Who Are the Underinsured?

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THE QUESTION OF THE ADEQUACY OF HEALTH insurance in the United States is as much a public concern as is the number and percentage of Americans who have no insurance from any private or public source at all. Like the uninsured, the "underinsured" live with the danger of financial hardship or even ruin in the event of a major illness. Like the uninsured, too, they threaten hospitals and physicians with the possibility of bad debts if they incur medical bills they cannot pay. The cost of such indigent care is passed along in the form of higher charges (and insurance premiums) to other patients and to government budgets that support public hospitals and clinics or the medically needy under Medicaid. Thus, inadequate insurance represents both a private and public burden. Here, the issue is addressed primarily with respect to the population under the age of 65. Because almost all of the elderly are covered by Medicare, the adequacy of their insurance involves a different set of circumstances related to the structure of Medicare itself, supplementary private plans, and the poorer health and lower incomes of the Medicare population.

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The question "Who are the underinsured?" is definitional as well as empirical. Both aspects are addressed here, and the sensitivity of empirical estimates to alternative definitions of underinsurance is explored. Depending on the definition, from 8 percent to 26 percent of the privately insured population under 65 is underinsured, with an intermediate estimate of 13 percent. The proportion who are underinsured increases as catastrophic protection—insurance against the small possibility of large uninsured expenses from a costly illness—is emphasized in the definition. From one-third to two-thirds of all nongroup enrollees are underinsured, although group enrollees, who constitute 90 percent of persons with private insurance, are a substantial majority of the underinsured.

Thus, the population under age 65 with inadequate insurance is about equal to the 9 percent who are completely uninsured during a year. Taking into account those who are uninsured for part of the year as well, the total gap in coverage is not just the 9 percent of the population always without insurance but rather about 27 percent of the population (a projected 55.7 million people rather than 18.8 million in 1984). The relative size of this gap ranges across population groups, amounting to as much as 56 percent in poor families (1.25 times the poverty level or below) and 42 percent in low-income families (twice the poverty level or below). Inadequate private insurance is a problem particularly among those aged 55 and older; while more likely to be insured throughout the year than the rest of the population, they face the likelihood of higher medical expenditures at an age of reduced employment, lower rates of group enrollment, and reduced income.

These findings are based on the out-of-pocket expenses that a nationally representative sample of persons were at risk of paying in 1977 after taking their health insurance into account. The characteristics of these persons and a detailed description of their health insurance benefits are among the data collected in the 1977 National Medical Care Expenditure Survey (NMCES), which was funded by the National Center for Health Services Research, cosponsored by the National Center for Health Statistics, and is described in Cohen and Farley (1984), Cohen and Kalsbeek (1981), and Bonham and Corder (1981). The NMCES data have been adjusted to account for improvements in the catastrophic protection offered by group major medical insurance since 1977.

Defining the Risks

The prospect of expenses that a person's insurance would not cover—which would have to be paid out of pocket—is a useful way of defining and comparing the adequacy of the wide variety of health insurance provisions in the United States. These out-of-pocket expenses cannot be described with certainty ahead of time, however, since they depend on the illnesses and expenses actually experienced by the insured over the term of the policy. For example, someone with a standard major medical policy involving a $100 deductible, 20 percent coinsurance, and a $1,000 annual limit on out-of-pocket expenses might pay nothing at all if he or she happened to go without any health care, but could pay as much as $1,000 if the year's medical bills reached $4,600 or more (the deductible plus 20 percent of $4,500). Although uncertain, these prospects can be fully described by the different levels of out-of-pocket expense that could occur and their probability—by definition the probability distribution of out-of-pocket expenses. This approach has been used to aid federal employees in comparing the insurance options available to them from the Office of Personnel Management (Francis 1984).

To define the probability distribution of out-of-pocket expenses, it is first necessary to define the nature and probability of the medical expenses that a person's insurance might have to cover. The likely mix of medical expenses is important, as well as the total, because insurance policies often provide different coverage for different services such as hospital and dental care. Moreover, two people with the same insurance but the expectation of different medical bills will not have the same out-of-pocket expenses on average. These differences in risk should be taken into account in identifying persons who are likely to incur substantial out-of-pocket expenses. For example, the average 60 year old had a 1 in 20 chance of exceeding $1,000 in out-of-pocket expenses in 1977 with a major medical policy that did not offer a $1,000 catastrophic limit, while the average 25 year old had only a 1 in 100 chance of exceeding $1,000 without this protection.

To calculate the probability distribution of out-of-pocket expenses in 1977 for the individuals in the NMCES sample, a probability distribution of total medical expenses was first constructed (table 1). The last six columns of table 1 are intervals ending at the 50th, 80th,

TABLE 1
Probability Distribution of Total Expenses for High and for Low Risks

Low risk*							
Person's total expense	$0	$40	$150	$425	$950	$2,050	$6,000
Hospital	0	0	0	0	555	1,200	3,800
Inpatient medical	0	0	0	0	180	150	500
Inpatient surgical	0	0	0	0	0	350	1,100
Outpatient laboratory	0	0	20	90	40	60	120
Physician office visits	0	20	80	175	120	200	350
Drugs	0	5	15	25	25	30	40
Dental	0	15	35	135	30	60	90
Probability of specified expense	18%	32%	30%	10%	5%	4%	1%
Expected value of total expense ($291) =	$0	+ $13	+ $45	+ $43	+ $48	+ $82	+ $60
High risk*							
Person's total expense	$0	$90	$375	$1,280	$2,800	$6,050	$14,500
Hospital	0	0	0	660	1,485	3,800	10,125
Inpatient medical	0	0	0	240	360	500	1,400
Inpatient surgical	0	0	0	0	500	1,100	2,000
Outpatient laboratory	0	15	60	60	80	100	195
Physician office visits	0	40	175	200	225	330	500
Drugs	0	20	65	70	90	150	200
Dental	0	15	75	50	60	70	80
Probability of specified expense	11%	39%	30%	10%	5%	4%	1%
Expected value of total expense ($803) =	$0	+ $35	+ $113	+ $128	+ $140	+ $242	+ $145

* Low risks are defined as persons in subgroups with average medical expenses less than the 76th percentile. The high-risk group is the remaining quarter of the population in subgroups with higher average expenses.
Source: Derived from utilization and expenditure data in the 1977 National Medical Care Expenditure Survey, National Center for Health Services Research.

90th, 95th, 99th, and 100th percentiles of the expenditure distribution for two risk groups. These actuarial assumptions regarding the likelihood and mix of total expenses for members of each risk group are stylized, but are derived from the utilization and expenditures actually observed in the survey during 1977. Thus, the probability of any given interval of total expense is derived for a person from the percentage of the sample in that interval. The composition of expenditures is derived from the average expenses of persons in each interval. As a result, the expected value of a person's probability distribution (the sum of the expenditure levels weighted by their probability) is the same as the actual average expense per person by risk group. The components of expense by service are the averages observed for hospitalized persons in intervals where a hospitalization is assumed.

The high-risk group is defined as persons in population groups (defined by a cross-classification of age, sex, race, income, perceived health status, and limitation of usual activity) with average medical expenses exceeding the 75th percentile for the population under age 65, or about $450 in 1977. All persons aged 55 to 64 or having an activity limitation are in this quarter of the nonelderly population. Virtually everyone reporting poor or fair health is also included in the high-risk group, as well as disproportionately more females and members of either poor or high-income rather than middle-income families. The low-risk group is the remaining three-quarters of the population.

Each person's health insurance is then measured against the contingencies described in table 1. Consider, for example, a high-risk person subject to 20 percent coinsurance on all expenses. From the first column in the bottom half of table 1 such a person had an 11 percent chance of incurring zero expenses and paying nothing out of pocket in 1977. The probability of incurring $90 in medical bills and paying $18 out of pocket (20 percent of $90) was 39 percent, with a 30 percent chance of paying $75 out of pocket (20 percent of $375), and so forth up to a 1 percent chance of $2,900 (20 percent of $14,500). Averaging over the entire distribution, the expected value of these out-of-pocket expenses was $160.60. Notice that this figure is much lower than some possible levels of expense. A low-risk person with the same insurance had an expected value of $58.20 in out-of-pocket expenses, with a 1 percent chance of paying $1,200

out of pocket (20 percent of $6,000, from the last column in the top of table 1).

Thus, the assumptions recorded in table 1 mean different out-of-pocket expenditures for persons with the same insurance but in different risk groups. The assumptions also affect the relative importance of coverage for different services, particularly inpatient compared to outpatient benefits. The probability of a hospital admission is assumed to have been 20 percent in the high-risk group and 10 percent in the low-risk group, with hospital and inpatient physician expenses accounting for a large proportion of expenses in the upper percentiles of the expenditure distributions. The low-risk group, for example, is viewed as having had a 1 percent chance of $5,400 in inpatient-related expenses—including $3,800 in hospital charges, $1,100 in surgery fees, and $500 for other inpatient medical services. Out-of-hospital expenses constitute only 10 percent of the total, assuming that a hospitalization would usually account for total expenditures of this magnitude. The calculation of out-of-pocket expenses from these assumptions gives greater weight to insurance for inpatient services than outpatient services at high levels of expense, in keeping with the average experience, but does not assign much weight to insuring against unusually large expenditures for outpatient care. Because the high probability of relatively modest outpatient bills does account, however, for a substantial share of all expenses, insurance for these expenditures means a substantial reduction in the overall expected value of out-of-pocket expenses.

Definitions and Estimates of the Underinsured

While the out-of-pocket expenditures associated with the contingencies shown in table 1 are defined by each person's health insurance, criteria for determining the number of persons who are "underinsured" on the basis of their potential out-of-pocket expenditures must also be defined. Here, an important issue is the relative weight to assign to out-of-pocket expenses with different probabilities, particularly because high expenditures have only a small probability of occurring. Consequently, if the underinsured are defined by out-of-pocket expenses

that exceed a given dollar threshold or percentage of income, the number declines as less emphasis is given to the unlikely catastrophes that generate high out-of-pocket expenses.

One extreme is to evaluate a person's insurance in terms of the expected value of out-of-pocket expenses. In this approach, each level of expense (or column of table 1) is weighted by its probability. There is no added emphasis on high-cost illnesses. A 10 percent chance of having to pay $200 out of pocket is consequently the same as a 1 percent chance of paying $2,000 out of pocket. The same is true when insurance is measured in terms of its actuarial value, the expected value of expenses paid by the insurer instead of the out-of-pocket expenses paid by the insured. For fewer than half the privately insured in 1977 was the expected value of out-of-pocket expenses as much as $100 (table 2). It was $200 or more for only 8 percent. Just 5 percent of the privately insured faced expected out-of-pocket expenses equal to 3 percent of family income. For 3 percent, expected out-of-pocket expenses were 5 percent of income. These expected values are low, although they take into account the expectation of higher expenses in the high-risk group, because the average total expenditure in 1977 was only $291 in the low-risk group and $803 in the high-risk group (table 1). Given that even a high risk with no insurance at all would confront only $803 in expected expenses, the issue raised by those persons exceeding 3 percent of income is not so much inadequate insurance as inadequate income to pay for even routine expenses.

The criteria that have been derived from economic theory—to maximize the expected utility of a risk-averse individual (Friedman and Savage 1948)—suggest that expected values give too little weight to the possibility of large expenditures (the right-hand columns of table 1) in defining the underinsured. The risk-averse individual assumed in the expected utility theory assigns increasingly greater weight to increasingly large losses, far out of proportion to the probability that these losses will actually occur. Furthermore, complete insurance for even small expenses is not optimal according to this theory unless the pooling of risks through insurance is costless, meaning that a premium equal to the average value of uninsured losses will cover the benefit payments. Insurance is not costless, because of the expenses associated with marketing and administering insurance plans. Also, people alter their behavior to consume more health services when they are insured (Newhouse et al. 1981), so losses under an insurance plan

TABLE 2

Alternative Definitions and Estimates of the Privately Insured Population under Age 65 with Inadequate Insurance: Percentage Underinsured

(1) Expected value of out-of-pocket expenses greater than or equal to	
$100	42.2%
$200	8.1
3% of family income	4.8
5% of family income	2.7
(2) One percent expectation of out-of-pocket expenses greater than or equal to	
$500	37.8
$1,000	17.6
$2,000	8.6
$5,000	3.1
3% of family income	36.9
5% of family income	23.6
10% of family income	12.6
20% of family income	7.0
(3) One percent expectation, unadjusted for risk, of out-of-pocket expenses greater than or equal to	
$2,000	6.7
10% of family income	10.7
(4) Five percent expectation of out-of-pocket expenses greater than or equal to	
$2,000	4.0
10% of family income	7.9
(5) No out-of-pocket limit for hospital expenses*	
1977	40.2
1984 estimate**	26.1
(6) No out-of-pocket limit for both hospital and medical expenses*	
1977	54.1
1984 estimate**	39.1

* Hospital expenses include room and board and miscellaneous charges. Medical expenses include inpatient physician and surgical fees, outpatient office visits, and outpatient tests.

** Assumes a 50 percent decline between 1977 and 1984 in group major medical insurance with no out-of-pocket limit.

Source: National Center for Health Services Research, *NMCES, Health Insurance/Employer Survey: United States 1977*.

are greater than the uninsured losses. Because of the costs associated with insurance, some expenditures (mostly in connection with small, high-probability expenses) should be paid out of pocket (Pauly 1980; Phelps 1976; Feldstein and Friedman 1977; Arrow 1976). For example,

if the costs associated with insurance are proportional to the benefits paid by the plan, then coverage of all expenses above some deductible is the most preferable type of insurance (Arrow 1963). Thus, the range of out-of-pocket expense is limited, but low levels of out-of-pocket expense are not only acceptable but desirable.

Aside from the theoretical implication that insurance of this type is preferred by buyers, a definition that emphasizes catastrophic coverage is also consistent with the social objective of preventing unexpectedly large medical bills from bankrupting patients and becoming bad debts. While this may be an unlikely possibility from the individual's perspective, it is certain to happen to someone from society's perspective. Taking this approach, the second set of estimates in table 2 defines the underinsured in terms of out-of-pocket expenses for only the most costly illnesses, the top percentile of expenditures by risk group (the right-hand column of table 1).

Accordingly, suppose that a 1 in 100 chance of spending 10 percent of family income defines the underinsured. Then, 12.6 percent of the privately insured population were underinsured. Or, to put it another way, 12.6 percent of the privately insured would have spent at least 10 percent of their family's income on an illness that 1 person in 100 could expect to experience. Nearly half of the underinsured by this definition were persons with basic but no major medical benefits (data not shown). The effects of using a different percentage of income or an absolute dollar threshold can be seen. Nearly 40 percent of the privately insured had a 1 in 100 chance of $500 or more in out-of-pocket expenses; 18 percent had the same probability of $1,000 or more; 9 percent, $2,000 or more; and 3 percent, $5,000 or more. Nearly 25 percent had a 1 in 100 chance of spending at least 5 percent of their income out of pocket, and 7 percent had a 1 in 100 chance of spending 20 percent.

The next figures show the sensitivity of the preceding estimates to the differences in expected medical expenditures for high and low risks. These next estimates assume that everyone faced the distribution of medical expenditures in the low-risk group—most of the population (75 percent) by construction. Thereby ignoring the risk of higher expenditures in some population groups, the estimated proportion of privately insured persons with a 1 in 100 chance of spending 10 percent of their income on uninsured expenses drops to 10.7 percent

from 12.6 percent. The estimate of those at risk of out-of-pocket expenses of $2,000 or more is about 7 percent, down from 8.6 percent.

The fourth set of estimates defines "a costly illness" to include a somewhat lower but more likely level of expense, considering the expectation of out-of-pocket expenditures for medical bills above the 95th rather than the 99th percentile by risk group. For 4 of the 5 people out of 100 who exceeded this threshold (in the next-to-last column of table 1), these bills would be much lower than the medical bills of the 1 person in 100 considered in the preceding estimates. When their insurance is measured against these lower expenditures, fewer people exceed the thresholds defining the underinsured. Thus, this definition places less emphasis on the small probability of the most costly illnesses and lowers the number of underinsured by about a third, with 7.9 percent exceeding 10 percent of the family's income. Only 4 percent exceeded $2,000 or more in expected out-of-pocket expenses for the top 5 percent of illnesses.

Finally, two definitions of the underinsured that are the most stringent in terms of catastrophic protection are considered in table 2, namely the privately insured without a strict upper limit on out-of-pocket hospital expenses or, yet more stringent, without a limit on inpatient and outpatient physician and laboratory expenses as well. These limits are generally found in major medical policies, but membership in an HMO, comprehensive basic benefits, or coverage by several plans may also effectively provide such protection. More than half of the privately insured were underinsured in 1977 by the latter criterion, suggesting that its extreme emphasis on complete catastrophic protection may be too stringent. Nonetheless, out-of-pocket limits in group major medical insurance have become much more common than in 1977, representing a significant change in benefits. According to more recent data for 1980 and 1983 (Health Insurance Association of America 1982; U.S. Bureau of Labor Statistics 1984), the number of employees without the catastrophic protection of an out-of-pocket limit in their major medical insurance is now probably about half what it was in 1977.

To make estimates of the underinsured that are based on the 1977 NMCES more relevant to the present day, estimates are shown for 1984 where half of those with group major medical insurance but no out-of-pocket limit in 1977 are assumed to have such a provision.

This adjustment is somewhat crude and ignores any other changes in private insurance benefits or enrollment since 1977. While it does have a major effect on the last estimates in table 2, the current applicability of the other estimates is minimally affected if limits of $1,000 on out-of-pocket expenses are assumed. The underinsured in 1977 did not generally have major medical insurance, and many did not have group coverage. Moreover, at the expenditure levels considered, very few of those with the relatively comprehensive benefits offered by group major medical insurance would have exceeded a $1,000 threshold even without a formal limit.

Since hospital bills constitute the bulk of catastrophic health expenditures, a limit on out-of-pocket hospital expenses is both more common and probably more important than having a limit that also encompasses physician and laboratory expenditures. Yet even by this definition (the fifth in table 2), 40 percent of the privately insured were underinsured in 1977, with about 26 percent currently estimated. If limits that encompass out-of-pocket expenditures not only for hospital expenses but for other services as well were considered the minimal standard, then the benefits of an estimated 39 percent of the privately insured would not currently pass the test. This standard—the last in table 2—requires the privately insured to be safe from financial ruin in nearly every imaginable circumstance.

This much emphasis on catastrophic coverage is in keeping with expected utility theory and society's interest in having individuals insure themselves against extraordinarily expensive illnesses. It may not be in keeping with the individual preferences actually suggested by consumer behavior, which are not necessarily the preferences assumed by expected utility theory. The buyers of insurance seem to value insurance for likely losses more than catastrophic insurance, as demonstrated by the insurance they actually purchase and their behavior in experimental studies. (See Arrow [1982] and the studies reviewed by and research of Kunreuther et al. 1978.) For example, over 70 percent of group enrollees and their dependents were fully insured for the initial days of a hospital stay in 1977 (Farley and Walden 1983), but only 49 percent were protected by a limit on out-of-pocket expenditures for hospital and medical services. By the same token, a third of elderly Medicare beneficiaries with private insurance had no catastrophic coverage for hospital utilization beyond Medicare's 150-day lifetime reserve, and another third were only partially covered

(Cafferata 1984). Virtually all bought insurance that paid the one-day hospital deductible imposed by Medicare. The lack of interest in catastrophic protection may be the result of relying on Medicaid or charity as a last resort, but that does not seem to be the entire explanation.

Characteristics of the Underinsured

Although the estimated size of the underinsured population is sensitive to these differences in definition, the characteristics associated with being underinsured are generally not (table 3). Persons with nongroup insurance were far more likely to be underinsured by any definition than group enrollees. They were without a hospital limit only twice as often, however, compared to being seven times more often underinsured when defined as having a 5 percent expectation of spending 10 percent of family income out of pocket. In other words, when judged simply by whether or not insurance offers a limit on out-of-pocket expenses, the coverage of underinsured population groups does not compare quite as unfavorably to other groups, whose benefits are also inadequate by this standard.

Thus, coverage of the underinsured in terms of a catastrophic limit was equivalent, but women and their dependents were underinsured according to the other definitions at about twice the rate for men and their dependents. Reflecting enrollment in group plans, which are largely employment-related, full-time employees and their families were least often underinsured, followed by part-time employees and the self-employed. The extent of underinsurance in families of persons who did not work—two-thirds of whom were not covered by group insurance (Farley and Walden 1983)—followed a pattern roughly similar to that of nongroup enrollees. Because of the lack of income associated with not working, however, greater emphasis on more likely out-of-pocket expenses in relation to income (using the first definition in table 3) implies that comparatively more of them were underinsured than nongroup enrollees. Not surprisingly, the uninsured expenses of the poor were likely to be high measured as a percentage of their income, with more than half facing a 1 percent chance of exceeding 10 percent of income. Yet, their insurance as well as their income was more inadequate; the proportion without a limit on hospital

TABLE 3
Alternative Estimates of the Underinsured: Percentage of the Privately Insured Population under Age 65 by Population Characteristics

Characteristic	Number (thousands)	5% expectation 10+% of income	1% expectation 10+% of income	No hospital limit (1977)
Total*	153,315	7.9%	12.6%	40.2%
Type of insurance				
Nongroup	14,815	35.8	51.6	67.8
Any group	138,500	5.1	8.6	37.4
25 or fewer members	12,130	6.6	13.3	29.5
26–250 members	28,154	5.7	9.1	33.2
251–2,500 members	36,331	4.1	7.6	43.2
Over 2,500 members	43,020	4.5	7.1	38.8
Sex of primary insured				
Male	113,260	6.4	10.8	40.8
Female	40,055	12.2	17.7	38.7
Employment status of primary insured				
Full-time employee	123,967	5.5	9.6	38.6
Part-time employee	7,304	13.4	18.7	45.6
Self-employed	10,731	12.3	20.3	47.4
Did not work in 1977	4,064	42.6	49.4	58.8
Age in years				
Less than 19	53,332	5.4	9.1	41.5
19–24	17,003	10.9	17.5	35.9
25–34	26,772	6.1	10.8	37.4
35–54	39,080	6.0	10.9	40.6
55–64	17,128	19.9	25.0	44.5

Ethnic/racial background				
White	121,624	7.6	12.1	40.4
Black	12,222	8.9	13.5	35.8
Hispanic	5,950	6.3	14.1	43.1
Family income				
Poor and near poor	9,979	48.2	56.2	47.8
Low	19,462	13.2	21.9	46.1
Middle	65,789	5.2	9.8	41.9
High	58,084	2.3	5.1	35.1
Perceived health status				
Excellent	75,892	5.5	9.6	39.5
Good	57,139	8.5	13.3	40.1
Fair	12,026	16.1	22.9	40.3
Poor	2,474	23.2	31.2	50.3
Place of residence				
SMSA	107,497	6.8	11.2	39.3
Not SMSA	45,818	10.5	15.9	42.5
U.S. census region				
Northeast	34,113	7.2	12.2	47.0
North central	49,231	6.8	9.8	36.6
South	45,859	9.4	15.0	42.7
West	24,113	8.5	14.1	33.6

* Includes persons for whom employment status of primary insured, group size, and perceived health status are unknown, as well as all other ethnic/racial groups not shown separately.
Source: National Center for Health Services Research, *NMCES, Health Insurance/Employer Survey: United States 1977.*

expenditures was about 20 percent higher than the national average. Young adults, 19 to 24 years old, were also more likely to be underinsured in relation to their income, although not in terms of having a catastrophic limit on hospital expenses.

About a quarter of the population aged 55 and older and persons in fair or poor health were underinsured according to the intermediate definition in table 3—about twice the national rate. Their insurance was generally less adequate according to the other definitions as well. These people are considered high risks and at any level of probability will have higher out-of-pocket expenses than a low risk with the same insurance. They are also less likely to have group insurance (Farley and Walden 1983).

Geographic variations in the extent of underinsurance were relatively smaller than between population groups, although they may be understated by ignoring variations in the price of health care in computing out-of-pocket expenses in different areas. The risk of high out-of-pocket expenses in relation to income was slightly higher outside standard metropolitan statistical areas (SMSAs) and was also higher in the South compared to the north central region. Catastrophic limits on hospital expenditures were also slightly less common outside SMSAs and in the South. There were relatively more underinsured persons in the Northeast according to definitions that emphasize catastrophic protection.

The estimates in the first two columns of table 3 define the underinsured on the basis of their income, expected medical expenditures, and their insurance. Shown in table 4 is a measure of insurance that depends only on the insurance of each population group—the possibility of out-of-pocket expenditures exceeding $2,000 for the top percentile of illnesses experienced by low risks. A smaller proportion of nongroup enrollees, persons who were not employed and their families, the older age group, the poor, and those in poor health were underinsured by a definition that does not take differences in risk or income into account. Nevertheless, even by this definition, these groups were underinsured more often than the rest of the privately insured. Their risks were not only greater and their incomes lower, but their insurance was also less comprehensive.

Comparing the second column of table 3 to the second column of table 4, the effect of adjusting for risk in defining the underinsured can be seen. The proportion of underinsured nongroup enrollees is

TABLE 4

Estimates of the Underinsured, Unadjusted for Risk: Percentage of the Privately Insured Population under Age 65 with 1 Percent Expectation of Specified Expense

Characteristic	Number (thousands)	$2,000+	10+% of income
Total*	153,315	6.7%	10.7%
Type of insurance			
Nongroup	14,815	38.2	45.3
Any group	138,500	3.5	7.1
25 or fewer members	12,130	5.1	10.8
26–250 members	28,154	2.5	7.6
251–2,500 members	36,331	2.7	6.1
Over 2,500 members	43,020	3.4	5.9
Sex of primary insured			
Male	113,260	5.9	9.1
Female	40,055	8.8	15.2
Employment status of primary insured			
Full-time employee	123,967	4.3	8.0
Part-time employee	7,304	11.1	15.8
Self-employed	10,731	16.5	16.3
Did not work in 1977	4,064	30.5	43.8
Age in years			
Less than 19	53,332	5.9	8.8
19–24	17,003	6.5	16.6
25–34	26,772	5.4	9.1
35–54	39,080	6.3	8.6
55–64	17,128	12.2	17.7

TABLE 4. Continued.

Ethnic/racial background			
White	121,624	6.7	10.2
Black	12,222	7.9	11.6
Hispanic	5,950	6.4	12.1
Family income			
Poor and near poor	9,979	13.0	53.4
Low	19,462	7.8	18.8
Middle	65,789	6.2	8.2
High	58,084	5.8	3.3
Perceived health status			
Excellent	75,892	6.2	9.1
Good	57,139	6.4	11.0
Fair	12,026	8.5	15.4
Poor	2,474	14.5	21.2
Place of residence			
SMSA	107,497	6.2	9.3
Not SMSA	45,818	7.9	13.8
U.S. census region			
Northeast	34,113	6.2	10.3
North central	49,231	5.0	8.4
South	45,859	8.7	12.8
West	24,113	7.0	11.6

* Includes persons for whom employment status of primary insured, group size, and perceived health status are unknown, as well as all other ethnic/racial groups not shown separately.
Source: National Center for Health Services Research, *NMCES, Health Insurance/Employer Survey: United States 1977*.

increased about 10 percent. The proportion nearing retirement age who were underinsured is increased by about 30 percent, and the proportion who were in poor health and underinsured is increased by nearly 50 percent.

Combined Estimates of the Uninsured and Underinsured

To place estimates of the underinsured in perspective, it is necessary to look at the entire population—including persons who have no private insurance at all—and to consider the protection offered by public programs. In some population groups, the problem of underinsurance may be dwarfed by the much bigger problem of lack of coverage from any public or private source at all. In addition, some public or private coverage is inadequate because it does not extend throughout the year, mainly because of changes in Medicaid eligibility or private insurance status (Walden, Wilensky, and Kasper 1985). Also, some of those who apparently have inadequate private insurance may qualify for public programs and have adequate coverage.

Nine percent of the population under age 65 had no coverage from private insurance or a public program (Medicare, Medicaid, CHAMPUS/CHAMPVA) during 1977 (table 5). Another 9.4 percent were uninsured at least part of the year. In addition, excluding those covered throughout the year by a public program, there were persons with inadequate private insurance as alternatively defined in table 3: persons with a 1 in 20 expectation of out-of-pocket expenses exceeding 10 percent of family income (definition 1), persons with a 1 in 100 expectation of exceeding the same income threshold (definition 2), and persons with no limit on hospital expenses (definition 3). Because they all assume the 1984 proportion of major medical plans with $1,000 out-of-pocket limits, the estimates in table 5 of the proportion of the population that is underinsured are projections of today's situation from 1977. According to these projections, the underinsured represent an additional 5 to 18 percent of the population who are inadequately covered, increasing in number as the definition places increasing emphasis on catastrophic protection. In all, the total number of persons who are inadequately covered (always uninsured, sometimes uninsured, underinsured) is two-and-a-half to four times the number always insured, or 24 to 37 percent of the United States population.

TABLE 5
Uninsured and Underinsured Persons in the U.S. Population under Age 65: Percentage with Inadequate Coverage According to Alternative Definitions*

Characteristic	1977 population (thousands)	Uninsured** all year	Uninsured** part year	Only private and underinsured		
				Definition 1	Definition 2	Definition 3
Total***	189,837	9.0%	9.4%	5.1%	8.3%	18.3%
Sex of household head						
Male	161,961	8.6	8.2	4.6	7.9	19.2
Female	27,877	11.5	16.7	7.9	10.6	13.3
Employment status of household head						
Full-time employee	136,686	6.3	8.6	4.0	6.9	18.0
Part-time employee	8,653	20.1	12.7	7.3	9.2	15.0
Self-employed	17,359	15.1	7.9	7.4	12.0	25.0
Did not work in 1977	17,877	16.9	16.8	8.2	11.0	12.8
Age in years						
Less than 19	69,014	8.4	9.0	3.4	5.9	17.6
19–24	22,109	13.3	18.4	6.4	9.6	13.5
25–34	32,155	9.0	11.0	4.2	7.4	17.0
35–54	46,354	8.2	6.4	4.0	7.8	20.0
55–64	20,206	7.9	5.5	13.7	17.9	24.6
Ethnic/racial background						
White	141,234	7.4	8.5	5.3	8.7	19.7
Black	19,630	10.7	15.3	4.0	6.3	11.4
Hispanic	9,264	12.8	12.3	3.3	6.3	14.6

Family income						
Poor and near poor	25,413	19.7	18.2	15.1	17.7	10.1
Low	27,005	15.4	13.9	7.7	12.3	17.3
Middle	75,238	7.1	8.0	3.5	7.1	20.7
High	62,182	4.2	5.6	1.9	4.3	19.3
Perceived health status						
Excellent	89,027	7.5	8.1	3.9	6.9	19.4
Good	71,249	9.6	10.0	5.6	8.8	17.8
Fair	16,881	10.8	12.4	8.0	12.3	16.3
Poor	4,572	12.7	10.0	8.1	11.8	13.1
Place of residence						
SMSA	131,346	7.4	9.4	4.4	7.4	18.0
Not SMSA	58,492	12.5	9.4	6.7	10.4	19.1
U.S. census region						
Northeast	39,915	5.5	6.0	5.3	9.1	23.7
North central	55,947	5.1	8.6	5.0	7.3	17.4
South	60,474	12.6	11.0	5.5	9.2	18.6
West	33,502	13.1	12.0	4.5	7.5	12.9

* Definitions of underinsured (adjusted for changes in group major medical insurance):
(1) 5 percent expectation of 10 percent of family income in out-of-pocket expenses;
(2) 1 percent expectation of 10 percent of family income in out-of-pocket expenses;
(3) No limit on hospital out-of-pocket expense.
** Not covered by private insurance, Medicare, Medicaid, or CHAMPUS/CHAMPVA.
*** Includes persons for whom employment status of household head and perceived health status are unknown, as well as all other ethnic/racial groups not shown separately.
Source: National Center for Health Services Research, *NMCES, Health Insurance/Employer Survey: United States 1977.*

Using the intermediate estimate of 8.3 percent of the entire population who are underinsured (definition 2), the entire group with inadequate coverage is about equally divided into a third who are uninsured all year (9.0 percent of the entire population), a third who are uninsured part of the year (9.4 percent of the entire population), and a third who are underinsured. This relationship roughly holds in the families of men and full-time employees, adults aged 25 to 54, and whites, regardless of family income, health status, and place of residence. In short, lack of coverage, lapses in coverage, and inadequate coverage contribute equally to the gap in the protection of each of these groups, despite wide variation in the overall proportion who are inadequately covered (see table 6 for the total proportion ever uninsured or underinsured according to the three definitions).

The distribution differs for some population groups. In households headed by women, where Medicaid is a relatively more important source of coverage, lack of continuity is a more important problem. The same is true of young adults (aged 19 to 24) and blacks. For the self-employed, lack of any coverage or inadequate private coverage outweighs changes in insurance status. Inadequate private insurance is a relatively more important gap in the protection of people aged 55 to 64 than for any other population group, despite their being much less likely ever to be uninsured. In the western region of the country and for part-time workers or nonworkers and their families, children, and Hispanics, it is less significant than lack of coverage or lapses in coverage.

By implying that a much higher proportion of the privately insured have benefits that are equally inadequate, the highest estimate of the underinsured (definition 3) makes the problem appear most serious in those population groups with the most private enrollment. For example, by this definition the proportion who are underinsured is twice as much in high-income families (19 percent) as among the poor (10 percent), and is higher in families headed by a full-time employee rather than a person who was not employed.

Summary and Conclusions

In 1977, 8 percent of the privately insured under age 65 would have incurred out-of-pocket expenses equal to at least 10 percent of their family's income for medical bills with a probability of 1 in 20 or

TABLE 6
Uninsured and Underinsured Persons in the U.S. Population under Age 65: Total Percentage with Inadequate Coverage According to Alternative Definitions*

Characteristic	1977 population (thousands)	Total with inadequate coverage**		
		Definition 1	Definition 2	Definition 3
Total***	189,837	23.5%	26.7%	36.7%
Sex of household head				
Male	161,961	21.4	24.6	35.9
Female	27,877	36.1	38.8	41.5
Employment status of household head				
Full-time employee	136,686	18.9	21.8	32.9
Part-time employee	8,653	40.2	42.1	47.8
Self-employed	17,359	30.4	35.0	48.0
Did not work in 1977	17,877	41.8	44.6	46.5
Age in years				
Less than 19	69,014	20.8	23.3	35.0
19–24	22,109	38.2	41.4	45.2
25–34	32,155	24.2	27.4	37.0
35–54	46,354	18.6	22.4	34.6
55–64	20,206	27.1	31.3	38.0
Ethnic/racial background				
White	141,234	21.1	24.5	35.5
Black	19,630	30.0	32.3	37.4
Hispanic	9,264	28.3	31.4	39.7

TABLE 6. Continued.

Family income				
Poor and near poor	25,413	52.9	55.6	47.9
Low	27,005	37.0	41.7	46.6
Middle	75,238	18.5	22.1	35.7
High	62,182	11.7	14.1	29.1
Perceived health status				
Excellent	89,027	19.5	22.5	35.0
Good	71,249	25.3	28.5	37.4
Fair	16,881	31.2	35.5	39.5
Poor	4,572	30.8	34.5	35.8
Place of residence				
SMSA	131,346	21.2	24.2	34.8
Not SMSA	58,492	28.6	32.3	41.0
U.S. census region				
Northeast	39,915	16.8	20.6	35.2
North central	55,947	18.7	21.0	31.1
South	60,474	29.1	32.8	42.2
West	33,502	29.6	32.6	38.0

* Definitions of underinsured (adjusted for changes in group major medical insurance):
(1) 5 percent expectation of 10 percent of family income in out-of-pocket expenses;
(2) 1 percent expectation of 10 percent of family income in out-of-pocket expenses;
(3) No limit on hospital out-of-pocket expenses.
** Uninsured all year, uninsured part year, or underinsured by indicated definition.
*** Includes persons for whom employment status of household head and perceived health status are unknown, as well as all other ethnic/racial groups not shown separately.
Source: National Center for Health Services Research, *NMCES, Health Insurance/Employer Survey: United States 1977*.

less. Thirteen percent had a smaller chance, 1 in 100, of spending that much. Projections from the adjusted 1977 NMCES data indicate that 26 percent currently face at least a small chance of an unlimited share of hospital bills that they might be required to pay, a figure that was 40 percent in 1977. Thus, the number of underinsured increases with increased emphasis on catastrophic protection.

These estimates are designed to suggest a conservative picture of those currently underinsured in the United States. The 1977 data from the National Medical Care Expenditure Survey have been adjusted to reflect the rapid growth of provisions limiting out-of-pocket expenditures under group major-medical plans. Individual out-of-pocket expenses, rather than the higher figure for family expenses, are considered and compared to family income. A 10-percent income threshold is also used. The "high cost illness" assumed to be the top percentile of the expenditure distribution is moderate—$6,000 for the low risk group and $14,500 for the high-risk group. Coverage of inpatient expenses is emphasized, giving greatest weight to services that insurance tends to cover most comprehensively. Little weight is given to the potentially large expenditures associated with some services that private insurance typically covers in a limited way if at all, such as nursing home care or psychiatric treatment. Finally, the upper estimate of the underinsured does not confine the definition of adequate insurance to protection from large out-of-pocket expenditures under nearly all imaginable circumstances, since it does not require a limit on physician and laboratory expenses.

A substantial number of people who are covered by private plans are underinsured by the foregoing definitions. Consequently, the population with inadequate coverage is understated if considered along with estimates of the population without private insurance or eligibility for the public programs that finance health care. While roughly 10 percent of the population is uninsured throughout the year according to these estimates, a similar proportion are underinsured. The proportion with lapses in coverage during the year is also about equal to the proportion who are always uninsured. In total, the number of people under age 65 with inadequate coverage is three times the number who are always uninsured. At least a quarter of the nonelderly population—about 50 million people in 1977 and a projected 56 million in 1984—are inadequately protected against the possibility of large medical bills.

Employing the intermediate estimate of the underinsured, the proportion with inadequate coverage (always uninsured, sometimes uninsured, and underinsured) ranges from 14 percent in high-income families to 56 percent in poor families. At least 40 percent of several other population groups are inadequately protected: those in families with low incomes or headed by someone not employed full-time and not self-employed, and 19 to 24 year olds. In general, the underinsured do not figure quite as significantly in the large gap in coverage of these groups as in the population as a whole, mainly because of their lower enrollment in private insurance. If covered by private insurance, however, they are relatively more often underinsured. The underinsured represent an especially important gap in the protection of those approaching age 65, who are more likely to have nongroup insurance while confronting medical expenses that are higher both absolutely and in relation to reduced incomes.

As noted at the outset, inadequate insurance imposes both public and private burdens. The lower two estimates of the underinsured are actuarial in nature and predict that 8 to 25 nonelderly Americans in 10,000 will be billed at least 10 percent of their income in uninsured expenses despite being covered by private insurance. This is equal to about 170,000 to 520,000 people who are a public concern because of medical bills that they are in danger of not being able to pay. The private burden falls disproportionately on nongroup enrollees, the sick, the poor, and those approaching retirement age. They are more likely to be underinsured if they have private insurance. However, these are relatively small population groups who often have no private coverage. Equally important is the fact that in population groups that are large and commonly covered by private insurance, the relatively small proportions who are underinsured also represent large numbers. About 60 percent of the underinsured are full-time employees and their dependents; half are in middle- or high-income families, and about three-quarters are white. In this sense, the private burdens of the underinsured are not limited to a few subgroups, but are widely distributed across the population.

The discussion here has focused somewhat on out-of-pocket expenses with a 1 in 100 chance of occurring. Higher probabilities necessarily involve illnesses that are less costly and loom smaller in relation to a family's income. Lower probabilities are associated with even costlier illnesses and the possibility of even greater financial disaster. As a

corollary, insurance that emphasizes high probabilities pays small benefits to a lot of those covered; an emphasis on low probabilities pays large benefits to only a few.

Public policy has favored the former over the latter, reinforcing the apparent preferences of insurance buyers. Medicaid was designed to finance routine care for the poor. Medicare provides practically complete coverage of the first sixty days of a hospital stay, but subjects beneficiaries to an open-ended and increasing share of additional hospital expenses. It does not cap out-of-pocket expenses for other types of care. Federal standards for private insurance supplementary to Medicare, specified in the Baucus Amendments of 1980, require only partial coverage of hospital days not covered by Medicare. As shown here, despite the favorable tax treatment of insurance benefits that employers finance for most of the population (an implicit subsidy nearly equal in magnitude to Medicaid [Wilensky 1983]), more than a quarter of the privately insured under age 65 have no protection against unusually expensive hospital stays.

Ultimately, however, public financing cannot shoulder the burden of extraordinary uninsured expenses that individual patients cannot conceivably pay. Medicaid, bad debts, and charity are the financing of last resort. As a consequence, unless private insurance for the low probability of a catastrophic illness is encouraged as a matter of public policy, or the orientation of public programs is shifted away from routine expenses toward more emphasis on catastrophic protection, public financing will continue to subsidize both types of health expenditures for a significant part of the population and, in a particularly haphazard fashion, the inadequately insured.

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