Articles

The Extent of Physician Participation in Medicaid: A Comparison of Physician Estimates and Aggregated Patient Records

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This article compares two measures of the extent of physician participation in Medicaid programs. The first, which has been used in most research to date on the subject, is based on physician estimates of the proportion of their patients who are Medicaid patients. The second derives from encounter forms for a sample of visits to the interviewed physicians. The comparison shows that physicians in the sample tended to overestimate by 40 percent the extent of their Medicaid participation. Because the two measures are highly correlated, the analysis of the determinants of Medicaid participation was not affected by the measure used. However, since physicians tended to overstate the proportion of Medicaid patients in their practices, interview data should not be used to measure the amount of physician participation or to calculate elasticities for the effects of policy changes on the extent of participation.

The extent of physician participation in Medicaid programs is an issue whose importance is indicated by the increasing attention it has been receiving [1-3]. Its significance derives from two facts: first, patients' access to mainstream medical care, the original purpose of Medicaid, is limited by the extent to which office-based physicians will or will not treat them; and second, office-based physicians provide primary care much less expensively than the principal alternative sources, hospital emergency departments.

Thus, the extent to which office-based physicians agree to treat Medicaid patients has substantial policy implications, and measuring it

is an important research issue. In this article, we consider a fundamental methodological issue, the reliability with which physicians estimate the extent of their Medicaid participation. We define the extent of a physician's Medicaid participation as the proportion of his patients who are covered by Medicaid. The accuracy with which physicians estimate the extent of their Medicaid participation is a critical question because previous investigators have relied on self-reported physician estimates as the principal data on participation in Medicaid programs [4–6]. While they had to assume the accuracy of the physician estimates, we were able to design a study that permitted a test of that assumption. This paper contains a report of that test. The results showed that the actual extent of participation was only about 60 percent of physician estimates. Thus, physician self-reports should not be used to calculate elasticities and other indexes which measure proportionate change in participation. On the other hand, in this study, the analysis to identify determinants of the extent of participation was unaffected by the particular measure used.

The article is divided into five sections. First, the data collection procedures are described; then the two measures of physician participation used in the study are defined. Third, data are presented to show that the extent of Medicaid participation as measured by self-reported physician estimates is greater than that based on aggregated patient records. In the fourth section, we demonstrate that the discrepancy

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between the two measures is not attributable to errors or idiosyncrasies in the methodology. And finally, we discuss the implications of these findings for the assessment of previous research on physician participation and for the utility of these measures for policymakers.

SURVEY AND DATA COLLECTION METHODS

The data presented in this analysis are from a survey of pediatrician participation in Medicaid conducted by the National Opinion Research Center in 1979 and 1980 for the American Academy of Pediatrics.[1] Original data were obtained from personal interviews with physicians as well as from encounter forms completed for samples of their patient visits [7]. Thus, we have alternative sources of information on the extent of Medicaid participation.

A three-stage sampling plan was used to collect these data. In the first stage, a sample of 13 states was drawn using a method designed to maximize variation in state Medicaid policies. In the second stage, the Physician Masterfile of the American Medical Association was used to draw a random sample of nonfederal, office-based pediatricians in each of the study states. A total of 1,457 physicians was included in the original sample, but in telephone-administered screening interviews, only 879 physicians were found to be eligible for the survey.[2] Of the eligible pediatricians, 814 participated in the personal interview, yielding a response rate of 93 percent. In the third stage, samples of patient visits were selected, and the physicians were asked to complete a one-page patient record on each of approximately 35 patient visits. The patient record was a 16-item form which asked for information on various aspects of the visit, including the expected source of payment.

After the personal interview in which he gave his self-reported estimate of Medicaid participation, each doctor who agreed to participate in the second phase of the study was asked to indicate the number of patients he expected to see during the week following the interview. Based on his response, the physician was then asked to complete one of the forms for every fifth, every third, every second, or every single patient visit of the survey week.[3] The sampling fractions were assigned to physicians so that a target number of 35 patient records would be obtained from each. The methodology used to sample the physician's patients was adapted from the National Ambulatory Medical Care Survey [8]. A total of 710 pediatricians completed patient records for a response rate of 81 percent.

ALTERNATIVE INDEXES OF MEDICAID PARTICIPATION

Using these methods, we obtained two measures of the physicians' extent of Medicaid participation. First, in the interview the physicians were asked to estimate the percentage of their patients whose care was paid for by Medicaid. Second, they were asked to indicate on each patient record form the expected source of payment for the patient visit. By aggregating the patient records for each physician, we were able to calculate the proportion of patients in the sample for whom Medicaid was expected to pay.[4] Data for both measures were obtained for each of 660 pediatricians.

Neither of these indexes resulted in a perfect measure of a physician's extent of Medicaid participation. The physician estimate was subject to error when the physician did not have accurate knowledge about the source of payment for his patients. Various factors may have caused the physician to have a false impression of the extent of his Medicaid participation. For instance, one group of patients may have stood out relative to others in the physician's mind, causing him to overestimate their true presence in his practice. Thus, if a physician's Medicaid patients had more complex clinical problems or were more difficult to communicate with than most of his other patients, it may have seemed to him that he had more Medicaid patients than he actually did. For similar reasons, physicians may have been inclined to overestimate their Medicaid participation if they found it especially difficult to complete Medicaid claims or if they found Medicaid to take a relatively longer period than others to make payments.

The index based on aggregated patient record data is subject not to the weakness of the physician's estimate, but to sampling error. Because of chance variation in the selection of visits for which the physician completed patient records, the sample of patients may not have been representative of the physician's practice. As a result, the estimate of Medicaid participation based on the aggregated patient record data may not equal the physician's true rate of participation.

If the sample of patient records is, in fact, representative of the physician's practice, however, then it should provide an accurate picture of the extent of the physician's participation in Medicaid.[5] And if the physician did in fact have accurate knowledge of the extent of his participation in Medicaid, the self-reported estimate would be approximately equal to the estimate based on the aggregated patient record data. Therefore, if the sample of patient records is representative, then

the accuracy of the doctors' perceptions about their Medicaid participation can be determined by comparing these two indexes.[6]

DESCRIPTIVE DATA FOR THE TWO INDEXES

Examination of the two indexes of Medicaid participation shows that doctors tended to overstate the extent of their participation in Medicaid. The average value of the physician estimates is 13.0 percent, whereas the average value of the index based on the aggregated patient records is 7.7 percent, or only 60 percent of the self-reports for the 660 doctors for whom valid data were obtained for both indexes.

Figure 1 is a histogram showing the number of pediatricians by their self-reported estimates (PE) of participation; and Figure 2 is a histogram for the aggregated patient record (APR) data. Both have very skewed distributions, but the index based on the patient record

Figure 1: Histogram for Physicians' Self-Reported Estimates of Their Extent of Medicaid Participation

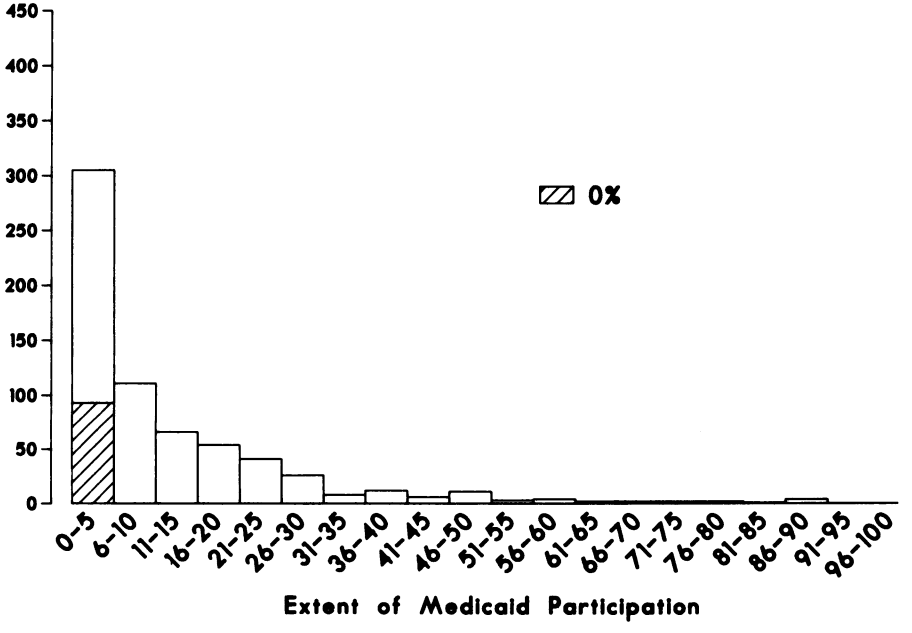
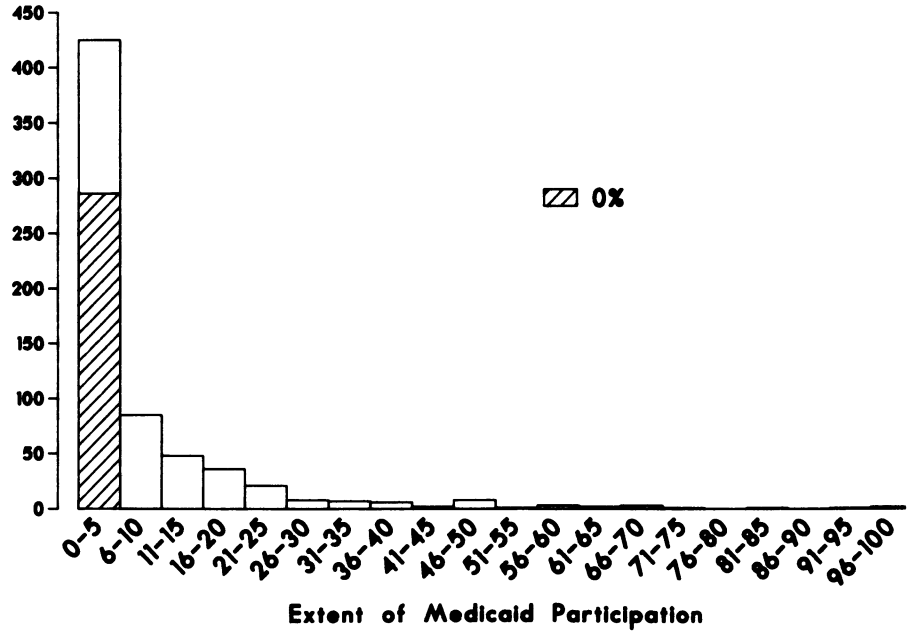


Figure 2: Histogram for Physicians' Extent of Participation as Measured by Aggregated Patient Record Data

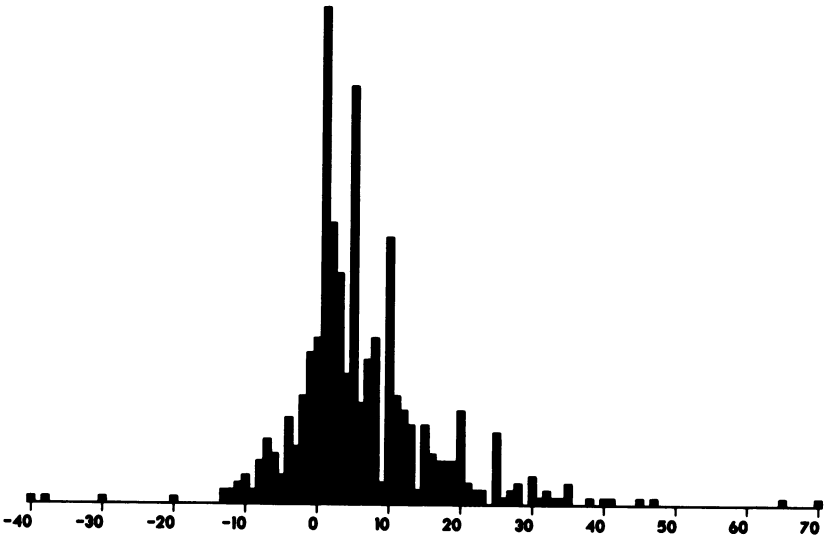


data is skewed to a greater degree because more physicians are concentrated in the 0–5 percent category.

According to their self-reported estimates, 93 of the pediatricians were nonparticipants and claimed to devote no percent of their practices to Medicaid patients. In this analysis, we assume that these physicians consciously decided not to participate in the Medicaid program, and as a result, could know their participation in Medicaid with complete accuracy. In contrast, those who participated had to estimate the extent of their participation.[7] Consequently, we eliminated the nonparticipants from the sample for the rest of the analysis. With their exclusion, PE had an average value of 15.1 percent, and APR had an average of 8.9 percent.

The variable DIFF was computed by subtracting the behavioral index (APR) from PE in order to measure the amount by which the physicians' self-reported estimates exceeded the aggregated patient record index. Figure 3, a histogram for DIFF, shows a distribution

Figure 3: Frequency Distribution for DIFF



ranging from -40 to + 70 with the greatest concentration in the values above zero. DIFF was positive for 78 percent of the sample and negative for only 17 percent, showing that the vast majority of physicians overstated their Medicaid participation. The average value of DIFF was 6.2 percent, and the median value was 5 percent, indicating that half of the physicians overstated their Medicaid participation by at least 5 percentage points. Thirty percent of the physicians overstated their participation by 10 or more percentage points.

THE RELATIONSHIP BETWEEN PHYSICIAN ESTIMATES AND AGGREGATED PATIENT RECORDS

Although the physician estimates of the extent of Medicaid participation (PE) were higher than those based on the aggregated patient record data (APR), these two indexes had a strong positive relationship—a Pearson correlation of + .77. The relationship between

the two indexes can be further described through the use of regression analysis. The first column of Table 1 shows a regression equation in which PE was regressed on APR. Note that the one independent variable explained almost 59 percent of the variance. The second column of Table 1 displays the regression equation when ten outliers were removed from the sample.[8] The regression constant of 6.7 is the expected value of PE for participating doctors who filled out no patient records for Medicaid patients—that is, doctors for whom APR equaled 0. For these physicians, the difference between the self-reported index and the aggregated patient record data was, on average, 6.7 percent. Also note that since the regression coefficient was .90, the expected value of PE increased by only 0.9 for every unit increase in APR. As a result, the discrepancy between the expected values of PE and APR was less for physicians with large Medicaid practices.

EXPLAINING THE RESULTS

As reported, the results showed that physicians' estimates of the extent of their Medicaid participation were higher than revealed by the aggregated patient record data, and we argued above that, in the absence of sampling error, the latter should be taken as accurate. Before we discuss the implications of these findings, therefore, we need to show that

Table 1: Regression Analysis of the Physician's Self-Reported Estimate of the Extent of Medicaid Participation (PE) on the Aggregated Patient Record Index (APR)

	Entire Sample	*Sample with Outliers Removed*
Independent Variable	*Regression Coefficient*	*Regression Coefficient*
Participation index based on the aggregated patient record data (APR)	0.856*	0.897*
Constant	7.479	6.660
R^2	0.587	0.655
N	567	557

*Significant at $p < .01$.

in fact they are reasonable representations of reality and were not produced by errors in data collection or in the definition of terms. In particular, we need to establish that physicians were not doing more for Medicaid patients than the patient record data gave them credit for doing. We will consider two issues: the first is a conceptual difference between the physicians' self-reported estimates and the aggregated patient record data, and the second concerns the possibility of sampling bias in the patient record data.

A CONCEPTUAL DIFFERENCE BETWEEN THE TWO INDEXES

The physician's self-reported estimate measured the percent of his *patients* who were paid for by Medicaid, whereas the index based on the aggregated patient record data was based on a sample of recorded *patient visits* to the physician. One could argue that, even if a physician had perfect knowledge of his participation in Medicaid, these two indexes would be equal only in the unlikely event that the physician's Medicaid patients made office visits with precisely the same probability as his non-Medicaid patients. The issue of whether Medicaid children had the same probability of making office visits to a physician can be divided into two questions: (1) Did Medicaid children make office visits to any physician as frequently as non-Medicaid children? (2) Did Medicaid children make office visits to more physicians than non-Medicaid children? That is, were Medicaid children more likely to divide their patient visits among several physicians and thus, for that reason, to have a lower probability of making a patient visit to a given physician.

An analysis of secondary data sources suggests that the Medicaid children in our sample made office visits just as frequently as non-Medicaid children. In the Appendix we present data from the Health Interview Survey which indicate that, among children who made office visits, those from low-income families tended to make more visits than those from high-income families. Thus, the aggregated patient record data may actually *overstate* the percentage of the physicians' patients who are paid for by Medicaid, and the difference between the two measures may actually be *understated.*

Unfortunately, there are no data with which we can give a fully satisfactory empirical answer to the second question—whether Medicaid patients see more physicians than non-Medicaid patients. Although many studies have established that health care use varies with income and mode of payment, to our knowledge none of these

studies has analyzed the number of different physicians seen by various groups of people. Moreover, one study of the use of services by Medicaid patients suggests that the hospital emergency department, and not other physicians, is the most frequent additional source of care for patients who also visit office-based physicians [9]. Finally, even these data may overstate the use of multiple physicians by Medicaid patients, since it was not possible to identify the extent to which the physicians seen were members of the same practice group. In our opinion, it is unlikely that differences in the number of office-based physicians seen by Medicaid and non-Medicaid patients were large enough to explain the discrepancy between the two indexes for the extent of Medicaid participation. This is, of course, an empirical question that should be addressed in future research.

POSSIBLE BIAS IN THE PATIENT RECORD DATA

As noted above, the collection of data from patient records is subject to possible sampling error. In order for the aggregated patient record data to provide an undistorted estimate of a physician's true extent of Medicaid participation, it is necessary to assume that the sample of patients was selected with no systematic bias. The question of whether the selection of patient visits produced bias in the sample can be divided into two parts: (1) Were the patients chosen representative of all the patients the physician saw *that week*? (2) Were the patients that week representative of the patients the doctor saw *that year*?

It is unlikely that the method by which patients were chosen would create bias in the representativeness of patient record data for the survey week. One might argue on technical grounds that choosing every n^{th} patient does not constitute a random sample. However, this method of selecting a sample (known as sequential sampling) is a source of bias only in unlikely situations—such as a receptionist organizing a doctor's schedule so that every other patient seen was a Medicaid patient. Moreover, this method of sampling patient visits has been used by the National Ambulatory Medical Care Survey, which has successfully collected data on ambulatory medical care for many years.

The second issue—whether or not the patients selected were representative of the physician's patients for the entire year—is a more probable source of bias. The patient records completed by the physicians were for visits between July and December 1978. The percentage distribution of the patients by month shows that the majority of the patients were concentrated in the month of August (Table 2). Is it

Table 2: The Distribution of Patient Records by Month

Month	*Number*	*Percent*
July	2,313	8.1
August	16,004	56.2
September	4,609	16.2
October	1,162	4.1
November	4,154	14.6
December	244	0.9
Total	28,486	100.0%

possible that the concentration of patient visits in this month distorts our picture of a doctor's year-round practice? And, if so, could this distortion in representation have caused the discrepancy between the self-reported and behavioral estimates of Medicaid participation?

Unfortunately, we cannot provide a fully satisfactory answer, since the data show month-to-month variation in the proportion of Medicaid patients in the sample (Table 3). In the context of the present study, therefore, the critical question becomes: Did the lower estimate derived from patient records understate the true extent of physician participation? If it did, then we cannot be sure that the physicians' own estimates exaggerated the extent of their participation.

The data do permit us to address this question. They show not only that Medicaid participation varied by month, but also that the percentage of records of patient visits paid for by Medicaid was higher in the summer months of July and August and lower in the fall.[9] Since these were also the months with the largest numbers of sampled visits, the data suggest that the extent of Medicaid participation in the whole sample was not understated. In fact, since Medicaid participation was somewhat above average in August, the month given heaviest weight in the analysis, the extent of participation found in the patient records may itself be somewhat overstated. In light of this observation, there appear to be no compelling reasons to believe that the difference between the self-reported and behavioral estimates of Medicaid participation could have been caused by sampling bias in the patient record data. To the contrary, the reported differences may actually be somewhat smaller than the actual one. We conclude, therefore, that physicians in the study did indeed overestimate the extent of their Medicaid participation.

Table 3: Percent of Patient Records for which Medicaid Is the Source of Payment by Month

Month	*Patient Records Paid by Medicaid* (%)	n
July	9.0	2,313
August	8.5	16,004
September	5.8	4,609
October	7.0	1,162
November/ December	6.3	4,398
Total	7.7%	28,486

IMPLICATIONS FOR THE EVALUATION OF PAST RESEARCH

It has been established that physicians' self-reported estimates greatly exaggerated the amount of their participation in Medicaid. We now consider the implications of this finding on the evaluation of previous attempts to identify the determinants of Medicaid participation which have analyzed physician estimates. The conclusions of this section are based on two regression equations, one analyzing the physician estimate of Medicaid participation (PE) and the other analyzing the aggregated patient records (APR). If the results of the two analyses differ, then it is reasonable to conclude that the use of physician estimates as the dependent variable in a multivariate analysis may produce misleading results and that the findings of past research must be reconsidered. On the other hand, similarities between the two regressions provide additional support for previous findings.

THE DETERMINANTS OF MEDICAID PARTICIPATION

The regression equations presented here contain 14 independent variables grouped into three categories: (1) personal and practice characteristics, (2) service area characteristics, and (3) policy variables.[10]

The results of the two regression analyses are shown in Table 4. They are based on the sample of 525 doctors for whom we obtained data on PE, APR, and all of the independent variables of the regression equations. In many respects, the two regression equations in

Table 4 are quite similar. The signs of the coefficients are identical for all variables in both equations. Further, the regression coefficients are nearly equal for many of the independent variables. With only one exception, the set of variables significant at the .05 level or better is identical for both regression equations. The lone exception, the number of active physicians per 100,000 population, although negative in both equations, had a statistically significant effect in the equation using physician estimates, but not in the one using aggregate patient records. There are several other minor discrepancies between the two equations. The regression constant is -11.3 for the physician estimate and -16.9 for the aggregated patient records. The difference in these values apparently reflects the difference between the mean values of the two dependent variables. Another important difference is that the regression coefficient for Medicaid reimbursement in the analysis of APR is only about 60 percent of what it is in the analysis of PE. In other words, the effect of Medicaid fees on the extent of participation is less in the analysis of the aggregated patient records than it is for the self-reported estimates.

IMPLICATIONS

The striking similarities of these two regression equations suggest that, in fact, self-reported estimates can be used reliably in research on the *determinants* of the extent of Medicaid participation. In this respect, the analysis supports the findings of past research. However, as pointed out earlier, self-reported estimates greatly overstate the amount of actual physician participation in Medicaid. Thus, when the purpose of a study is to measure the amount of participation or to predict the proportionate increase in participation due to a particular policy change, self-reported estimates are unreliable. For example, some past studies have reported elasticities for the independent variables in their analyses, which were computed using the means of the physicians' self-reported extent of Medicaid participation. Since the means were inaccurate, it follows that the values of the elasticities must also have been inaccurate.

CONCLUSION

In this article, we have compared two measures of an important policy outcome, the extent of physician participation in Medicaid. The results show that while physicians have tended to overstate the extent of their

Table 4: Regression Analyses of the Physician's Self-Reported Estimate of the Extent of Medicaid Participation (PE) and the Aggregated Patient Record Index (APR)

	Self-Reported Estimate	*Aggregated Patient Record Data*
Independent Variables	*Regression Coefficient*	*Regression Coefficient*
Personal and Practice Characteristics		
Age	-0.0235	-0.0180
Place of medical education	12.379†	12.699†
Board certification status	-1.581	-1.549
Agree/disagree that government should provide medical care to the poor	2.699	1.851
Service Area Characteristics		
Nonphysician personnel costs	0.0130*	0.0144†
1970 per capita income in doctor's zip code area	-0.00261	-0.00194
Active physicians per 100,000 county population, 1976	-0.01190*	-0.00235
Estimate of proportion of zip code area population on Medicaid, 1978	1.294†	1.150†
Size/type of community	2.171	0.874
Medicaid Policy Characteristics		
State Medicaid reimbursement for a follow-up office visit	1.050†	0.584*
Percent of Medicaid claims returned for additional work	-1.201	-1.211
Elapsed weeks between billing and payment of claims	-1.031	-0.330
Minutes spent completing a Medicaid claim	0.140	0.870
Revised Medicaid Program Index, 1978	0.785†	0.667†
Constant	-11.304	-16.872
R^2	0.262	0.244
N	525	525
$F(14,510)$	12.950	11.788

*Significant at $p < .05$.
†Significant at $p < .01$.

participation, their self-reports have strongly correlated with estimates based on aggregated patient records. Thus, either measure can be used to identify the determinants of participation. On the other hand, physician self-reports should not be used to estimate the average extent of participation or the proportionate increase in participation due to a policy change.

Social scientists are increasingly called upon to undertake research on health policy matters. Our study suggests that investigators must be sensitive to the issues raised by the inaccuracy of self-reported measures. As the findings indicate, self-reported estimates may suffer from systematic bias; their accuracy thus should be validated whenever possible. Further research is needed to investigate discrepancies between self-reported measures and other indexes, not only for outcome variables such as Medicaid participation, but also for independent variables like Medicaid fees. Such efforts to validate data are particularly important when research findings have implications that go beyond academic theorizing. In the practical arena of public policy decisions, mistakes associated with error in the measurement of health policy outcomes may affect the benefits available to recipients, the taxes paid by citizens, and the political futures of officeholders.

APPENDIX

THE USE OF OFFICE-BASED SERVICES BY MEDICAID AND NON-MEDICAID CHILDREN

The central finding of the research reported here is that the average value of the aggregated patient record measure of Medicaid participation is only about 60 percent of the value of the self-reported measure. As already stated, this discrepancy may be due in part to conceptual differences between the two measures. The self-reported measure is defined as the doctor's estimate of the percentage of his *patients* who were paid for by Medicaid. In contrast, the aggregated patient record measure is defined as the proportion of the doctor's sample of *office visits* for which he expected Medicaid to pay. If Medicaid patients, on the average, made fewer office visits than non-Medicaid patients, the discrepancy between the observed and self-reported measures of Medicaid participation may be a statistical artifact. That is, the discrepancy may

be due to the way the indexes were defined and not to physicians' overstatements about their participation.

In this appendix, we contend that Medicaid children do, in fact, make as many office visits as non-Medicaid children and, hence, that the discrepancy between the two measures is not a statistical artifact.[11] This is an empirical issue which can be resolved only by a closer look at relevant data. Unfortunately, since the 13-state Medicaid participation study used a cross-sectional design, it does not provide information on the rate of office visits. We must rely, therefore, on a secondary source with data comparable to those from the 13-state study—a source which meets the following criteria: first, we need data on the frequency with which *office visits* are made, not physician contacts in general. This is an important consideration, since several sources of utilization data (e.g., the Health Interview Survey) encompass in their definition of "patient visits" almost any sort of consultation between doctors and patients, including telephone calls, house calls, and visits to hospital emergency rooms and clinics.

Second, the data should be limited to the patients who made *at least one office visit*, because the unit of analysis for the data from the 13-state study is the office visit. People who did not make at least one office visit, therefore, could not have been included in that data set.

Third, the data should be limited to *children*. The restriction is important, because utilization data for the total population often show patterns that differ from data solely for the child population.

Fourth, the data preferably should be available for both the Medicaid and non-Medicaid populations. Unfortunately, necessary data are not available on the utilization of physician offices by Medicaid and non-Medicaid patients. Thus, we must use income-category data instead—and assume that Medicaid patients behave in a manner similar to all low-income patients. This represents a shortcoming in the suitability of the data available for our purposes.

Fifth, the data should be limited to patients seen by pediatricians. Unfortunately, since no suitable data on utilization rates of pediatricians' patients are broken down by income, we must draw inferences from the patients seeing physicians of all specialties. One should keep in mind that pediatric patients may differ from this more general population in ways that possibly affect their utilization patterns.

Given these criteria, the most useful source of available data is the third volume of *Better Health for Our Children, The Report of the Select Panel for the Promotion of Child Health* [10]. This volume provides a statistical profile of child health in the United States, drawing data from a wide

variety of sources, including the Health Interview Survey (HIS). The data in this volume are not cross-classified exactly as needed, but they nevertheless provide a base from which we can make inferences.

In drawing inferences from the HIS data published in *Better Health for Our Children*, it was necessary to make several computations; these are presented in the worksheet (Table A1). Column 1 of the worksheet displays "the number of physician contacts per year for children under 18 years of age." These data represent the 1975–1976 annual average. The data in Column 1 represent all physician contacts, including emergency room visits and telephone calls as well as office visits. We can adjust the data in Column 2 to represent the frequency of *office visits* alone by multiplying the data by "the percent of physician contacts which are office visits." Unfortunately, these latter data are not available for the various income categories. However, we were able to find a fairly close proxy, "the proportion of children under 18 whose last physician contact was an office visit." These data are displayed in Column 2.

This proxy is acceptable for two reasons. First, the two variables are closely related, and there do not appear to be any compelling reasons to believe that the proxy might deviate systematically from the preferred variable.[12] Second, the data available for the two variables are in close agreement. The first column of Table A2 displays HIS data on "the place-of-visit of physician contacts for children under 15"; and the second column of Table A2 displays data on "the place-of-visit of the last physician contacts made by children under 18," i.e., the proxy variable. The two percentage distributions are in close agreement, supporting the notion that one variable can be used as a proxy for the other.

Returning to Table A1, Column 3 displays estimates for "the number of *office visits* per year for children under 18," which were calculated by multiplying the values in Column 1 and Column 2. The data in Column 3 represent the average frequency of office visits for *all* children under 18 years of age, including those children who made no office visits. As stated above, the children with no office visits would not be included in this analysis, because they are not included in the data from the 13-state study.[13] We therefore adjust the data in Column 3 to represent only those children who made at least one office visit by dividing Column 3 by the "proportion of children who made at least one office visit in the previous year." Column 4 displays this proportion for each of the income categories.[14]

Column 5 displays estimates for the "number of office visits per

Table A1: Worksheet To Compute the Number of Office Visits per Year for Children with at Least One Office Visit by Income Category

Income Category	*(1) Number of Physician Contacts per Year for Children Under 18, 1975–76 Annual Average**	*(2) Proportion of Children Under 18 Whose Last Physician Contact was an Office Visit, 1975–76 Annual Average†*	*(3) Estimated Number of Office Visits per Year for Children Under 18, 1975–76 Annual Average (3) = (1) · (2)*	*(4) Proportion of Children Under 18 Who Made at Least One Office Visit in the Preceding Year, 1974‡*	*(5) Estimated Number of Office Visits per Year for Children Under 18 Who Made at Least One Office Visit in the Preceding Year (5) = (3)/(4)*
Under $5,000	4.3	.558	2.40	.495	4.85
$5,000–$9,999	3.7	.574	2.12	.547	3.88
$10,000–$14,999	4.1	.651	2.67	.648	4.12
$15,000 or more	4.4	.671	2.95	.707	4.18
Total/Average	4.1	.634	2.60	.620	4.19

*Kovar. *Better Health for Our Children*, Vol. 3, Table 74, p. 237.
†Ibid. Table 75, p. 239.
‡Ibid. Table 79, p. 245.

Table A2: A Comparison of the Percent Distribution of the Preferred and Proxy Variables by Place-of-Visit (All Income Categories Combined)

Place of Visit	All *Physician Contacts Made by Children Under 15, 1975** (%)	Last *Physician Contacts Made by Children Under 18, 1974*† (%)
Physician's office	61.5	63.4
Hospital clinic or emergency rooms	14.3	14.2
Telephone	18.6	16.9
Home	0.5	0.6
Other	5.1	4.9
Total	100.0%	100.0%

**Vital and Health Statistics*, Series 10, Number 128. "Physician Visits: Volume and Interval Since Last Visit, 1975," Table 17, p. 30.
†Kovar. *Better Health for Our Children*, Vol. 3, Table 75, p. 239.

year for children under 18 who made at least one office visit in the preceding year," which were computed by dividing Column 3 by Column 4. The data in Column 5 show that the frequency of office visits among children with at least one office visit is actually higher in the lowest income category than in any of the higher income categories.

The available data show that low-income children who made at least one office visit in the previous year made at least as many office visits as high-income children (and quite possibly more). It follows that there is no reason to believe that Medicaid patients were less likely than non-Medicaid patients to be included in the doctors' sample of office visits, and, in fact, they may have been somewhat more likely to have been included. Thus, the discrepancy between the self-reported and behavioral measures of participation does not appear to be the result of a statistical artifact.

NOTES

1. For a more thorough description of the survey methodology, see S. M. Davidson, et al. Variations by State in Physician Participation in Medicaid, Final Report. Health Care Financing Administration, Grant 18-P-97159/5, October 1982.

2. To be eligible, the respondent had to be an office-based pediatrician in practice at least 20 hours per week; had to have practiced in the same community for all of the preceding year; and could not be affiliated with a group practice of ten or more physicians.
3. Many of the pediatricians surveyed were, of course, women. The term "he" is used here strictly to avoid the distraction inherent in the awkward "he/she" terminology. If the doctor said that he would not be seeing any patients in the week following the interview, he was asked to complete the patient records during the next week in which he would see patients.
4. Before calculating the index based on aggregated patient records, we eliminated from the sample of doctors those who filled out fewer than 15 patient records because we believed that percentages based on fewer than 15 patient records would be unreliable.
5. Data were also collected, 6–8 months after the visit, on the actual source of payment. Aggregating that payment data into two categories, Medicaid and non-Medicaid, the physician's entry on the encounter form regarding the expected source of payment and the actual source of payment reported were identical in the 98.4 percent of the 8,600 visits for which data were obtained.
6. We will argue below that, although it is not possible to demonstrate conclusively that the proportion of Medicaid patients included in the aggregate patient records is representative of the proportion of Medicaid patients seen over the entire year, we can suggest that the patient records do not understate the physicians' Medicaid participation. In the context of this article, that assertion is almost as useful.
7. This difference between participants and nonparticipants is borne out by the patient record data. None of the declared nonparticipants completed patient records for Medicaid patients. Thus, the two indexes are in perfect agreement at zero percent for nonparticipants, while there is considerable disagreement between them for the participants.
8. An analysis of the residuals of this regression showed that ten doctors were statistical outliers (considering statistical outliers to be those doctors for whom the residual for the regression equation is greater than $\pm$ 3.0 standard deviation). These are the doctors who did a particularly bad job of estimating the extent of their Medicaid participation. Removing these outliers from the analysis strengthened the relationship between the two indexes, increasing the Pearson correlation from + .77 to + .81.
9. Because of the small number of patient records in December, the data for this month were combined with those for November.
10. Since it is not pertinent to the primary issue of this article, we will not present a detailed description of the theoretical perspective on which this study is based. A complete discussion, including operational definitions of variables in the equations and their expected effects on Medicaid participation, can be found in Davidson et al. [7].
11. We wish to express our appreciation to Mary Grace Kovar for raising these questions about the analysis and encouraging us to pursue them further. We believe our conclusions are stronger as a result.
12. The use of a proxy requires the assumption that "the percent of children whose last physician contact was an office visit" equals "the percent whose

first contact (middle contact, etc.) was an office visit." There may be reasons why this is not true, but in the absence of empirical evidence, it appears to be a reasonable assumption.

13. The inclusion of these children in the data of Column 3 puts a negative bias on the frequency of office visits. This is especially the case for the lower income categories in which a large proportion of the children made no office visits.
14. Note that the data in Column 4 are for 1974, whereas the rest of the data in Table A1 are for 1975–1976. This lack of comparability could cause some bias, especially since we are dealing with income categories which are subject to change due to inflation. However, the difference between these two time periods is fairly small, and consequently, we expect the amount of bias to be minor.

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