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Health and Medical Care Costs to Society of Teen Pregnancy: Children from Birth to Age 14

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Abstract

Although teen childbearing connotes negative outcomes for the mothers, we know little about the effects on the children of being born to a teen mother. We explore some of the possible health and medical care consequences associated with having a teenage mother. The 1987 National Medical Expenditure Survey (NMES), a nationally representative data set, is the data source we use to examine the consequences teen parenting might have on additional health and medical care costs for the children. We find that the children of teenage mothers tend to be in poorer health than the children of older mothers, and that a greater proportion of their medical expenses are borne by other members of society.

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INTRODUCTION

In the press and today's "common wisdom," teen childbearing is associated with negative outcomes for the mothers: teen mothers are less likely to graduate from high school and more likely to live in poverty than are older mothers. However, little is known about the effect of teenage motherhood on the children born to teenage mothers.

In this paper, we explore some of the possible health and medical care consequences of having a teenage mother. For example, children of teen mothers may face an increased risk of medical problems. This increased risk may be due to the relatively poor parenting skills of teenage mothers, which may arise from the lower levels of education associated with teenage childbearing. Poorer parenting and lower income among teen mothers may lead to poorer nutrition, later detection of health problems, and greater risk of accidents among their children. Alternatively, teen childbearing may be associated with fewer medical problems during childbirth and a higher probability of giving birth to a healthy infant. These positive effects of teen childbearing might help to offset the negative effects of poorer parenting skills and lower income levels.

Even if children of teens are more likely to be in poor health than are the children of older mothers, they will not necessarily incur higher medical costs or have greater medical care utilization. There are several possible explanations for this. First, persons with lower incomes and those without insurance are less likely to take their children to medical care providers (Wolfe 1994). Second, if they do take their children, they are more likely to use lower-cost providers such as subsidized clinics and primary care providers, rather than specialists (Mitchell 1991). Finally, since Medicaid generally reimburses providers at a lower level than private insurers do, reported expenditures are likely to be lower for those who are covered by Medicaid.

Teen mothers are more likely than others to have public insurance (Medicaid) or to have no insurance coverage. If the cost of their children's medical care is paid by Medicaid or is shifted to other payers, then other members of society are paying for these costs. Hence, the difference in such coverage times the utilization by the children of teen mothers provides an estimate of the additional cost to the public of teen parenting in terms of the children's medical care costs.

DATA

In this paper, we use a nationally representative data set, the 1987 National Medical Expenditure Study (NMES), to investigate the consequences of teen parenting in terms of the additional health and medical care costs of the children. This is the most recent data set to collect detailed data on medical care utilization, health status, and insurance coverage for a national sample. We use these data to construct a sample of 3,047 children who were less than 14 years old at the time of the last interview and who had mothers less than 33 years old. Maternal characteristics are merged onto the child's observation to complete our analysis file. The sample is restricted to children and mothers for whom complete information is available.

Unfortunately, the NMES data set is not ideally suited for studying the fertility decisions of the women in the sample. In fact, we know very little about their fertility histories. Instead, we infer the age at which women had their first child by subtracting the age of the mother's oldest child in the sample from the mother's age. Clearly, this approach has several problems. First, since the sampling unit is the household, we only observe the mother and the child if they are living in the same household at the time of the first interview. For example, if the mother's oldest child moved away from home sometime prior to the initial interview, we would underestimate the age at which the mother had her first child. To address this problem, we restrict the sample of mothers to those who were less than 33

years old at the time of the last interview. This restriction minimizes the chances that one or more of the mother's children will no longer be living in the household.

A second problem results from restricting our sample to children whose mothers live in the same household and thus omitting children who live only with their fathers or other relatives. It seems reasonable to assume that children of teenage mothers might disproportionately live with other family members. To the extent that this is true, we do not have a representative sample of children of teen mothers.

We use these data to compare the characteristics of children born to teen mothers and children born to older mothers. (The overall means, standard deviations, minimums, and maximums of the variables used from these data are presented in Table 1.)[1] In particular, for these two groups, we study differences in health status, medical care utilization and expenditures, insurance coverage, and public cost of medical care. To make these comparisons, we present the results from two separate analyses. First, we present average (mean) utilization and medical expenditure figures for the following three groups of children: (1) children born to mothers who first gave birth as a young (less than 18) teen *(young teen mother),* (2) children born to mothers who first gave birth as an older (age 18–19) teen *(older teen mother),* and (3) children born to mothers who never gave birth as a teen *(older, or late-fertility, mother)*. Further, we present these means for children stratified by the following six age groups: 0–1 year, 2–3 years, 4–5 years, 6–7 years, 8–10 years, and 11–14 years. The first group (0–1 year) comprises children who are most likely to receive well-baby care. The second group (2–3 years) are at the age when vaccinations are usually given. Four- to 5-year-olds are at nursery school age, 6- to 7-year-olds are in their first years of elementary school, 8- to 10-year-olds have completed most of elementary school, and 11- to 14-year-olds are entering their early adolescent years.

[1]A discussion of outliers appears in Appendix A.

TABLE 1

Definitions, Means, and Standard Deviations of Variables Used in Tobit Estimates on Sample of All Children of Women 16–32 as of 1987 (*N* = 3,463)

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variables				
Total number of medical care visits	3.76	8.22	0	196
Total medical care expenditures	$406.40	$2,305.00	$0.00	$101,200.00
Total dollars paid by others	$198.00	$1,258.00	$0.00	$ 38,080.00
Independent variables				
Age of child	5.52	3.46	0	14
Race of child is white	.61	.49	0	1
Sex of child is male	.52	.50	0	1
Child has excellent health	.52	.50	0	1
Child has poor health	.07	.26	0	1
Mother first gave birth when <18	.20	.40	0	1
Mother first gave birth when 18–19	.24	.43	0	1
Mother first gave birth when 20–21	.23	.42	0	1
Child born to mother when <18	.13	.34	0	1
Child born to mother who was 18–19	.14	.34	0	1
Other variables				
Mother a high school graduate	.69	.46	0	1
Mother's age in 1987	27.62	3.41	16	32
Mother's number of children in 1987	2.27	1.11	1	7

Data source: National Medical Expenditure Survey (NMES).

Although the descriptive analysis presented first provides insight into the consequences of teen childbearing, it does not control for many important variables. Hence, we also conduct multivariate regression analysis on medical care utilization, total medical expenditures, and total social expenditures. Since the dependent variable is censored at zero for a substantial fraction of the observations, we use tobit analysis.

HEALTH STATUS

We use four measures of health status in this paper. The first two are based on parents' self-assessment and are perhaps the most widely used of all health status measures.[2] The first measure is a dummy variable for whether the child is reported to be in excellent health *(excellent),* and the second measure is a dummy variable for whether the child is reported to be in poor or fair health *(poor-fair).* We also use two other indicators of health problems, one that indicates the presence of acute health conditions *(acute)* and a second that indicates the presence of chronic health conditions *(chronic).* Both variables are based on a series of questions asked of parents. The chronic conditions included differ slightly for children less than 5 years old relative to children over 5 (see the glossary in Appendix B for more detail). These data are presented in Table 2 for children born to a mother who first gave birth as a young teen (<18), for children born to a mother who first gave birth as an older teen (18–19), and for children born to a mother who first gave birth after her teenage years (≥20). Both unweighted and weighted means are presented. The overall proportion of children in excellent health is clearly lower for children whose mothers were teens at first birth than for those whose mother never gave birth as a teenager. Far more than half of children born to nonteen mothers are reported to be in excellent health,

[2]The validity of this measure has been tested for older population age groups. See, for example, Maddox and Douglass (1973) and Fylkesnes and Forde (1991).

TABLE 2

Means of Children's Health Status, by Mother's Age at Birth of First Child

	Age Category of Child																				
	Mother <18							Mother 18–19						Older Mother							
Variable	0–1	2–3	4–5	6–7	8–10	11–14	All	0–1	2–3	4–5	6–7	8–10	11–14	All	0–1	2–3	4–5	6–7	8–10	11–14	All
Excellent health																					
Unweighted	0.41	0.44	0.40	0.44	0.39	0.38	0.41	0.43	0.44	0.42	0.49	0.52	0.52	0.48	0.58	0.60	0.61	0.55	0.59	0.52	0.59
Weighted	0.36	0.43	0.40	0.39	0.37	0.35	0.38	0.48	0.48	0.45	0.49	0.50	0.52	0.49	0.60	0.62	0.64	0.56	0.58	0.57	0.60
Fair or poor health																					
Unweighted	0.06	0.11	0.06	0.13	0.07	0.07	0.08	0.09	0.11	0.16	0.10	0.05	0.03	0.09	0.05	0.08	0.04	0.06	0.04	0.04	0.06
Weighted	0.08	0.13	0.06	0.13	0.06	0.07	0.09	0.07	0.11	0.16	0.09	0.06	0.03	0.09	0.04	0.08	0.05	0.05	0.03	0.03	0.05
Acute																					
Unweighted	0.69	0.57	0.55	0.46	0.45	0.51	0.52	0.74	0.62	0.65	0.54	0.51	0.51	0.57	0.69	0.66	0.61	0.59	0.58	0.64	0.63
Weighted	0.68	0.52	0.59	0.48	0.45	0.51	0.52	0.74	0.63	0.64	0.54	0.50	0.50	0.50	0.70	0.67	0.60	0.58	0.59	0.57	0.63
Chronic																					
Unweighted	NA	NA	0.61	0.06	0.02	0.05	NA	NA	NA	0.60	0.07	0.09	0.08	NA	NA	NA	0.61	0.08	0.06	0.14	NA
Weighted	NA	NA	0.63	0.05	0.01	0.05	NA	NA	NA	0.63	0.07	0.10	0.07	NA	NA	NA	0.61	0.07	0.06	0.11	NA
N	54	89	67	85	132	150	577	53	133	110	134	164	120	714	248	456	320	301	221	50	1,596

Note: NA = Not applicable.

whereas less than half of children born to the teen mothers have reported excellent health. Children born to a young teen mom are least likely to report excellent health (38 percent), whereas nearly half of the children born to an older teen mother report excellent health.

Although the unweighted and weighted tabulations are generally consistent, the weighted tabulations suggest that the differences are more pronounced between children born to young teens and other children. Further, the reported health status of children born to teen mothers is never better than that of children born to mothers who first gave birth at a later age. Using weighted data, 60 percent of children born to older mothers have excellent health reported, as opposed to 38 percent for those born to a mother who was less than 18 and 49 percent for those born to an older teen mother. There are also differences in the proportion of children with reported poor or fair health status by mother's age at her first birth, although these differences are small: 5 percent of children born to older mothers had poor or fair health reported, compared to 9 percent of children born to mothers who ever gave birth as a young or older teen. The pattern for acute and chronic illness is rather different: in these cases, the proportions with acute or chronic conditions are somewhat greater for children of older mothers. These differences may reflect real health differences or simply greater use of medical care and the diagnosis rendered at the site of care.

UTILIZATION

We use five measures of utilization: outpatient visits to medical providers, outpatient visits to hospital clinics, visits to an emergency room, number of inpatient or hospital stays, and total number of visits. Much of the literature suggests that emergency room visits represent inappropriate medical care utilization: in many cases, such visits take place when access to providers is restricted and care is postponed until it is an "emergency." Further, some inpatient stays are also the result of postponed medical care and may represent a lack of access—rather than access—to medical care. Finally, in some

areas of the country, outpatient visits to hospitals may indicate a lack of access to private providers as well as the lack of a regular provider.

Table 3 presents the average pattern of utilization of medical providers. As in Table 2, the first row in each set is unweighted, and the second contains the weighted means. Both sets provide clear evidence that children born to mothers who never gave birth as a teen have greater use in terms of visits to medical care providers. This is true for every age of the child, although the differences are greater at younger ages. Note in particular the comparison of 6.89 medical provider visits (weighted) for infants and 1-year-olds of older mothers, compared with 3.90 and 4.41 for infants and 1-year-olds born to young and older teen mothers, respectively. The overall differences are also large: 4.15 for children of older mothers versus 1.84 for children born to a young teen mother and 2.71 for those born to an older teen mother. In each of these tabulations, the same pattern exists: children of young teen mothers have the lowest utilization, whereas children born to late-fertility mothers ($\geq$20 years of age) have the highest utilization. Turning to hospital outpatient visits, a pattern again emerges of greater use among children born to older mothers, although the differences are smaller and the utilization is far smaller on average. Emergency room visits suggest little difference by age of the mother at her first birth. However, in the youngest age group, the pattern is the one hypothesized above: greater use for infants of teen mothers. In this case, the mean use is .66 for children born to young teen mothers, .77 for those born to older teen mothers, and .47 for later-fertility mothers. Inpatient stays are so infrequent in this age group that the pattern is not clear. Finally, since total medical care visits are dominated by visits to a medical provider, the patterns of total visits are essentially identical to those for utilization of medical providers: significantly greater use among children born to older mothers. A comparison of children born to a young teen mother versus those born to an older mother shows that children in the first group have fewer than half the number of total visits as those in the latter group (weighted).

TABLE 3

Means of Health Care Utilization, by Mother's Age at Birth of First Child

	Age Category of Child																				
	Mother <18							Mother 18–19							Older Mother						
	0–1	2–3	4–5	6–7	8–10	11–14	All	0–1	2–3	4–5	6–7	8–10	11–14	All	0–1	2–3	4–5	6–7	8–10	11–14	All
Medical provider visits																					
Unweighted	3.38	2.57	1.83	1.60	1.12	1.40	1.78	4.32	2.11	3.34	3.72	1.84	1.13	2.57	6.27	4.51	3.24	3.42	2.12	2.24	3.88
Weighted	3.90	2.87	1.93	1.33	1.14	1.42	1.84	4.41	2.27	3.52	3.51	2.21	1.28	2.71	6.89	4.96	3.36	3.53	2.16	2.25	4.15
Hospital outpatient visits																					
Unweighted	0.74	0.30	0.45	0.03	0.16	0.07	0.24	0.48	0.31	0.28	0.15	0.12	0.12	0.22	0.57	0.27	0.30	0.21	0.16	0.44	0.30
Weighted	0.56	0.28	0.27	0.03	0.10	0.08	0.18	0.54	0.28	0.28	0.19	0.16	0.11	0.23	0.58	0.32	0.26	0.20	0.17	0.33	0.31
Emergency room visits																					
Unweighted	0.72	0.38	0.30	0.23	0.24	0.17	0.29	0.83	0.39	0.28	0.23	0.20	0.21	0.30	0.52	0.40	0.29	0.23	0.16	0.13	0.32
Weighted	0.66	0.38	0.25	0.25	0.22	0.16	0.27	0.77	0.38	0.27	0.20	0.21	0.18	0.29	0.47	0.40	0.26	0.24	0.17	0.14	0.31
Inpatient stays																					
Unweighted	0.10	0.10	0.02	0.05	0.02	0.01	0.04	0.12	0.06	0.04	0.01	0.02	0.06	0.05	0.12	0.07	0.05	0.03	0.01	0.00	0.06
Weighted	0.11	0.10	0.01	0.04	0.02	0.02	0.04	0.08	0.08	0.04	0.02	0.03	0.06	0.05	0.12	0.05	0.05	0.03	0.01	0.00	0.05
All medical visits																					
Unweighted	4.93	3.34	2.59	1.92	1.54	1.66	2.35	5.75	2.87	3.94	4.10	2.17	1.51	3.14	7.48	5.25	3.88	3.88	2.45	2.81	4.56
Weighted	5.24	3.64	2.47	1.63	1.52	1.68	2.33	5.80	3.01	4.11	3.72	2.60	1.63	3.27	8.06	5.74	3.93	4.00	2.51	2.71	4.82
N	61	105	110	98	152	174	700	65	155	160	144	184	136	844	282	516	462	346	259	54	1,919

SOURCE OF PAYMENT FOR MEDICAL CARE

Table 4 provides information on the ratio of medical expenditures paid for by three sources: self-payment (payment by the parents), private insurance, and other members of society. Payment by other members of society includes payments made by Medicaid, by the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS), and by Medicare (for a small number of disabled children), with an adjustment for uncompensated care (see the glossary in Appendix B). The pattern here is quite clear: children born to older mothers are more likely to have their care paid for directly by their parents. In the weighted sample, 47 percent of the cost of care was paid out-of-pocket for children born to older parents, compared with only 38 percent of the costs for children of older teen mothers and 35 percent for children born to young teen mothers.

The proportion covered by private insurance also differs by mother's age at first birth. On average, 32 percent of medical costs were paid for by private insurance for children born to older-fertility mothers, compared to 23 and 16 percent for children of older teen mothers and younger teen mothers, respectively.

The ratio paid by others in society is again consistent with expectations: far more children born to teenage mothers, especially young teen mothers, had publicly provided insurance. Whereas only 20 percent of medical care costs were paid by others in society for children born to older-fertility mothers, nearly half (49 percent) of the costs for children born to young teen mothers were paid by others in society.

EXPENDITURES

Table 5 provides information on total annual medical expenditures for all of these children ages 0–14, unweighted and weighted. As expected, based on utilization, expenditures are greater for

TABLE 4

Means of Proportion of Medical Expenses Paid by Source, by Mother's Age at Birth of First Child

	Age Category of Child																				
	Mother <18							Mother 18–19						Older Mother							
	0–1	2–3	4–5	6–7	8–10	11–14	All	0–1	2–3	4–5	6–7	8–10	11–14	All	0–1	2–3	4–5	6–7	8–10	11–14	All
Percentage self-paid																					
Unweighted	0.27	0.22	0.23	0.35	0.36	0.33	0.29	0.35	0.39	0.28	0.37	0.42	0.37	0.36	0.47	0.47	0.46	0.43	0.38	0.37	0.45
Weighted	0.34	0.25	0.29	0.41	0.45	0.35	0.35	0.36	0.42	0.27	0.42	0.41	0.43	0.38	0.49	0.48	0.50	0.45	0.40	0.39	0.47
Percentage paid by private insurance																					
Unweighted	0.11	0.15	0.18	0.17	0.17	0.24	0.17	0.12	0.18	1.20	0.20	0.25	0.27	0.20	0.29	0.31	0.30	0.30	0.36	0.32	0.31
Weighted	0.10	0.15	0.16	0.18	0.14	0.21	0.16	0.09	0.20	0.26	0.20	0.29	0.28	0.23	0.30	0.32	0.33	0.31	0.37	0.32	0.32
Percentage paid by others in society																					
Unweighted	0.61	0.63	0.59	0.48	0.47	0.44	0.53	0.53	0.43	0.52	0.43	0.33	0.37	0.43	0.25	0.22	0.23	0.27	0.26	0.31	0.24
Weighted	0.56	0.60	0.56	0.42	0.41	0.44	0.49	0.55	0.38	0.47	0.39	0.31	0.30	0.39	0.21	0.20	0.17	0.24	0.25	0.30	0.20
N	50	80	72	47	82	85	416	58	116	105	80	103	73	535	268	429	368	243	172	38	1,518

TABLE 5

Total Annual Expenditures, by Mother's Age at Birth of First Child (1987 Dollars)

	Mother < 18			Mother 18–19			Older Mother		
	Unweighted	Weighted	*N*	Unweighted	Weighted	*N*	Unweighted	Weighted	*N*
0–1	$753.91	$926.88	61	$924.47	$783.01	65	$1,096.83	$1,167.64	282
2–3	434.10	472.76	105	316.22	348.01	155	513.30	512.60	516
4–5	344.74	271.20	110	473.22	405.63	160	345.48	336.49	462
6–7	560.73	324.35	98	139.91	165.52	144	283.27	289.44	346
8–10	315.37	222.22	152	149.65	173.58	184	144.59	156.76	259
11–14	103.23	121.34	174	324.47	315.53	136	206.94	188.07	54
All	357.63	311.77	700	327.90	311.96	844	458.79	469.22	1,919

children born to an older mother than for those born to a teen mother. Overall, in 1987 dollars, the weighted average is $469 for children born to nonteen mothers versus a weighted average of $312 for children born to a mother who first gave birth as a teen.[3] The pattern is not consistent across all age groups. For infants (0–1), the highest average expenditures are among children born to a late-fertility (older) mother; the lowest (weighted) are among those born to an older teen mother. For ages 4–5 the pattern differs: the highest expenditures are for children born to older teen mothers, and the lowest are for those born to young teenage mothers.

The final table of means is for the amount paid by other members of society. In this case, even though average expenditures are greatest for children born to older mothers, the amount paid by other members of society is greatest for children born to mothers who first gave birth as young teens. Table 6 shows that children born to mothers who first gave birth as young teens incurred $187 in social costs, compared to about $164 incurred by children born to all older mothers, including older teen mothers. Since acute health problems may explain differential medical expenditures, we include means by whether or not the child has a reported acute condition. On average, those with acute conditions report far greater social and total expenditures than do those with no acute conditions. For those with acute conditions, children born to a young teen have the highest expenditures paid by others in society ($282), and children born to all older mothers have lower "publicly paid" expenditures ($225).

MULTIVARIATE ANALYSIS

The means above provide us with a picture of differences in health status, medical care use, and expenditures, by whether or not a child was born to a young teenage mother (before age 18), an

[3]Unless otherwise specified, all dollar amounts are expressed in 1987 dollars, which can be converted to current dollars by using the consumer price index for medical care.

TABLE 6

Means of Total Expenditures and Amount Paid by Others in Society, by Mother's Age at Birth of First Child (1987 Dollars)

	Health Status: Actively Ill (1) or Not (0)								
	Mother < 18			Mother 18–19			Older Mother		
	0	1	All	0	1	All	0	1	All
Dollars paid by others									
Unweighted	$153.31	$250.02	$203.43	$100.84	$270.65	$198.35	$65.49	$263.86	$190.28
Weighted	83.64	282.49	186.70	85.76	224.66	164.79	56.60	226.50	163.78
Total expenditures									
Unweighted	216.81	397.36	310.37	156.98	499.58	353.71	210.72	655.77	490.69
Weighted	141.02	459.66	306.17	149.28	474.25	334.19	214.45	672.31	503.27

Note: 0 = not actively ill; 1 = acute condition present.

older teen mother (age 18–19), or a mother who started childbearing after her teen years. Since the distribution of children's ages is not constant across these groups, we use multivariate analysis to better isolate the impact that having a mother who first gave birth as a teen has on her children's medical care use. To this analysis, we also add whether a particular child was born to a young teen or an older teen mother while the mother was a younger or older teen, respectively. We look at three measures of medical care use: total number of visits, total expenditures, and societal expenditures (expenditures paid by others). For all three dependent variables, a number of children have zero values; hence we use tobit analysis.

Three models are estimated for each dependent variable. Model 1, the simple, or limited, model, includes only the child's age at the time he or she is observed in 1987; dummy variables indicating that the child's mother first gave birth prior to age 18, at age 18–19, or at age 20–21; and dummy variables indicating that the child's mother was a teenager (either less than 18 or 18–19) at the time of *this* child's birth. Model 2 adds the child's race and sex to the equation. We include these variables because race and sex are associated with some illnesses and may be associated with barriers to medical care. Model 3 adds two measures of a child's health to the estimates: a dummy variable for poor-fair health and a dummy variable for excellent health. The former is expected to lead to greater use of care, the latter to less use. Other variables normally included in utilization estimates, such as insurance coverage and income, are not included for several reasons: (1) both variables are likely to be endogenous to the mother's fertility decisions, (2) reported income may belong to the mother's parents as the mother may not have her own household, and (3) there are documented problems with the income imputations at the tails of the distribution.[4]

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[4]In an alternative specification, we add a dummy variable for high income. Although this inclusion did not significantly affect the results for the total medical expense regressions or the total medical visits regressions, the results from the regressions for total dollars spent by others in society were significantly different. The general pattern of the coefficient estimates remains the same, but the magnitude of the effects is somewhat diminished. Not surprisingly, the coefficient estimate for the

The tobit estimates appear in Tables 7–9, which present the estimated coefficients and *t*-statistics for each of the three models described above. Table 7 presents the estimates for the determinants of total medical care visits. The results are consistent with the means presented earlier: older children have fewer visits; children with mothers who first gave birth prior to age 22 use less care, particularly children born to mothers who first gave birth before age 18. However, there is some indication that the children born to a mother *while* she was a young teen (<18) use somewhat more care than their younger siblings. Children's health status plays the expected role and is quite significant. In addition, white children have relatively more medical visits than nonwhite children, even after controlling for the child's health status, age, sex, and mother's age at birth.

In Table 8, we investigate the determinants of medical care expenditures. Results are similar to those for visits, with the following exception: even after a child's health is taken into account, children born to a teen who was less than 18 at (this child's) birth have significantly greater expenditures than do subsequent children born to these mothers.

Finally, in Table 9, we explore the determinants of medical care cost borne by other members of society. Here we have the strong finding that others in society bear significantly greater costs for the medical care of children born to a mother who first gave birth when younger than 22. Children born to a mother when the mother is under 18 have even greater costs than do subsequent children born to the same mothers. These findings suggest some learning: the children born to mothers who first gave birth as young teens but who were not young teens at their birth have somewhat lower medical care costs paid by others in society than do their older siblings. This pattern does not appear to hold for firstborns of 18- to 19-year-old mothers.

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dummy variable for high income is large, negative, and statistically significant at the 1 percent level.

TABLE 7

Determinants of Total Medical Care Visits: Tobit Estimates (*N* = 3,463)

Variable	Model 1		Model 2		Model 3	
Constant	6.49	(17.8)	4.38	(9.0)	4.83	(7.8)
Child's age	-.55	(9.8)	-.54	(9.8)	-.57	
Child's sex = male			.15	(0.4)	.16	(0.4)
Mother first gave birth when <18	-3.79	(5.2)	-2.94	(4.0)	-3.45	(4.1)
Mother first gave birth when 18–19	-1.80	(3.0)	-1.15	(1.9)	-1.37	(2.0)
Mother first gave birth when 20–21	-1.52	(3.3)	-1.35	(2.9)	-1.38	(2.6)
Mother <18 at birth	.84	(1.0)	.94	(1.1)	1.05	(1.1)
Mother 18–19 at birth	-.81	(1.1)	-.91	(1.3)	-.83	(1.0)
White			2.69	(7.3)	2.79	(6.6)
Child's health						
Excellent					-.96	(2.3)
Fair-poor					4.49	(5.8)
Log likelihood	-10,254		-10,227		-8,666	

Notes: Mean of the dependent variable = 3.76; standard deviation = 8.22. *T*-statistics are in parentheses.

TABLE 8

Determinants of Medical Expenditures: Tobit Estimates (*N* = 3,463)

Variable	Model 1		Model 2		Model 3	
Constant	$671.10	(6.3)	$443.90	(3.1)	$647.80	(3.6)
Child's age	-141.7	(8.7)	-141.6	(8.7)	-150.1	(8.3)
Child's sex = male			-17.3	(0.2)	-72.6	(0.06)
Mother first gave birth when <18	-460.3	(2.2)	-361.2	(1.7)	-704.8	(2.9)
Mother first gave birth when 18–19	-420.9	(2.4)	-343.2	(1.9)	-437.5	(2.2)
Mother first gave birth when 20–21	-110.3	(0.8)	-90.4	(0.7)	-95.6	(0.6)
Mother < 18 at birth	179.8	(0.7)	190.5	(0.8)	504.3	(1.8)
Mother 18–19 at birth	125.9	(0.6)	11.4	(0.5)	202.3	(0.9)
White			311.5	(2.9)	377.2	(3.1)
Child's health						
Excellent					-360.6	(3.0)
Fair-poor					899.7	(4.0)
Log likelihood	-23,692		-23,688		-19,955	

Notes: Mean of the dependent variable = $406.44; standard deviation = 2,305.3. *T*-statistics are in parentheses.

TABLE 9

Determinants of Medical Expenditures Paid by Society: Tobit Estimates (*N* = 3,463)

Variable	Model 1		Model 2		Model 3	
Constant	-$1,572.3	(11.9)	-$1,269.0	(7.6)	-$ 959.1	(5.4)
Child's age	-165.9	(9.1)	-166.7	(9.1)	-156.9	(8.9)
Child's sex = male			135.2	(1.2)	66.5	(0.6)
Mother first gave birth when <18	870.7	(3.8)	712.2	(3.1)	398.4	(1.7)
Mother first gave birth when 18–19	857.9	(4.4)	736.1	(3.7)	565.9	(2.9)
Mother first gave birth when 20–21	607.4	(3.8)	576.9	(3.6)	589.9	(3.8)
Mother <18 at birth	475.1	(1.9)	455.6	(1.8)	672.2	(2.6)
Mother 18–19 at birth	-75.5	(0.3)	-52.4	(0.2)	49.5	(0.2)
White			-510.2	(4.3)	-327.1	(2.8)
Child's health						
Excellent					-486.4	(4.1)
Fair-poor					1,150.2	(5.8)
Log likelihood	-10,341		-10,331		-8,477	

Data source: 1987 National Medical Expenditure Study.

Notes: Mean of the dependent variable = $198.00; standard deviation = 1,257.9. *T*-statistics are in parentheses.

As argued above, it is possible that the health status of the child will vary systematically with the mother's age at birth. Indeed, the descriptive statistics in Table 2 suggest that children of teenage mothers are less likely to report excellent health than the children of older mothers. However, the descriptive statistics do not allow us to control for demographic variables such as sex and race. To control for these factors, we use a probit model to examine the effect of teen motherhood on health status; the dependent variables are the self-reported health status variables, poor-fair and excellent.

Table 10 reports the coefficient estimates for the probit model. The results indicate that teen motherhood is significantly associated with a lower likelihood of excellent health status. This negative effect on health status is greatest for the youngest mothers (those less than 18 at the time of their first birth), and the effect decreases in magnitude as the mother's age increases. Further, the negative effect of teen motherhood on health status does not appear to be offset in any way by birth order. The results also suggest that having a mother who first gave birth as a teen is positively associated with a higher probability of a child having poor or fair health. However, the coefficient is significant only for older teen mothers.

SIMULATIONS

The tobit estimates presented in Tables 7–9 and the probit estimates in Table 10 can be used to simulate the expected effect of teen motherhood on the medical expenses of and utilization by children. The simulations are conducted as follows. First, based on the tobit estimates, the expected value of the dependent variable is calculated for all children in the sample. Second, the age of the mother at first birth is "aged" (where appropriate), and the expected value of the dependent variable is recalculated.

The results presented in Tables 11–13 show the average expected or simulated value of the dependent variable for aging the mother, by subgroups of the children in the sample. Our simulations

TABLE 10

Determinants of Child's Health Status: Probit Estimates (*N* = 2,887)

Variable	Fair-Poor	Excellent
Constant	-1.19	.12
	(11.9)	(1.8)
Child's age	-.03*	.004
	(-2.5)	(.53)
Child's sex = male	-.16*	-.05
	(-2.3)	(-.98)
Mother first gave birth when <18	.06	-.49*
	(.44)	(-4.9)
Mother first gave birth when 18–19	.25*	-3.4*
	(2.1)	(-4.0)
Mother first gave birth when 20–21	-.20*	-.13*
	(1.9)	(-1.9)
Mother <18 at birth	.11	.05
	(.66)	(.47)
Mother 18–19 at birth	-.17	.08
	(-.13)	(.83)
White	-.13	.21*
	(-1.7)	(4.2)
Log likelihood	-727.04	-1,953.8

* Statistically significant at the 5 percent level.

provide a range of expected effects. The upper bound of this range is calculated under the assumption that all covariates in the analysis are held constant except age of the mother at first birth. However, one might argue that this is not a very good assumption: for example, as the probit results in Table 10 show, the health status of the child is also affected by a change in the mother's age at first birth. In particular, raising the age of the mother should result in improved health status for the child. Hence, we also calculate a lower bound that incorporates the expected change in health status when the mother's age changes (simulated using the probit results). In Tables 11–13, the top figure given in each cell represents the upper bound, and the bottom figure given represents the lower bound.

Panel A of Table 11 shows how average total medical expenses would be expected to vary if the mother were older when she had her first child. Panel B of Table 11 converts these values into 1994 dollars using the medical care consumer price index (CPI); the discussion here is based on the 1987 values. As a baseline case, column 2 presents the average “expected” value for different groups of children in the sample that uses the actual values for all variables. The first row suggests that if a woman who first gave birth before age 18 postponed childbirth until she was 18–19 years old, till 20–21, or till 22 or older, then the expected medical expenses for one of her children would increase from about $829 to $859, $949, or $992, respectively. However, these values represent the upper-bound estimates; they do not incorporate the potential improvement in the child's health status as the age of the mother increases. When the expected change in health status is included in the simulations, the change in expenditures is smaller for each incremental increase in the mother's age. For example, the upper-bound calculation reported above indicates that annual medical expenses would increase by about $163 if a mother who was under 18 at the time of her first birth were to postpone childbearing until she was over 21 years old; in contrast, the lower-bound calculation suggests that total medical expenses would increase by only $126 if the mother waited until age 22 or older.

TABLE 11

Total Expected Medical Expenses

A. Simulated Expenses in 1987 Dollars

Population	Number of Observations	Simulations: Original Simulated Value	Simulations: If Mother 18–19 = 1	Simulations: If Mother 20–21 = 1	Simulations: If Mother >21
Age of mother at first birth was <18	577	$829.15 821.93	$858.54 842.20	$949.27 905.90	$991.52 948.12
Child born when mother <18	377	835.26 827.61	821.61 798.54	877.89 835.38	917.95 874.96
Child born when mother >17	200	817.45 811.23	928.15 924.50	1,083.82 1,038.83	1,130.22 1,086.04
Age of mother at first birth was 18–19	714	894.94 884.82		997.22 957.91	1,040.93 1,001.80
Child born when mother was 18–19	394	858.33 848.96		916.42 887.61	957.71 928.86
Child born when mother >19	320	940.02 928.97		1,096.80 1,044.46	1,143.38 1,091.62
Age of mother at first birth was 20–21	661	1,057.79 1,052.22			1,103.51 1,099.16
Age of mother at first birth was >21	935	1,238.62 1,232.03			
Total	2,887	1,030.39 1,023.03			

Note: The top figure in the cell denotes simulated expenses assuming that the child's health does not change; the bottom figure denotes simulated expenses assuming that the child's health changes as predicted by the probit estimates in Table 10.

TABLE 11 (continued)

B. Simulated Expenses in 1994 Dollars

Population	Number of Observations	Simulations: Original Simulated Value	Simulations: If Mother 18–19 = 1	Simulations: If Mother 20–21 = 1	Simulations: If Mother >21
Age of mother at first birth was <18	577	$1,344.74 1,333.03	$1,392.41 1,365.91	$1,539.55 1,469.22	$1,608.08 1,537.69
Child born when mother <18	377	1,354.81 1,342.24	1,332.51 1,295.10	1,423.79 1,354.84	1,488.76 1,419.04
Child born when mother >17	200	1,325.76 1,315.68	1,505.30 1,499.38	1,757.77 1,684.81	1,833.02 1,761.37
Age of mother at first birth was 18–19	714	1,451.44 1,435.03		1,617.32 1,553.57	1,688.21 1,624.75
Child born when mother was 18–19	394	1,392.07 1,376.87		1,486.28 1,439.55	1,553.24 1,506.45
Child born when mother >19	320	1,524.55 1,506.63		1,778.66 1,693.94	1,854.37 1,770.42
Age of mother at first birth was 20–21	661	1,715.56 1,706.52			1,789.71 1,782.65
Age of mother at first birth was >21	935	2,008.83 1,998.14			
Total	2,887				

Note: The top figure in the cell denotes simulated expenses assuming that the child's health does not change; the bottom figure denotes simulated expenses assuming that the child's health changes as predicted by the probit estimates in Table 10.

Table 12 presents similar simulations for expected medical visits. The results show that medical visits increase when the mother is older at the time of her first birth. However, the expected differences in medical care utilization decrease somewhat when the change in health status is included in the simulation (denoted by the bottom figure in each cell).

Panel A of Table 13 shows the total expected expenses paid for by others in society, by subgroups of children. Panel B of Table 13 presents similar estimates but uses 1994 values adjusted using the medical care CPI. As was the case for Table 11, our discussion uses the 1987 values.

The results from these simulations are particularly striking: if a mother who was younger than 18 at her first birth were to postpone childbearing until after age 21, the expenses paid for by others in society on behalf of one of her children would decrease from $405 to $224, a decrease of about 45 percent. As noted above, the total medical expenses for each member of this group would increase from $829 to $992, which implies that as the age of the mother increases, others in society pay an unambiguously lower percentage of the health expenses of her children. Again, the expected effect is attenuated by the inclusion of health status in the simulation. The single greatest expected decrease is for children born to young teen moms while they are teens: from $426 ($414) to $197 ($171). Later children born to these young teen moms also show a significant expected decrease, but a far smaller one than for the firstborn child.

Although the results of these simulations provide an interesting first step toward measuring the effects of teen childbearing on the health status and health expenses of children, it is important to highlight the limitations of our simulations. The estimates on which the simulations are based are reduced form regressions. Because we do not have a structural model of the process in which teen childbearing plays a major part, we cannot make policy predictions based on our simulations. For example, several important factors that may be correlated with both health care utilization and teen motherhood are necessarily omitted from our analysis. These include educational attainment, earnings

TABLE 12

Total Annual Expected Medical Visits

Population	Number of Observations	Simulations: Original Simulated Value	Simulations: If Mother 18–19 = 1	Simulations: If Mother 20–21 = 1	Simulations: If Mother >21
Age of mother at first birth was <18	577	3.8 3.8	4.2 4.2	4.5 4.3	5.3 5.1
Child born when mother <18	377	3.7 3.6	3.8 3.7	4.2 4.0	4.9 4.7
Child born when mother >17	200	4.0 4.0	5.1 5.1	5.1 4.9	5.9 5.8
Age of mother at first birth was 18–19	714	4.6 4.5		4.8 4.6	5.6 5.4
Child born when mother was 18–19	394	4.0 4.0		4.5 4.3	5.2 5.1
Child born when mother >19	320	5.3 5.2		5.3 5.0	6.1 5.9
Age of mother at first birth was 20–21	661	5.2 5.2			6.1 6.1
Age of mother at first birth was >21	935	6.8 6.8			
Total	2,887	5.3 5.3			

Note: The top figure in the cell denotes simulated expenses assuming that the child's health does not change; the bottom figure denotes simulated expenses assuming that the child's health changes as predicted by the probit estimates in Table 10.

TABLE 13

Total Expected Expenses Paid by Others in Society

A. Simulated Expenses in 1987 Dollars

Population	Number of Observations	Simulations: Original Simulated Value	Simulations: If Mother 18–19 = 1	Simulations: If Mother 20–21 = 1	Simulations: If Mother >21
Age of mother at first birth was <18	577	$405.36 393.68	$346.22 328.41	$344.85 307.87	$223.94 196.76
Child born when mother <18	377	425.96 413.94	311.76 289.54	306.11 271.34	196.77 171.30
Child born when mother >17	200	366.52 355.48	411.19 401.68	417.88 376.73	275.15 244.75
Age of mother at first birth was 18–19	714	357.11 339.15		356.96 318.16	233.00 203.43
Child born when mother was 18–19	394	312.15 297.04		306.49 278.51	197.06 175.78
Child born when mother >19	320	412.46 390.99		419.10 366.98	277.24 237.48
Age of mother at first birth was 20–21	661	345.49 335.42			223.04 215.03
Age of mother at first birth was >21	935	265.95 254.09			
Total	2,887	334.57 321.65			

Note: The top figure in the cell denotes simulated expenses assuming that the child's health does not change; the bottom figure denotes simulated expenses assuming that the child's health changes as predicted by the probit estimates in Table 10.

TABLE 13 (continued)

B. Simulated Expenses in 1994 Dollars

Population	Number of Observations	Simulations: Original Simulated Value	Simulations: If Mother 18–19 = 1	Simulations: If Mother 20–21 = 1	Simulations: If Mother >21
Age of mother at first birth was <18	577	$657.43 638.48	$561.51 532.63	$559.29 499.31	$363.19 319.11
Child born when mother <18	377	690.83 671.34	505.62 569.58	496.46 440.07	319.13 277.80
Child born when mother >17	200	594.43 576.53	666.88 651.46	677.73 610.99	446.25 396.94
Age of mother at first birth was 18–19	714	579.17 550.04		497.07 451.70	319.60 285.09
Child born when mother was 18–19	394	668.94 634.12		679.71 595.18	449.64 385.15
Child born when mother >19	320	668.94 634.12		679.71 595.18	449.64 385.15
Age of mother at first birth was 20–21	661	560.33 543.99			361.73 348.74
Age of mother at first birth was >21	935	431.33 412.09			
Total	2,887	542.62 521.66			

Note: The top figure in the cell denotes simulated expenses assuming that the child's health does not change; the bottom figure denotes simulated expenses assuming that the child's health changes as predicted by the probit estimates in Table 10.

opportunities, and income of mothers—all likely to be correlated with teen motherhood and health care utilization. Insurance status is another important omitted variable that is likely to be correlated with both medical utilization and teen motherhood. Hence, although our results provide a useful description of the differences in medical care use and expenses between children born to teenage mothers and other children, we are unable to predict behavioral responses to alternative policies.

CONCLUSION

Our results show that the children of teenage mothers tend to be in poorer health than are the children of older mothers. In addition, although the children of teenage mothers visit medical providers less frequently and have lower *total* medical expenses, a larger percentage of the higher expenses they incur are paid by others in society than is the case among children of older mothers. Hence, a greater proportion of medical expenses for children of teenage mothers is borne by other members of society.

Our simulations suggest that the medical expenses paid by society would be reduced dramatically if teenage mothers were to wait until they were older to have their first children. However, the simulations are based on the assumption that current teenage mothers will “act” like older mothers, not only in terms of their fertility behavior but also in their educational attainment, earnings, and insurance. If these assumptions do not hold, then our results are likely to overstate the savings to society from postponing the childbearing of current teenage mothers.

APPENDIX A

OUTLIERS

Whenever medical care use or expenditures are studied, the mean (average) can be influenced by a few outliers. In this appendix, we report the results obtained after eliminating observations that might be considered as outliers: In particular, we eliminate observations with values of the dependent variable that exceed two standard deviations above the mean.

For total medical care visits, the overall mean is 3.76, and the standard deviation is 8.22. If we eliminate all those with more than 20 visits (70 observations), the mean becomes 2.95 with a standard deviation of 3.48. Nevertheless, the pattern of coefficients is similar, though each is smaller. For mothers who first gave birth before age 18, the coefficient is negative and statistically significant at the 1 percent level, as is the negative and smaller coefficient on mothers who first gave birth at age 18 or 19, and the still smaller negative coefficient on mothers who first gave birth at age 20 or 21. The one change from Table 7, where the coefficient on mothers who were 18 or 19 at birth is negative but not statistically significant, is that in the regression omitting those with 20-plus visits, this coefficient is positive and significant at the 5 percent level. The other variables are consistent with the initial specification.

A similar exercise for the total medical expenditures yields comparable results. Here we eliminate observations with expenditures more than two deviations above the mean, or greater than $5,017. This omits 48 possible outliers. The mean is reduced from $406.44 to $239.85 and the standard deviation from $2,305 to $576. In this case, the pattern of coefficients on the variables for age at which the mother first gave birth is identical to those reported in Table 8.

Finally, turning to the average dollars paid by other members of society, excluding amounts more than two standard deviations above the mean eliminates those with values greater than $1,714 (88 observations). This reduces the mean from $198 to $58 and the standard deviation from $1,258 to $181.

Again, the pattern of coefficients on the dummy variables on the set of mother's age at birth are consistent with those reported: all are positive.

These tests of the potential impact of “a few” possible outliers suggest that our results are fairly robust. Since no a priori reason exists to exclude these observations or to believe they are not representative of the general population, the results for the full sample are reported in the text.

APPENDIX B
GLOSSARY OF VARIABLES

Demographic Variables

LASTAGE	Child's age at last interview.
MOMAGE	Mother's age at last interview.
TEENBORN	1 if mother had this child while a teen (less than 19: MOMAGE - LASTAGE $\leq$19); 0 otherwise.
TEENMOM	1 if mother ever had a child when less than 19 years old (MOMAGE - LASTAGE of oldest child) $\leq$19; 0 otherwise.
WHITE	1 if child is white; 0 otherwise.

Health Variables

acute

This variable is intended to capture acute health problems. For all children, the dummy variable is equal to 1 if any of the following conditions were reported to occur within 30 days prior to the interview at which the health status questionnaire was administered (between rounds 1 and 2): stomachache for at least two days, stomach flu with vomiting or diarrhea lasting at least three days, ear infection or earache lasting at least two days, skin infection, sore throat, and high fever lasting at least two days, diarrhea lasting at least two days, poor eating habits, or trouble with school work. In addition, the acute variable is equal to 1 if the child had any of the following conditions in the 12 months prior to the interview: asthma, hay fever, two or more ear infections, stammering/stuttering, migraines, anemia, heart problems, enuresis, parasites, or digestive problems.

chronic

This variable is intended to capture chronic health problems. For children less than 5 years old, this variable equals 1 if the parent answered yes to any of the following questions:

1. During the past three months, has the child been unable to take part in the usual kind of play activities done by most children his age?

2. During the past three months, has the child been limited in the kind or amount of play activities due to a health problem or impairment?

3. Is the child limited in any way due to a health problem or impairment?

Also, this variable equals 1 if the child has difficulty seeing with glasses or hearing with a hearing aid.
For children who are between 5 and 14 years old, the chronic variable is equal to 1 if the parent answered yes to any of the following questions:

	1. Does this child attend (or need to attend) a special school or special classes due to an impairment or health problem? 2. Is this child limited in school attendance or unable to attend school due to her health? 3. Is this child limited in any way because of an impairment or health problem? Again, this variable is equal to 1 if the child has difficulty seeing with glasses or hearing with a hearing aid.
excellent	Self-reported health status (reported by primary respondent for the children) is excellent.
fair-poor	Self-reported health status (reported by primary respondent for the children) is fair or poor.

Utilization

ER visits	Total number of emergency room visits, measured over all rounds.
Hospital inpatient visits	Total number of inpatient hospital stays, measured over all rounds.
Hospital outpatient visits	Total number of hospital outpatient visits, measured over all rounds.
Medical provider visits	Total number of visits to medical providers measured over all rounds.
All medical visits	Total of all reported visits to medical providers, hospital outpatient departments, emergency rooms, and inpatient hospital stays.

Expenses

The NMES has detailed data on medical expenditures. The visit data include information on payment source. Expense variables include total medical expenses corresponding to all reported visits, including facility and physician charges where applicable. In addition, the data include the fraction paid by (1) self; (2) private; and (3) public—Medicare, Medicaid, CHAMPUS,[*] other federal program, other state program, workers' compensation, other, or free from provider.

[*]The Civilian Health and Medical Program for the Uniformed Services is a health insurance package provided to active and retired military personnel and their families.

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