Health insurance coverage for families with children

Findings from Consumer Expenditure Survey show that families without health insurance are less likely to receive some kinds of care than families who are at least partially insured, even when income and other characteristics are held constant

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Health insurance coverage is an important ingredient in the maintenance of good health. This is particularly true for families with children. According to Peter J. Cunningham and Alan C. Monheit, children in families without health insurance coverage are "at a disadvantage regarding access to, quality of, and continuity of health care."[1] Judith D. Kasper finds that uninsured children under 18 are less likely to see a physician at least once during the past year, and are less likely to visit a physician for an immunization or general checkup.[2] Such regular, preventive medical care is especially important for children who, in general, are more prone to illness than adults. Without preventive care, families may face large medical expenses as their children grow up.

Additionally, health care costs have risen substantially in recent years. Data from the Consumer Price Index show that the price of medical care has risen at a much higher rate than for all other goods and services. From 1989–94, the medical care index increased 41.3 percent, compared with 18.2 percent for all items less medical care. In 1993, the Nation's health care costs rose to $884.2 billion, up 7.8 percent from 1992.[3] A recent article by Geoffrey D. Paulin and Wolf D. Weber suggests that as a result of these large increases, the direct costs of funding health care have been shifting from business and government to families, thus affecting their expenditures for nonhealth items.[4]

Meanwhile, in 1992, more than 8 million American children under age 18 had no health insurance coverage of any kind.[5] While many of the poorest families receive health insurance in the form of government-provided medicaid benefits[6] the percentage of children without public or private health insurance coverage grew by more than 40 percent between 1977 and 1987.[7]

This study identifies families with children that have full health insurance coverage, partial coverage, and no coverage. It examines the demographic characteristics of each insurance group, types of policies held, health care expenditure patterns for each group, and the relationship between the family's demographics and the probability of being in a particular "coverage group."

Background. According to Gloria J. Bazzoli,[8] studies examining the health insurance status of individuals in an attempt to measure medical indigence have generally defined medical indigence as the "lack of public or private health insurance coverage. The rationale behind this definition is that the uninsured are entirely responsible for their own medical expenses. If they experience a costly illness, they are less likely to be able to afford necessary treatment than similarly ill individuals with insurance coverage."[9] Bazzoli also describes a study in which the author examines "underinsurance," a status that "depends upon the probability that an individual will experience large out-of-pocket expenses due to a costly illness."[10]

In a subsequent study, Richard D. Miller[11] uses data from the 1987 Consumer Expenditure

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Interview Survey to identify medically uninsured *consumer units*[12] rather than uninsured individuals. Miller uses a binomial logit model to estimate the relationships between various independent variables and the probability that a family has inadequate coverage—that is, the probability of having at least one member of the consumer unit who lacks health insurance coverage.

A later paper by Elizabeth M. Reise,[13] which examines only families with children, divides the sample into three groups: those with full health insurance coverage (that is, all members are covered), partial health insurance coverage (that is, at least one, but not all, members are covered) and no health insurance coverage (that is, no member is covered). Reise uses an ordered multinomial logit to examine the probability of being in each group. Reise's paper is important because it distinguishes between those families with no (or at most very limited) health insurance coverage and those families with at least some health insurance coverage. These families have different spending patterns, as described by Paulin and Weber.

This study builds upon and extends the works of Miller and Reise in several ways. In addition to using more recent data, this study, as noted earlier, describes types of policies that families with insurance hold, as well as differences in levels of health care expenditures for families with different levels of coverage. It examines the probability of incurring health care expenditures as well as the probability of being insured.

The data. The data for this study are selected from the 1991–93 Consumer Expenditure Interview Surveys for families with all children under age 18.[14] Families are defined as consumer units consisting of a husband, wife, and their own children with no other persons present, or single parents with their own children and no other persons present.

Because the focus is on families who must rely on private coverage, families covered by the medicaid and medicare programs are excluded from the analysis. In addition to health benefits, medicaid recipients may receive other benefits (such as food stamps) that would distort estimates of the relationship between characteristics (such as income) and the decision to purchase insurance. Similarly, virtually all U.S. citizens who are at least 65 years old are eligible for medicare, thus potentially distorting estimates of the relationship between age and the decision to purchase insurance. Additionally, the costs and benefits of enrolling in medicare (once eligible) are assumed to be different from those of enrolling solely in private insurance programs. Therefore, medicare recipients are also excluded.[15]

Consumer Expenditure Survey collects information on the number of family members covered by each policy. It does not record specifically which members are covered by the policy. The difference between the number of family members and the number of members covered by a household policy is used as a proxy to measure complete or incomplete health insurance coverage. If the family holds more than one policy, the total number of members covered by all policies must be greater than or equal to the number of family members for the family to be considered fully covered. It is assumed that households do not overlap coverage for some members while having no coverage for others. Policies for persons outside the family, or that are limited in coverage (dental only or special policies for injuries related to school athletic programs) are counted as covering zero family members for the purpose of defining coverage status.

As in the studies by Miller and Reise, this analysis uses data only from the second interview of the Consumer Expenditure Interview Survey. Consumer units are interviewed five times on a quarterly basis. The selection of only second-interview families avoids biasing the results by ensuring that all families who are analyzed are unique.

All data presented in this study are unweighted to be consistent with those shown in the regression results. Logistic regression is sensitive to weighting, as described later.

Demographic characteristics. Table 1 shows the differences in demographic characteristics of families with children, by insurance coverage category. Although there is little difference in age or family size for the groups, income (as proxied here by total expenditure outlays[16]) appears to be correlated with insurance status. The fully covered have the highest incomes, while the uninsured have the lowest incomes. Similarly, uninsured families have lower levels of education, lower levels of work force participation and therefore fewer earners than the insured families. Uninsured families are also more likely to be black or Hispanic[17] than partially or fully insured families. The uninsured are the only group whose families are about as likely to rent as to own their homes, although the rate of "outright" homeownership (that is, families that own with no mortgage) appears to be highest for the uninsured.

Policies held. Table 2 shows that fully and partially insured families have similar types of policies. About the same percentage in each group holds at least one Blue Cross/Blue Shield policy, other commercial health policy, or dental only policy. (However, the partially insured are less likely to be members of a health maintenance organization—HMO— and to have more limited coverage policies, as denoted by "other health insurance.") The average number of policies held is also similar, though partially insured families have slightly fewer on average. But the quality of the policies held is different. Fully insured families on average cover 113 percent of their members. Partially insured families, however, cover

Table 1. Demographic characteristics of families with children by health insurance status, Consumer Expenditure Survey, 1991–93

Characteristic	Fully insured	Partially insured	Uninsured
Sample size	2,605	347	773
Characteristics of average family			
Age of reference person	37.3	37.1	35.7
Family size	3.8	3.6	3.7
Number of earners	1.8	1.7	1.5
Persons under 18 years old	1.9	1.9	2.0
Total expenditure outlays (annual)			
Mean	$40,785	$32,491	$28,613
Median	$34,741	$28,686	$24,277
Other characteristics (in percent):			
Living in the—			
Northeast	22.8	16.7	14.8
Midwest	28.6	24.2	19.3
South	27.2	36.3	35.5
West	21.5	22.8	30.5
Urban area	87.8	87.3	89.0
Black	7.0	7.8	10.9
Hispanic	4.7	8.7	15.3
Occupation of the reference person:			
Wage and salary	88.2	87.6	75.9
Manager/professional	39.0	30.6	23.3
Technical/sales	18.4	23.9	15.1
Service	5.9	11.2	10.1
Blue collar	24.9	21.9	27.4
Self-employed	7.0	6.6	10.5
Retired	.3	.3	.3
Unemployed	.4	.3	1.3
Out of the labor force	4.1	5.2	12.0
Education of the reference person:			
Less than high school	7.0	10.7	22.7
High school graduate/ some college	58.7	65.4	57.2
College graduate	34.3	23.9	20.2
Family composition:			
Single parent	12.6	30.0	22.5
Husband/wife family	87.4	70.0	77.5
Earner status:			
No earners	0.8	1.4	6.9
One earner	30.9	39.2	44.1
Two earners	60.8	51.6	43.3
At least three earners	7.5	7.8	5.7
Housing tenure:			
Homeowner with mortgage	68.9	54.8	41.5
Homeowner, no mortgage	7.8	6.9	9.3
Renter	23.3	38.3	49.2
At least one child:			
Under age 6	50.6	47.3	47.6
6 to 11	51.3	43.5	53.6
12 to 17	37.7	42.1	41.3
Student status of reference person:			
Full time	1.4	3.8	2.2
Part time	5.5	4.6	4.9

50 percent of their members. Although partially insured families are more likely to have at least one policy fully paid for by someone outside the family (such as an employer), fully insured families are more likely to have at least one partially paid policy, and partially insured families are more likely to have at least one policy for which they pay entirely.

Children make up a large percentage of individuals not covered in partially insured families. Although the Consumer Expenditure Survey does not ask which members are covered by each policy, under the assumption made earlier that families do not overlap coverage as long as at least one member remains uncovered, a lower and upper bound on the number of children covered can be estimated. To get the lower bound, all families are assumed to follow an "adult first" strategy. That is, the first person covered will be an adult. If the family is a husband/wife family, then if only two members are covered, they will be the husband and the wife. Only if three members are covered will a child be covered. To get the upper bound, families are assumed to follow a "child first" strategy. That is, only after all children are covered will an adult be covered. As shown in the following tabulation, the average partially insured family, which has 1.9 children, has between 0.5 children and 1.5 children covered:

Number of children	1.9
Number of children covered:	
Adults first	0.5
Children first	1.5
Percent of children covered:	
Adults first	26.3
Children first	78.9

In other words, about one-fourth to three-fourths of children are covered in partially insured families. This implies that at least one-fourth of all children in partially insured families have no health insurance coverage. If combined with children in uninsured families, this implies that between one-ninth and one-sixth of the children in the sample lack health insurance coverage.[18]

Health care expenditures. Table 3 shows that the fully insured pay the largest amount for health care in total. Although partially insured families appear to pay slightly more for medical services than fully insured families, this difference is not statistically significant.[19]

When shares of the health care budget are considered, the fully insured spend the largest share (49 percent) on health insurance, but the smallest on medical services (39 percent). However, the fully and partially insured spend about the same share (12 percent) on prescription drugs. The uninsured spend the largest shares on medical services (57 percent) and prescription drugs and medical supplies (15 percent) and the smallest share for insurance (28 percent).

However, insurance premium payments for the uninsured could be for someone outside the immediate family (perhaps an older relative, a child from a previous marriage, and so forth), and therefore perhaps should not be counted when comparing health care expenditures by insurance status. Furthermore, insurance policies may "favor" certain types of treatment—that is, they may pay for medical services, but not prescription drugs. Therefore, it is interesting to examine health care expenditures for items other than insurance premiums to see how levels and shares differ by insurance status. Of the health care dollars not spent on insurance premiums, the fully insured allocate 76 percent to medical services and 24 percent to prescription drugs and medical supplies. This compares with an 81-percent/19-percent split for the partially insured, and a 79-percent/21-percent split for the uninsured.

Probability of purchase. The fact that the fully and partially insured families spend more on medical services, prescription drugs, and medical supplies does not, by itself, indicate that insurance status is related to health care usage. The uninsured have lower incomes than the insured, so it is to be expected that they spend less on these services. Therefore, to estimate the direct effect of health insurance status, all other factors, such as income, age, and family size must be held constant. Rose M. Rubin and Kenneth Koelln perform such a study.[20] They find that indeed, *ceteris paribus,* the presence of insurance is positively correlated with expenditures for medical services, prescription drugs, and medical supplies.

However, Rubin and Koelln do not measure frequency of usage of these goods and services. This may be because the Consumer Expenditure Survey does not measure usage directly; that is, the respondent is not asked how many times a member of the family went to the doctor during the past 3 months. However, if a respondent reports a medical expenditure, then someone in the family must have used such services.

Results of a logistic regression modeling the probability of incurring expenditures for different types of health care are shown in table 4 (medical services) and table 5 (prescription drugs and medical supplies). In this case, the logistic regression is binomial, meaning that the outcome predicted is either "yes" (family did incur an expenditure) or "no" (family did not incur an expenditure). The predicted probability of incurring an expenditure is:

$$P = 1/\{1 + \exp[-1 *(\alpha + \beta' X]\}$$

where

P is predicted probability of incurring an expenditure

α is a constant

β' is a vector of parameter estimates

X is a vector of independent variables.

In tables 4 and 5, parameter estimates for the first column represent the coefficients for the fully insured. If statistically significant, these indicate that the variable is important in predicting the probability of incurring an expenditure for medical services (table 4) or prescription drugs (table 5). The second and third columns of parameter estimates show whether the relationship of the variable to the probability of incurring an expenditure is different for the partially insured or uninsured than it is for the fully insured. If the parameter estimate is statistically significant, the relationship is different.

As with any regression, it is important to define a reference group to make comparisons more accurate. In tables 4 and 5, each insurance group consists of families with median income (table 1), whose reference person is between 25 and 44 years old, married with two children, neither black nor Hispanic, and containing two earners.[21] The probability of incurring an expenditure for each of these groups is shown in the tables. (For example, table 4 shows that members of the fully insured reference group are predicted to have a 73.2-percent probability of incurring expenditures for prescription drugs and medical supplies, compared with a 66.1-percent probability for members of the uninsured reference group.)

Table 2. Health insurance policies, by health insurance coverage status, 1991–93

Characteristic	Fully insured	Partially insured	Uninsured
Family size	3.8	3.6	3.7
Members covered	4.3	1.8	.0
Percent of members covered	113.1	50.0	.0
Percent with at least one—			
Blue Cross policy	28.1	28.5	9.2
Commercial health policy	47.8	44.7	13.7
HMO policy	24.1	18.4	8.9
Dental only policy	9.3	8.7	7.0
Other health insurance policies[1]	13.6	19.0	4.4
Average number of policies held	1.39	1.32	.45
Blue Cross	.31	.30	.09
Commercial health	.56	.50	.15
HMO	.26	.21	.09
Dental only	.10	.09	.07
Other health insurance[1]	16	.22	.05
Percent with at least one policy paid for—			
Entirely by the family	18.6	22.8	8.7
Partially by someone else	56.2	45.0	18.5
Entirely by someone else	39.9	45.5	11.9
Number of policies paid for—			
Entirely by the family	.22	.29	.27
Partially by someone else	.68	.52	.60
Entirely by someone else	.49	.50	.40

[1] Includes policies providing special limited coverage, medicare supplements, and other health insurance policies.

Table 3. Health care expenditures by health insurance coverage status, 1991–93

Expenditure allocation	Fully insured	Partially insured	Uninsured
Total health care (annual)	$1,880	$1,668	$972
Health insurance	920	663	269
Medical services	732	811	556
Prescription drugs/ medical supplies	229	194	147
Percent of health care allocated to—	100.0	100.0	100.0
Health insurance	48.9	39.7	27.6
Medical services	38.9	48.6	57.2
Prescription drugs/ medical supplies	12.2	11.6	15.1
Percent of total expenditure outlays allocated to—			
Health insurance	2.3	2.0	.9
Medical services	1.8	2.5	1.9
Prescription drugs/ medical supplies	.6	.6	.5
Percent reporting expenditures (quarterly):[1]			
Health insurance	67.3	58.8	23.0
Medical services	70.1	62.0	51.2
Prescription drugs/ medical supplies	57.7	54.2	40.5

[1] Does not include reimbursements for payments made in previous quarters but received in current quarter.

In tables 4 and 5, probabilities for each group are predicted, given that each reference group family has $32,175 in total expenditure outlays, which is the median value for the sample as a whole. This value is substantially less than the median value for the fully insured (about $2,000 less), and substantially more than the median values for the partially insured (about $6,500 more) and uninsured (about $7,800 more).

Table 4 shows that insurance status is definitely important for the reference group. The fully and partially insured have similar probabilities of incurring a medical service expenditure. However, when the probability for the fully insured (73.2 percent) is compared with the probability for the uninsured (66.1 percent), the difference is significant in a statistical and economic sense.

Thus, the data may indicate that uninsured families are less likely to seek preventative care, as Kasper finds. By contrast, families with insurance may be more likely to visit the doctor for minor illnesses, as Rubin and Koelln imply. To further investigate the "usage" issue, expenditures for prescription drugs and medical supplies are examined. A family with insurance may automatically incur an expenditure for a doctor visit (either through a deductible or copayment). However, if the illness is not severe, the doctor need not prescribe medicine. If insured families are more likely *ceteris paribus* to incur prescription drug expenditures, then it is safe to assume that when they become ill, they become well faster than their uninsured counterparts. Furthermore, any reimbursements for these expenditures are treated as if no visit occurred, because the reimbursed visit may have taken place more than 3 months prior to the interview date.

When all characteristics, including income, are held constant, the predicted probabilities that the fully and partially insured will incur an expenditure are once again very similar: 58 percent for the fully insured and 61 percent for the partially insured (table 5). The predicted probability for the uninsured, 47 percent, suggests that this group is much less likely to incur an expenditure for prescription drugs or medical supplies than either of the insured groups, even when all else is held constant. However, because neither the intercept nor income parameter estimate is statistically significant, caution must be used when interpreting this result.

Given the findings of Kasper, those of Rubin and Koelln, and the results shown in tables 4 and 5, it appears that there is a relationship between level of insurance coverage and receipt of medical care. Therefore, it is important to understand the relationship between demographic characteristics and level of insurance coverage.

Probability of coverage. To estimate the relationship between level of health insurance coverage and demographic variables, a different kind of logistic regression is needed. In this case, there are three possible outcomes: full health insurance coverage, partial health insurance coverage, or no health insurance coverage. Therefore, the dependent value can take on values from 1 (fully insured) to 3 (uninsured). Because the dependent variable takes on three distinct, qualitative values of ascending order, the parameters of this model are estimated using an ordered multinomial logistic regression. From these estimated parameters the probabilities that a particular family will be fully, partially, or not insured can be predicted using the following formulas:[22]

$$P_m = F(\beta' x)$$
$$P_{m-1} = F(\beta' x + \alpha_1) - F(\beta' x)$$
$$P_{m-2} = F(\beta' x + \alpha_1 + \alpha_2) - F(\beta' x + \alpha_1)$$

where

P_m is the probability of being fully insured (in this case)
P_{m-1} is the probability of being partially insured
P_{m-2} is the probability of being uninsured.

The function F(·) has the same form as it does for a binomial logit. For example,

$$F(\beta' x) = 1/[1 + \exp(-1 * \beta' x)]$$

where

β' is a vector of parameter estimates
x is a vector of demographic characteristics.

Several independent variables are chosen for this model. The first is annual total expenditure outlays for the family (that is, quarterly total expenditure outlays multiplied by four), which are used as a proxy for permanent income in accordance with Milton Friedman's "permanent income hypothesis."[23] Before using this variable, though, it is subjected to a Box-Cox transformation to normalize its distribution.[24] The formula for a Box-Cox transformation is:

$$Y^* = (Y^{\lambda}-1)/\lambda$$

where

Y is the initial value of total expenditure outlays

λ is a variable found through experimentation

Y^* is the transformed value of total expenditures.

Using a maximum-likelihood technique described by Stuart Scott and Daniel J. Rope,[25] the best estimate of λ is 1/8.[26] (This transformation of total expenditure outlays is also used in the binomial logit described earlier.) In addition to normalizing the distribution of total expenditure outlays, the fact that λ is 1/8 is consistent with the assumption that the probability of a family having full health insurance coverage increases with income, but at a decreasing rate. This is a plausible assumption, as it indicates that an increase in income (say, $1,000) is associated with an increase in probability of having full coverage, but that the increase in probability is greater for a low-income family than for a high-income family receiving the same increase in income.[27]

Also included are several dummy variables describing characteristics of the reference person including age (under 25 or at least 45), ethnic origin (black or Hispanic), type of occupation or labor force status (if not working), level of education, and student status (enrolled in college full time or part time). Dummy variables describing the family include number of children (one child or three or more), type of family (single parent or husband/wife), children's age (at least one child is older than age 12 because older children may be less prone to illness than younger children), region of residence (Northeast, Midwest, or West),[28] whether the family lives in an urban or rural area, number of earners (no earners, one earner, or at least three earners), and housing tenure (owner without mortgage or renter).[29] The omitted category in each case is shown in table 6 with the regression results. The variables are meant to control for differences in "tastes" for insurance (family type, ethnic origin, education); opportunity of obtaining policies (occupation, number of earners, and student status, because some colleges and universities offer special policies to students); and other factors.

Table 4. Results of binomial logit predicting probability of incurring expenditures for medical services, with median income held constant for all insurance groups ($32,175)

Characteristic	Parameter estimate	Estimate 1	Estimate 2	Fully insured	Partially insured	Uninsured
Reference group:	(1)	(1)	(1)	0.732	0.759	0.661
Intercept	[2] -3.420	-2.712	[3] -2.050	—	—	—
Standard error	.587	1.725	1.135	—	—	—
Annual expenditure outlays (Box-Cox)	[2] .208	[3] .134	.081	.737	.766	.669
Standard error	.027	.080	.053	—	—	—
Age of reference person (ages 25 to 44)						
Reference person under age 25	-.351	.648	-.024	.658	.809	.573
Standard error	.285	.629	.449	—	—	—
Reference person over age 44	.007	-.076	-.304	.734	.747	.592
Standard error	.129	.381	.273	—	—	—
Number of children (two)						
One child	[2] -.233	.376	[2] .457	.684	.785	.710
Standard error	.101	.297	.213	—	—	—
Three or more children	.058	.104	-.067	.743	.788	.659
Standard error	.123	.380	.245	—	—	—
Family type (husband/wife)						
Single parent	-.058	.402	-.204	.721	.817	.601
Standard error	.148	.352	.276	—	—	—
Ethnic origin (white/other)						
Black	[2] -.708	.060	-.033	.574	.623	.505
Standard error	.163	.473	.318	—	—	—
Hispanic	[2] -.523	-.421	-.154	.619	.551	.498
Standard error	.194	.457	.301	—	—	—
Number of earners (one earner)						
No earners	-.487	(4)	-.731	.627	.660	.366
Standard error	.432	(1)	.628	—	—	—
One earner	-1.39E-03	-.416	-.111	.732	.675	.636
Standard error	1.09E-01	.313	.213	—	—	—
At least three earners	-.257	.231	.286	.679	.755	.668
Standard error	.175	.184	.396	—	—	—

1 Not applicable.

2 Statistically significant at the 95-percent confidence level.

3 Statistically significant at the 90-percent confidence level.

4 Variable omitted from regression. None of the five families in this category incurred a medical service expenditure.

Table 5. Results of binomial logit predicting probability of incurring expenditures for prescription drugs and medical supplies, with median income held constant for all insurance groups ($32,175)

Characteristic	Parameter estimate	Estimate 1	Estimate 2	Fully insured	Partially insured	Uninsured
Reference group:	(1)	(1)	(1)	0.584	0.606	0.468
Intercept	[2] –3.060	–1.605	–1.055	—	—	—
Standard error	.528	1.579	1.064	—	—	—
Annual expenditure outlays (Box-Cox)	[2] .160	.080	.028	.589	.612	.473
Standard error	.024	.073	.049	—	—	—
Age of reference person (ages 25 to 44)						
Reference person under 25	–.135	–.118	.698	.551	.544	.607
Standard error	.285	.609	.437	—	—	—
Reference person over age 44	.098	–.018	.181	.608	.625	.538
Standard error	.119	.357	.260	—	—	—
Number of children (two)						
One child	–.070	.083	.256	.567	.609	.515
Standard error	.093	.278	.206	—	—	—
Three or more children	.158	–.047	.135	.622	.632	.541
Standard error	.112	.344	.235	—	—	—
Family type (husband/wife)						
Single parent	.152	–.178	[3] –.459	.621	.599	.393
Standard error	.141	.336	.273	—	—	—
Ethnic origin (white/other)						
Black	[3] –.264	–.424	–.042	.519	.436	.307
Standard error	.161	.471	.314	—	—	—
Hispanic	[2] –.976	[3] .756	.201	.346	.552	.288
Standard error	.199	.446	.315	—	—	—
Number of earners (One earner)						
No earners	[3] –.922	1.067	.096	.359	.640	.278
Standard error	.501	1.136	.664	—	—	—
One earner	[2] –.229	.031	.099	.528	.557	.436
Standard error	.099	.301	.204	—	—	—
At least three earners	[3] .300	–.580	–.227	.655	.537	.486
Standard error	.170	.475	.381	—	—	—

[1] Not applicable.

[2] Statistically significant at the 95-percent confidence level.

[3] Statistically significant at the 90-percent confidence level.

For the sample as a whole, the median value for annual total expenditure outlays is $32,175; the average age of the reference person is 36.9, with average family size of 3.8 persons. Therefore, the reference group consists of husband/wife families with two children (both under age 12), median outlays,[30] and two earners, whose reference person is between ages 25 and 44, neither black nor Hispanic, working for a wage or salary in a managerial or professional position, a high school (but not college) graduate, and not enrolled in college at present. These families live in homes they own (though they still pay a mortgage) in the urban South.

The data used in this analysis are unweighted. As noted earlier, logistic regression can be sensitive to weighting. If weighted, the parameter estimates tend to be statistically significant in every case. On the other hand, the relatively small sample size (especially for the partially insured and uninsured), may lead to large standard errors for some parameter estimates, thus understating the number of significant relationships. Therefore, in the interest of obtaining conservative estimates of statistical significance, no weights are applied, but the 90-percent confidence level is used to define statistical significance.

Regression results are shown in table 6. Along with coefficients, the predicted *difference* in probability for each group, compared to the reference group is shown. For example, families whose reference person is under age 25, but who are otherwise identical to the reference group, are about 7 percent less likely to have full coverage than families in the reference group. Thus, for the younger group, the value listed in the fully insured column is –0.074. The younger group has a 5-percent greater probability of being uninsured. Thus, for the uninsured column, the value is shown as 0.053.

Income and insurance status. Perhaps the most important independent variable in any study of consumer expenditure patterns is income. Generally, the more income a family has, the more of any good or service it can afford to purchase, including health insurance. Therefore, it is not surprising that the parameter estimate for income is statistically significant at the 99.9 percent confidence level.

However, despite the statistical strength of the relationship, the probability that a family has full insurance coverage increases slowly with income. Table 7 shows how the predicted probability changes if a family with characteristics of the reference group somehow obtains additional income. Given a 1-percent increase in income, the probability of being fully insured barely increases—rising from 76.7 percent to 76.9 percent. The table shows that even with fairly large increases of income (up to $3,000 per year, nearly a 10-percent increase), the probability of full coverage does not increase much, rising only to 78.1 percent.

Nevertheless, because three-fourths of the reference group are predicted to have full coverage, and well over four-fifths

are predicted to have at least partial coverage, the reference group is predicted to be relatively well-off when it comes to insurance coverage. Therefore, it may be more interesting to study those who are least well-off: the uninsured.

Table 8 shows the predicted probabilities of coverage for a family with characteristics typical of the uninsured. That is, the family is similar to the reference group, except that it has substantially lower income ($24,277, the median value for the uninsured), rents its home, has a reference person who is employed in a blue-collar job, and one earner (the reference person in this case).

Uninsured families are similarly slow to purchase health insurance when they receive increases in income. For example, an increase of $3,000 dollars (a 12-percent increase in income) is associated with a higher probability of full coverage for families with characteristics typical of the uninsured; however, the difference is small—52.6 percent, compared with 50.2 percent.

Other characteristics. Other demographic characteristics are also associated with differences in insurance coverage. Families with young parents (that is those whose reference person is under age 25) are significantly less likely to have full coverage than older families. On the other hand, families with young children (all children are under age 12) are more likely to have health coverage than families who have at least one child over age 12. Families may choose health insurance coverage more readily when the perceived health risks to their children are greater, during the years of early childhood development. Families with older children may also experience the financial pressure of putting extra savings into a college fund and may choose not to spend on health insurance as a result.

Educational attainment also raises the probability of full coverage. Those who did not graduate from high school are less likely to be fully covered than

Table 6. **Predicted probabilities for insurance status, multinomial logit results**

Characteristic	Parameter estimate	Probability of being— Fully insured	Partially insured	Uninsured
Sample (size: 3,725)	—	0.699	0.093	0.208
Reference group:	—	.757	.090	.153
Intercept 1	[1]–3.743	—	—	—
Standard error	.569	—	—	—
Intercept 2	[1]–3.160	—	—	—
Standard error	.568	—	—	—
Annual outlays (Box-Cox)	[1].232	[2].005	[2]–.001	[2]–.003
Standard error	.025	—	—	—
		Difference from reference group probability		
Age of reference person (25 to 44)				
Reference person under age 25	[3]–.381	–.074	.021	.053
Standard error	.199	—	—	—
Reference person at least age 45	.042	.007	–.002	–.005
Standard error	.120	—	—	—
Number of children (two children)				
One child	.129	.022	–.007	–.015
Standard error	.089	—	—	—
Three or more children	.061	.011	–.003	–.007
Standard error	.103	—	—	—
Family type (husband/wife)				
Single parent	.083	.014	–.005	–.010
Standard error	.125	—	—	—
Ethnic origin (white/other)				
Black	.121	.021	–.007	–.014
Standard error	.140	—	—	—
Hispanic	[1]–.412	–.081	.023	.058
Standard error	.140	—	—	—
Occupation (manager/professional)				
Technical/sales	–6.20E-04	–.000	.000	.000
Standard error	.117	—	—	—
Blue collar	–.052	–.009	.003	.007
Standard error	.113	—	—	—
Service	[1]–.348	–.068	.019	.048
Standard error	.152	—	—	—
Self-employed	[1]–.717	–.150	.038	.112
Standard error	.147	—	—	—
Retired	1.185	.147	–.052	–.095
Standard error	.748	—	—	—
Unemployed	–.210	–.039	.012	.028
Standard error	.483	—	—	—
Out of labor force	–.238	–.045	.013	.032
Standard error	.196	—	—	—
Education (high school/some college)				
Did not graduate high school	[1]–.525	–.106	.029	.077
Standard error	.120	—	—	—
College graduate	.012	.002	–.001	–.001
Standard error	.101	—	—	—
Age of children (all under age 12)				
At least one child over age 12	[1]–.258	–.049	.014	.035
Standard error	.090	—	—	—
Region (South)				
Northeast	[1].648	.095	–.032	–.063
Standard error	.113	—	—	—
Midwest	[1].633	.094	–.032	–.062
Standard error	.104	—	—	—
West	–.044	–.008	.002	.005

Table 6. Continued—Predicted probabilities for insurance status, multinomial logit results

Characteristic	Parameter estimate	Fully insured	Partially insured	Uninsured
Degree urbanization (urban)				
Rural	0.188	0.032	-0.010	-0.022
Standard error	.123	—	—	—
Number of earners (two earners)				
No earners	[1]-1.266	-.285	.055	.230
Standard error	.339	—	—	—
One earner	[1]-.368	-.072	.020	.052
Standard error	.097	—	—	—
At least three earners	-.216	-.041	.012	.029
Standard error	.163	—	—	—
Housing tenure (owner with mortgage)				
Owner, no mortgage	-.199	-.037	.011	.026
Standard error	.143	—	—	—
Renter	[1]-.531	-.107	.029	.078
Standard error	.091	—	—	—
Student status (nonstudent)				
Full-time	-.260	-.049	.014	.035
Standard error	.266	—	—	—
Part-time	.025	.004	-.001	-.003
Standard error	.172	—	—	—

[1] Statistically significant at the 95-percent confidence level.
[2] Difference in predicted probability given $1,000 increase in annual outlays.
[3] Statistically significant at the 90-percent confidence level.

those who did graduate, although there is no statistically significant difference in probability of full coverage for high school and college graduates.

Occupational status appears to be associated with different levels of health insurance coverage. The reference group consists of salaried professional or managerial workers; these are the workers who are expected to have high-coverage health benefit plans. However, of the wage or salary occupations, only those families whose reference person is employed in services have a lower probability of being fully insured than members of the reference group. Families whose reference person is self-employed are even less likely to have full coverage.[31]

As expected, number of earners in the family is significantly related to the level of health insurance coverage. Families with two earners (the reference group) are expected to have more health coverage on average than families with fewer earners but equal income, because the two-earner family may have a choice between two employer-sponsored health insurance plans. (Or at least there is a greater chance that someone in the family is eligible for such a plan.) Families with more than two paychecks may need several incomes to cover the family's expenses. If all members earn relatively low wages, they may be in jobs which have poor benefits. Therefore, families with more than two earners are expected to have a lower probability of full coverage. The negative coefficient for multiple earner families seems to confirm this intuition, but it is not statistically significant. Therefore, no firm inference can be drawn.

Cultural differences by race and ethnicity may make certain groups less averse to the risk of being uninsured. Although the coefficient for black families is not statistically significant, the coefficient for Hispanics is very significant. Its negative sign indicates Hispanic families are less likely to be insured.

Regional differences are significantly related to differences in health insurance coverage. Compared with the South, which is the most populous region, families in the Northeast and Midwest have a much higher probability of being fully insured. This may be attributed to any number of factors, including differences by region in State laws, costs of health care, unionization of the work force (which may result in greater availability of employer-provided health plans), rates at which employers offer benefits, or other factors. The West, however, is not significantly different from the South.

In most cases, the probability of being partially insured does not change much with characteristics. This may imply that families "vault over" the partially insured category—that is, if they get extra income, they will move from no insurance to full coverage. But this is not necessarily true in all cases. For example, it is possible that a two-earner family with full insurance coverage moves to the partial coverage class if an earner loses a job, rather than slipping all the way into no coverage. Some of those with partial coverage may move to the no coverage category under similar circumstances. Thus, the probability of partial coverage is similar across demographic characteristics, even though some families may be moving in and out of the category.

Table 7. Predicted probability of health insurance status for families with median income ($32,175)

Item	Probability of being—		
	Fully insured	Partially insured	Uninsured
At present level of income	0.767	0.088	0.145
Given an increase in income of—			
One percent	0.769	0.087	0.144
$1,000	0.772	0.086	0.142
$2,000	0.776	0.085	0.139
$3,000	0.781	0.084	0.136

HEALTH INSURANCE status plays an important role in providing health care to families. This study finds that families with children and at least partial coverage are more likely to receive at least some kinds of care (medical services) than uninsured families with children, even when income and other characteristics are equal.

Certain characteristics are related to the ability to obtain health insurance coverage. In this study, income, age, education and number of earners are found to be positively related to a family's level of health insurance coverage. Characteristics of the reference person such as being a service worker, self-employed, or Hispanic are negatively related to the probability of coverage.

Although income is an important predictor of insurance status, families do not change their level of coverage much, even when income increases substantially. This would indicate that if increased health insurance coverage is a desired outcome, direct grants of cash to families will not raise levels of coverage in any substantial way. Although prices and qualities of insurance plans are not studied in this article it would be useful to find out what influence these factors have on the probability of receiving coverage. Also, data on difficulty of obtaining access to health insurance coverage is useful to understanding why some families are uninsured. For example, if plans are readily available through an employer, are families likely to take advantage of them?[32] Exploration of these issues should provide for interesting future research. □

Table 8. Predicted probability of health insurance status for families with characteristics typical of the uninsured (median income: $24,277)

Item	Probability of being—		
	Fully insured	Partially insured	Uninsured
At present level of income	0.502	0.142	0.357
Given an increase in income of—			
One percent	0.504	0.141	0.355
$1,000	0.510	0.141	0.349
$2,000	0.518	0.140	0.342
$3,000	0.526	0.139	0.335

Footnotes

[1] Peter J. Cunningham and Alan C. Monheit, "Insuring the Children: A Decade of Change," *Health Affairs*, Winter 1990, p. 78.

[2] Judith D. Kasper, "The Importance of Type of Usual Source of Care for Children's Physician Access and Expenditures," *Medical Care*, May 1987, 25(5), pp. 386–98, especially tables 4 and 7.

[3] *HHS News*, U.S. Department of Health and Human Services, November 1994, p.1.

[4] Geoffrey D. Paulin, and Wolf D. Weber, "The effects of health insurance on consumer spending." *Monthly Labor Review*, March 1995, pp. 34-54.

[5] *Statistical Abstract of the United States: 1994* (U.S. Bureau of the Census, 1994), table no. 165. "Health Insurance Coverage Status, by Selected Characteristics: 1987–92," p. 118.

[6] Cunningham and Monheit, pp. 77–78.

[7] Cunningham and Monheit, p. 80. Based on data from the 1977 National Medical Care Expenditure Survey, 1977 and the National Medical Expenditure Survey, 1987. (See exhibit 2, p. 81.)

[8] Gloria J. Bazzoli, "Health Care for the Indigent: Overview of Critical Issues," *Health Services Research*, August 1986, pp. 353–93.

[9] *Ibid.*, p. 356.

[10] *Ibid.*, p. 357.

[11] Richard D. Miller, "Another Look at the Medically Uninsured Using the 1987 Consumer Expenditure Survey," *Bureau of Labor Statistics Working Paper* 205, October 1990.

[12] A consumer unit is a single person living alone or sharing a household with others who are all financially independent; members of a household related by blood, marriage, adoption, or other legal arrangement; or two or more persons living together who share responsibility for at least two out of three major types of expenses: food, housing, and other expenses.

[13] Elizabeth M. Reise, "A Look at Private Health Insurance Coverage of Families with Children under 18 Using Data from the Consumer Expenditure Interview Survey 1989–91," *Proceedings of the Social Statistics Section* (Alexandria, VA, American Statistical Association, 1993), pp. 827–32.

[14] This includes all children living at home. Presumably, most children who are over 18 and living away from home are independent, and responsible for their own health insurance. The Consumer Expenditure Survey considers college students who live at school to be separate consumer units.

[15] The numbers of families excluded from the sample are as follows: medicaid only: 454; medicare only: 32; medicaid and medicare: 16.

[16] The total expenditure definition used in the Consumer Expenditure Survey excludes mortgage principal payments (though it includes mortgage interest payments), and includes the full purchase price of a vehicle, if one is purchased. In the present study total expenditure outlays are defined to include mortgage principal payments, because they are an important component of the homeowner's budget, and are not easily changed once negotiated. Additionally, the full purchase price of a vehicle is replaced by actual outlays. That is, if the respondent reports vehicle payments, including finance charges, these are included rather than the full purchase price, unless the vehicle is purchased outright.

[17] Ethnic origin of the reference person is used to define these variables. Families are defined as black if reference person's ethnicity is described as "Afro-American." Families are defined as Hispanic if the reference person's ethnicity is described as "Mexican American," "Chicano," "Mexican," "Puerto Rican," "Cuban," "Central or South American," or "Other Spanish." Families are defined as white and other if the reference person's ethnicity is described as "German," "Italian," "French," "Polish," "Russian," "English," "Scottish," "Dutch," "Swedish," "Hungarian," "Other," or "Do not know."

A separate variable identifying race of the reference person (white; black; American Indian, Aleut, Eskimo; Asian or Pacific Islander; other) is not used in these definitions. The distinction between race and ethnicity is especially important for the model results shown later. For example, someone who is Hispanic by ethnic origin but black by race is still classified as Hispanic in these models.

[18] The number of uninsured children is calculated by multiplying the average number of children per uninsured family (2.0) by the number of uninsured families (773). The number of fully insured children found similarly for the fully insured families (1.9 multiplied by 2,605). Uninsured children from partially insured families are found for "children first" families by multiplying the percentage of uninsured children (1-0.789) by the number of children in these families (1.9 multiplied by 347). Similarly, the number of uninsured children

in partially insured, "adult first" families can be calculated. The total number of uninsured children (that is, children from uninsured families added to uninsured children from partially insured families) provides the numerator for a percent calculation. The total number of children, regardless of coverage, provides the denominator. If all partially insured families follow the "children first" strategy, then 11.2 percent of children in the sample are uninsured. If they all follow the "adult first" strategy, then 15.8 percent of children in the sample are uninsured.

[19] The standard errors of the means for medical services are 32.49 for the fully insured and 92.64 for the uninsured.

[20] Rose M. Rubin and Kenneth Koelln, "Determinants of Household Out-of-Pocket Health Expenditures," *Social Science Quarterly*, December 1993, pp. 721–35.

[21] These variables are a subset of those chosen for the multinomial logit model described later in the multinomial logit section.

[22] See G.S. Maddala, *Limited Dependent and Qualitative Variables in Econometrics* (Cambridge, England, Cambridge University Press, 1983), pp. 46–47.

[23] Milton Friedman, *A Theory of the Consumption Function* (Princeton, NJ, Princeton University Press for National Bureau of Economic Research, 1957), p. 221.

The use of total expenditures as a proxy for permanent income is common in the literature (for example Miller, Reise, and Paulin and Weber). Rubin and Koelln use an instrumental variable form of total expenditures as a proxy for permanent income to avoid simultaneous equations bias in predicting health care expenditures (pp. 727–28). That is, health care expenditures are a subcomponent of total expenditures, so using total expenditures to predict health care expenditures may result in a bias. No such instrument is necessary in the present case, because only probabilities, not levels, of expenditures are predicted.

Other recent studies that use total expenditures as a proxy for permanent income to model expenditures other than health care include Julie Nelson, "Individual Consumption Within the Household: A Study of Expenditure on Clothing," *Journal of Consumer Affairs*, Summer 1989, pp. 21–43; and E. Raphael Branch, "Short Run Income Elasticity of Demand for Residential Electricity Using Consumer Expenditure Survey Data," *The Energy Journal*, 1993, pp. 111–21.

[24] G.E.P. Box and D.R. Cox, "An analysis of Transformations," *Journal of the Royal Statistical Society*, Series B, 1964, pp. 211–43.

[25] Stuart Scott and Daniel J. Rope, "Distributions and Transformations for Family Expenditures," *Proceedings of the Section on Social Statistics* (Alexandria, VA, American Statistical Association, 1993), pp. 741–46.

[26] Using a computer program written by Daniel J. Rope, the variable l was tested over the a range of values from zero to one with increments of 1/16.

[27] Further evidence of the plausibility of this assumption comes from Reise, "A Look at Private Health Insurance" and Miller, "Another Look." Both authors test for a *lack* of health insurance coverage. Reise uses the natural log of total expenditures in her model, and finds the coefficient negative and statistically significant, indicating that the probability of a *lack* of coverage decreases with income at a decreasing rate. Miller uses total expenditures and total expenditures squared in his model. He finds a negative coefficient for total expenditures and a positive coefficient for total expenditures squared. Both coefficients are statistically significant. As in Reise's study, the signs of Miller's coefficients also indicate the *lack* of insurance coverage is decreasing at a decreasing rate with respect to income. If the problem is reversed, that is, the probability of *full* insurance coverage is estimated instead of a *lack* of coverage, the signs of the coefficients reverse, indicating that the probability of having full insurance coverage *increases* with income, though still at a decreasing rate, as postulated in this article.

Note also that both Reise's and Miller's specifications are forms of the Box-Cox transformation. Reise, in effect, assumes the optimal value of l is zero; that is, the natural log is the appropriate transformation. Miller assumes the optimal value of l is 2; that is, a squared term is appropriate. As noted earlier, in this study, the optimal value of l is found to be 1/8, which is between the Reise and Miller estimates.

[28] Regions are designated by standard U.S. Bureau of the Census definitions.

[29] In Miller, "Another Look," the author includes a dummy variable for renters (as opposed to homeowners) "as a proxy for wealth" (p. 8), and finds that renters are significantly more likely to lack full insurance coverage than are homeowners (p. 24). In this study a dummy variable is also included to distinguish families that own their homes outright from families that still pay a mortgage. Paulin finds that families that own outright spend about 11 cents out of every additional dollar on health and personal care, compared to 5 cents for mortgage payers and renters. This may reflect a wealth effect, or simply the fact that families that own outright have more money available to spend than those who must pay a mortgage, *ceteris paribus*. See Geoffrey D. Paulin, "A Comparison of Consumer Expenditures by Housing Tenure," *Journal of Consumer Affairs*, Summer 1995, pp. 164–98, especially p. 189.

[30] The median is chosen, as opposed to the mean, because outlays are not normally distributed. Table 3 shows that the mean is substantially higher than the median for all three insurance groups, which would raise predicted probabilities. Because the median represents the "middle" family better than the mean in this case, median outlays are chosen for the reference group.

[31] In fact, *ceteris paribus*, only families with no earners are predicted to have a lower probability of full coverage than those families whose reference person is self-employed.

[32] See William J. Wiatrowski, "Who really has access to employer-provided health benefits?" *Monthly Labor Review*, June 1995, pp. 36–44.