above, a sample from NMCUES that has the same characteristics as the SIPP data set is used (see Appendix Table A-1). The dollar value or dependent variable(s) is VALUE, which is defined as total charges minus out-of-pocket costs. This measure is designed to capture the value of the coverage as perceived by the consumer. This takes into account deductibles, copayments and coinsurance as well as a plan using a fixed fee schedule which requires the consumer to pay any difference between charges and fees. In other words, value captures the depth of insurance as well as extent of benefits or breadth. The results are presented in Table 5. Besides the utilization variables specified as linear-splines, region--to capture price differentials--and type of coverage are also included as independent variables.

These resulting coefficients are then applied to the six expected utilization measures for each woman in the sample to create expected values of outpatient, inpatient, and other medical care. The expected values for ambulatory care range from 0 to $644; those for inpatient care

Table 5

Mother's Value Equation
(NMCUES Data)
(Annual expenditures, 1980 dollars)

Value of Outpatient Visits		
Constant	39.64	(1.6)
2 + visits	36.27	(1.4)
3 + visits	-23.81	(.5)
4 + visits	11.57	(.3)
7 + visits	7.56	(.5)
13 + visits	-15.13	(7.2)**
Northeast	-38.27	(1.6)*
Midwest	-62.09	(2.7)**
South	-83.73	(3.9)**
Medicaid	91.11	(4.3)**
Private	.801	(.0)
R^2	.57	
N	553	
Value of Hospital Care		
Constant	135.99	(1.5)
2 + nights hospital	326.52	(3.8)**
4 + nights hospital	-21.06	(.1)
7 + nights hospital	-178.32	(2.2)**
Northeast	-300.69	(3.2)**
Midwest	-150.07	(1.6)*
South	195.74	(2.2)**
Medicaid	-75.88	(.9)
Private	159.87	(2.0)**
R^2	.47	
N	553	
Value of Other Medical Care		
Constant	-1.87	(.2)
2 + visits	4.88	(.5)
3 + visits	-4.29	(.2)
4 + visits	1.19	(.1)
7 + visits	.63	(.1)
13 + visits	-1.71	(.7)
2 + nights	3.79	(.5)
4 + nights	-20.31	(1.5)
7 + nights	35.3	(4.8)**
Northeast	-3.74	(.4)
Midwest	-1.5	(.2)
South	4.58	(.6)
Medicaid	9.60	(1.3)
Private	-7.57	(1.1)
R^2	.33	
N	553	

Note: t-statistics in parentheses.
*Significant at 10% level.
**Significant at 5% level.

Table 6

Predicted Utilization, Health, and Predicted Value of Coverage
by Current Insurance Coverage
Mothers, SIPP Data

	Insurance Coverage			
	None	Medicaid	Private	Both
Health Status				
No. days ill in last 4 months	1.86	3.75	2.29	9.24
Fraction in poor or fair health	.54	.58	.38	.75
Predicted Variables				
Predicted insurance:				
Medicaid	.33	.74	.13	.47
Private	.38	.11	.69	.29
Predicted utilization:				
Private-visits	5.72	6.38	4.98	7.54
Medicaid-visits	4.9	5.57	4.16	6.73
None-visits	1.24	1.90	.5	3.06
Private-inpatient nights	1.67	2.08	1.30	2.28
Medicaid-inpatient nights	1.35	1.77	.99	1.97
None-inpatient nights	1.01	1.43	.65	1.63
Expected value of coverage:				
Private-total	$458.05	$602.21	$379.86	$708.30
Medicaid-total	303.53	433.57	263.09	546.11
Private-ambulatory	100.30	122.49	85.07	140.43
Medicaid-ambulatory	171.01	192.88	155.70	210.95
Private-inpatient nights	351.84	473.75	291.28	559.83
Medicaid-inpatient nights	112.86	221.40	90.96	313.97
Private-other	5.91	5.96	3.51	8.04
Medicaid-other	19.66	19.30	16.43	21.20
N	317	578	774	33

- Table Continued -

Table 6, Continued

	Poverty Status		
	Below Poverty Line	Between One and Two Times Poverty Line	Greater than Twice the Poverty Line
Health Status			
No. days ill in last 4 months	3.05	3.86	2.33
Fraction in poor or fair health	.56	.49	.36
Predicted Variables			
Predicted insurance:			
Medicaid	.59	.33	.08
Private	.21	.45	.75
Predicted utilization:			
Private-visits	6.17	6.08	4.78
Medicaid-visits	5.36	5.26	3.97
None-visits	1.69	1.59	.30
Private-inpatient nights	1.96	1.73	1.18
Medicaid-inpatient nights	1.64	1.42	.87
None-inpatient nights	1.30	1.08	.53
Expected value of coverage:			
Private-total	$547.83	$498.68	$366.25
Medicaid-total	388.68	354.57	249.25
Private ambulatory	112.65	110.90	154.31
Medicaid-ambulatory	183.21	181.40	279.18
Private-inpatient nights	429.28	382.74	279.18
Medicaid-inpatient nights	186.07	154.48	78.87
Private-other	5.90	5.04	3.32
Medicaid-other	19.40	18.69	16.06
N	944	120	638

- Table Continued -

Table 6, Continued

	Health Status	
	Excellent or Good Health	Poor or Fair Health
Health Status		
No. days ill in last 4 months	1.12	4.69
Predicted Variables		
Predicted insurance:		
Medicaid	.31	.46
Private	.51	.33
Actual insurance:		
Private	.56	.38
Predicted utilization:		
Private-visits	4.0	7.42
Medicaid-visits	3.18	6.61
None-visits	0	2.94
Private-inpatient nights	.73	2.64
Medicaid-inpatient nights	.42	2.33
None-inpatient nights	.08	1.99
Expected value of coverage:		
Private-total	$203.91	$770.67
Medicaid-total	165.21	516.43
Private ambulatory	62.94	143.57
Medicaid-ambulatory	135.64	211.80
Private-inpatient nights	139.96	618.04
Medicaid-inpatient nights	15.35	282.32
Private-other	1.01	9.06
Medicaid-other	14.21	22.31
N	884	818

from 0 to $2123 and for other medical care 0 to $69. The range for the total value (the sum of ambulatory, inpatient and other) is $2.18 to $2740. The expected values by insurance coverage, poverty status, and health status are presented in Table 6. Looking at panel 1 by insurance coverage, the greatest expected total value is for private insurance for those who have both private and Medicaid types of insurance, $708.30 (in 1980 dollars), the smallest expected value is for Medicaid coverage among those with private coverage. For all groups, the expected total value is greater under private coverage than under Medicaid (even though most private insurance requires coinsurance payments). Behind this pattern, is a more complex picture; expected utilization is greater under private coverage than under Medicaid or no coverage for both ambulatory and inpatient care. Expected value of inpatient care is much higher under private coverage than under Medicaid coverage but the reverse holds for outpatient and other medical care. This may reflect differential (greater) private coverage for inpatient care than for outpatient care and differential reimbursement by private versus Medicaid payers to hospitals.

The total expected values for this population stratified by poverty (below the poverty line, one to two times the poverty line, and more than two times the poverty line) in panel 2 is greatest for those below the poverty line and much greater under private coverage than under Medicaid. Again the underlying composition is not straightforward: the highest income group has a higher expected value of ambulatory care than the lower income groups, but the reverse is true for inpatient care; the calculated values for ambulatory care are much greater if covered by Medicaid than private coverage (this is likely to reflect deductibles and coinsurance of private insurance, compared to the full coverage of Medicaid); inpatient care shows a very different pattern; the lowest income group has the highest expected value under each type of coverage, but the expected value under private coverage is much greater than under Medicaid. (Recall that these values differ both because predicted utilization differs by insurance and the value differs by

insurance.) All of these factors combined result in the highest expected total value for the lowest income group under private coverage.

Finally, the last panel in Table 6 presents these expected values by health status. Expected value is much greater for women in poor or fair health than those in good or excellent health; and greater under private coverage ($771, $204) than under Medicaid ($516, $165). Again the value for ambulatory care is greater under Medicaid than under private coverage while the reverse is true for inpatient care.

For all of the subgroups the value of other medical care is quite small and consistently greater under Medicaid than under private coverage. This is likely to reflect differential coverage of pharmaceuticals, eye glasses, and other benefits.

Next, we turn to children's value of Medicaid and private insurance coverage. This estimation is more straightforward for we directly estimate value (using NMCUES data) rather than utilization and then value, and do so for all medical care together rather than inpatient, outpatient, and other medical care. We follow this procedure because SIPP has no utilization data for children and to illustrate a simpler, more straightforward alternative to create an individual specific value of in-kind benefits.

The results are presented in Table 7. They suggest higher values for white children, for children whose mothers spend more time as inpatients, for disabled children, and for children covered by Medicaid. There is also an indication that children whose mothers report fair or poor health have lower values of medical care and that children living in families whose incomes are below the poverty line have lower values of medical care; these are likely to reflect lower utilization, perhaps because of reduced access.

These coefficients are now used to create three estimated values for each child in the SIPP sample; one for private coverage, one for Medicaid coverage, and one for no coverage. The

Table 7

Regression of Children's Value
of Medical Care Utilization
NMCUES Data
(Annual expenditures, 1980 dollars)

Independent Variables		
Constant	266.53	(1.26)
Child Characteristics		
Age	-7.97	(1.1)
White	129.23	(2.2)**
Mother's Characteristics		
Mother's age	.73	(0.2)
Never married	27.05	(0.6)
Divorced-widowed	-14.80	(0.4)
Education	3.23	(0.1)
Head	-53.27	(0.6)
Poor or fair health	-116.88	(1.6)
Mother's Utilization		
Inpatient nights	12.89	(1.7)*
Outpatient nights	2.49	(0.8)
Family Characteristics		
Household size	-17.91	(1.0)
Income $\leq$ poverty line	-96.91	(1.4)
Child Health		
Physical disability	184.62	(1.4)
Disabled	224.32	(1.9)*
Child Insurance		
Medicaid	230.49	(3.1)**
Private	-67.71	(.9)
R squared	.04	
N	1032	

Note: t-statistics in parentheses.
*Significant at 10% level.
**Significant at 5% level.

range of estimated values are from 0 to $1784 in 1980 dollars. The expected value under Medicaid is higher on average than for private coverage. Table 8 presents expected values by actual type of insurance coverage. These actually having private coverage have a higher expected value under private coverage than under Medicaid ($738 vs. $442). The reverse is true for the expected values for those covered by Medicaid and those uninsured. Those who are Medicaid participants have the largest expected value, $2034, under Medicaid coverage compared to $1742 under private coverage.

Total Value of Medicaid and Private Insurance

Finally, aggregating the value of Medicaid and of private insurance across families provides two family-heterogeneity indices: one for total family value under Medicaid and the second under private insurance. The mean value for Medicaid is $2237; that for private is $1859. The standard deviations are 9213 and 9188, respectively. The medians are $1143 and $762, the minimums $351 and $85 and the maximums $263,281 and $262,574 for Medicaid and private, respectively. Average values are presented for various subgroups in the population in Table 9. The first panel provides expected averages of Medicaid and private coverage by current type of mother's coverage; none (uninsured), Medicaid, and private. Those with both types of insurance are excluded here.[10] The highest group, those with Medicaid coverage, have expected values of more than $3,800 for both types of insurance. This group has the highest number of children on average, the highest percentage of women reporting fair or poor health and the highest percentage of families with a disabled child. Those with private coverage have the lowest expected values under both Medicaid and private insurance. They also have the fewest children on average and are the healthiest group of mothers according to the self-reported health measures we use.

Table 8

Predicted Value of Coverage of Children
under Current Insurance
(SIPP Data)

	None	Medicaid	Private
Characteristics			
Age	8.59	7.56	10.10
Whether disabled	.05	.07	.05
Family income < poverty line	.40	.80	.14
White	.62	.53	.69
Predicted Variables			
Expected value of coverage:			
Private-total	$777.45	$1742.09	$441.71
Medicaid-total	1071.75	2033.94	737.89
N	296	1247	1473

Table 9

Family Index of Value of Medicaid and Private Insurance,
and Factors Influencing Values
SIPP Data

	Medicaid Total Annual	Private Total Annual	No. Children < 18	% With Disabled Child	% Report Poor or Fair Health	N
Current Insurance Coverage						
None	1,973	1,625	1.71	6.6%	54%	317
Medicaid	4,229	3,816	1.99	18.8	58	578
Private	1,508	1,144	1.62	8.5	38	774
By Current Health Status						
Good to excellent	1,365	895	1.71	.069	0	884
Fair to poor	4,113	3,832	1.84	.121	1.0	818
By Current Income Relative to Poverty Line						
Below poverty line	3,450	3,060	1.88	.095	.56	944
One to two times the poverty line	1,831	1,439	1.80	.125	.49	120
More than twice the poverty line	1,715	1,355	1.60	.086	.36	638

The next panel presents the two indices by the women's health status. The differential between the health groups is large. For Medicaid, the index of families where the mother is healthy is one-third of that of families with a mother reporting poor or fair health; for private coverage the ratio is less than one-quarter.

The last panel presents these indices by current poverty level. Families living below the poverty line have higher expected values than those with higher levels of income. The ratios are in the .44-.49 range.

These values then show substantial variation, reflecting individual, family, and state characteristics.

CONCLUSION

This paper presents a new approach to valuing in-kind benefits. It is an approach that is (1) individual, or family, specific; and (2) assigns a positive value to all those eligible for the benefit regardless of actual use. It is designed in particular to value market benefits that are in the form of insurance. It is not an insurance value per se, however, for it excludes administrative and selling costs. Nonetheless, we expect that it is highly correlated with the underlying insurance value.

We demonstrate our Index for both Medicaid (public insurance) and private health insurance. We do this for a group likely to be eligible for both--single mothers and their children. For single women, the mean value of the Medicaid (private) index is $334 ($476). The standard deviation is 337 (421). It is greater for women in poorer health compared to better health, for women living in poverty compared to those with higher incomes and higher for those currently covered by Medicaid than private or no coverage. On average, the value of private insurance is greater than Medicaid.

Turning to children of these single mothers, the mean value of the Medicaid (private insurance) index is $719 ($203). The standard deviation is 192 (190). For children, the Medicaid value is greater on average than that of private coverage. It is greater for children currently covered by Medicaid, lowest for those currently covered by private insurance and intermediate for those currently without coverage.

For these families, the mean value of the index is $2237 for Medicaid and $1859 for private coverage. The standard deviations are respectively 9213 and 9188. The correlation between the mother's index and the family index is .27 for Medicaid and .25 for private coverage. The values tend to be greater for Medicaid than private coverage and higher for those currently covered by Medicaid than for those with no or private coverage. The values also are greatest for families living below the poverty line and for those in which the mother has fair or poor health.

These Indices could be useful in studying (1) the distribution of public benefits across groups defined by income, race, age, etc.; (2) the distribution of the benefits of private insurance across these same groups and/or in comparison to the distribution of tax benefits via the health insurance tax subsidies; and (3) labor market response to welfare benefits including Medicaid. For an example of the latter, and a comparison to the use of the nontraditional state average values, see Moffitt and Wolfe (1990).

Appendix Table A-1

Variable Descriptions, Means and Standard Deviations
Mothers--NMCUES Data
N = 554
(Calendar 1980 Amounts)

	Mean	Standard Deviation
2 + visits	5.57	9.12
3 + visits	4.88	8.94
4 + visits	4.32	8.70
7 + visits	3.12	7.91
13 + visits	1.83	6.33
Northeast	.22	.42
Northcentral	.23	.42
South	.33	.47
Medicaid	.32	.47
Private	.45	.50
2 + nights hospital	1.02	3.48
4 + nights hospital	.73	3.02
7 + nights hospital	.45	2.44
Value of visits	150.68	272.04
Value of hospital care	253.47	1007.52
Value--other medical care	13.14	77.85
Total value of health care	565.51	1324.97
Other Characteristics (for comparison purposes):		
Age	33.41	9.71
Total charges	754.38	1533.84
White	.63	.48
Head of household	.81	.39
Divorced-widowed	.50	.86
Never married	.19	.80
Household size	3.89	1.65

Appendix Table A-2

Variable Descriptions, Means and Standard Deviations
Children--NMCUES Data
N = 1033
(Calendar 1980 Amounts)

	Mean	Standard Deviation
Age	9.13	4.99
White	.59	.49
Mother's Characteristics		
Mother's age	33.69	8.53
Never married	.16	.70
Divorced-widowed	.50	.77
Education (categories)	3.74	1.1
Head	.87	.34
Poor or fair health	.22	.41
Inpatient nights	1.25	3.68
Outpatient visits	6.34	9.03
Household size	4.36	1.62
Mother works	.51	.50
Income $\leq$ poverty line	.42	.49
Own Characteristics		
Physical disability	.05	.21
Disabled	.06	.24
Medicaid	.37	.48
Private	.39	.49
Utilization and Expenditures		
Bed days per year	4.03	7.23
Nights in hospital	.39	1.88
Total charges	284.40	880.60
Total value	225.99	846.61

Notes

[1]For evidence on differences in utilization, consider the practice of insurance companies, who try to avoid insuring certain individuals; the high rates and incomplete coverage offered to individuals seeking coverage as compared to groups; the establishment of high risk pools in a number of states, etc.

[2]In econometric terms, this index should be thought of as an instrumental variable--correlated with the true value but not equal to it. Note as well that the coefficient on our index in a labor supply equation would reflect, in part, its cash-equivalent value. A one dollar increase in the value of an in-kind benefit is expected to generate a smaller effect than a one-dollar increase in cash (see Moffitt, 1989, for a proof).

[3]No adjustment is made in the index for premium payments for insurance.

[4]We do not predict insurance coverage for children, since children are not the decisionmakers; hence, coverage is exogenous to the children and is so treated.

[5]While the approach for children is more straightforward, the approach is not used for mothers because it does not make use of the more extensive set of variables available on SIPP compared to NMCUES.

[6]These results are consistent with those of Blank (1989). A priori the sign is ambiguous. Medically Needy coverage increases eligibility but also provides back-up coverage which might increase willingness to leave Medicaid's categorical coverage.

[7]The variables included in these equations are those of equation (1). Certain variables important for insurance--such as whether the state has a Medically Needy Program and the AFDC basic needs standard, whether child support is received, and homeownership--are not included. The last, homeownership, may reflect assets and hence eligibility for Medicaid.

[8]This result is consistent with the idea of patterns of care and suggests that in areas with higher use, these women are part of the pattern.

[9]This result is consistent with those of the Rand Health Insurance Experiment (see Manning et al., 1987).

[10]This group with both types of coverage stands out. Members of this group are high users of medical care, have a high proportion of women who report poor or fair health, are more likely to have a disabled child, and, on average, have more children than those in the other categories. Their average family values are $17,251 for Medicaid and $16,768 for private insurance. There are, however, only 33 families in this group.

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