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Problems in Estimating the Number of Women in Need of Subsidized Prenatal Care

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Synopsis

For effective allocation of resources, public program planners need to know how many women require subsidized prenatal care and where they are located. Because sample surveys are expensive, indirect methods of estimation using secondary data sources are frequently used to arrive at quick annual estimates. Census data on poverty are often incorporated into such methods, but our study of the eight southeast States in Federal Region IV shows that available census data severely underestimate the proportion of pregnant women who are poor. Updated poverty data from the 1990 census will not solve this problem of underestimation.

Alternative methods for estimating the number of women in need of subsidized prenatal care services, for measuring unmet need, and for doing estimates on the county level are presented and evaluated. Such considerations are especially important, given the new Title V block grant reporting requirements.

TO ALLOCATE RESOURCES effectively, public prenatal care program planners must identify geographic areas with unmet need and estimate the number of women who require subsidized care. Since birth certificates in most States do not list family size and income as indicators of poverty, a variety of other methods have been employed to estimate the number of pregnant women at different poverty thresholds.

Some States have conducted special postpartum sample surveys in hospitals to gather a variety of data, including poverty level, not routinely captured through vital records. Some States participate in an ongoing population-based surveillance of residents who recently have had a live birth. The Pregnancy Risk Assessment Monitoring System (PRAMS) is now operational in six States and the District of Columbia. Such surveys and ongoing surveillance activities provide valuable information to maternity program planners. But, to maintain usefulness, the surveys must be updated regularly. Periodic survey updates and ongoing surveillance activities are usually more expensive and time-consuming than most public programs can afford, and they generally cannot provide direct county-level estimates because of the restricted sample size.

Table 1. A comparison of two methods of estimating the percentage of live births to women below 100 percent of the Federal poverty level, Region IV States

State	Percentage of live births to married women with family income less than $12,000, 1980 NNS	Percentage of children ages 0–4 below 100 percent of poverty, 1980 census	Ratio of first column to second
Alabama	34.1	25.1	1.36
Florida	27.8	21.2	1.31
Georgia	29.2	22.8	1.28
Kentucky	33.6	22.9	1.47
Mississippi	38.7	30.5	1.27
North Carolina	30.6	19.7	1.55
South Carolina	30.8	22.1	1.39
Tennessee	33.1	21.9	1.51
United States	24.9	18.1	1.38

NNS = National Natality Survey.

Indirect methods of estimation using secondary data are most often used because they are less cost- and labor-intensive. They have been applied as a means of deriving quick, annual figures on the population in need of subsidized maternity care.

The Regional Network for Data Management and Utilization (RNDMU) in Federal Region IV is a consortium of maternal and child health program staff members and statisticians of eight States in the Southeast (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee) engaging in the production and analysis of common perinatal health indicators. One project of the RNDMU has been to determine a common method for using secondary data sources to estimate the number of women in each State in need of public maternity services.

After 2 years of work, it became apparent to us that there was no ideal method of doing this. Each method that we tried appeared to have substantial limitations. Our purpose in this paper is to share our experience, pointing out some of the pitfalls that we have encountered. The information is timely, since 1990 census data will become available soon. Also, the issue of need estimation methods is of particular interest, given the new Title V block grant reporting requirements.

Methods Currently Used by Region IV States

The States in Region IV use two basic methods for estimating the number of women in need of subsidized maternity services. Method 1 is to multiply the number of live births in the current year by an estimate of the proportion below the poverty level as determined from census data. An advantage of this approach is that the poverty threshold closest to the eligibility level used by health departments in the State can be chosen from several that are available in the census data (*1*). Some States adjust this result by estimating, most often from Current Population Survey data for the State as a whole, the change in the poverty rate after the 1980 census. Method 2 is to estimate the population of women ages 15–44 below a defined poverty level (using either census data or a combination of census and recent population data) and multiply this by the current fertility rate to produce the number of births to women in poverty. In addition to State-level estimates, some States do county-level estimates using county-specific census and fertility data. Some compare women currently served by health departments or by Medicaid with estimates of the number in need to determine the percentage of the target population served.

Both of these methods underestimate the population in need in Region IV. In Method 1, no measure of the proportion of pregnant women or of women giving birth who are in poverty is available from the census. This proportion is higher than the proportion of total persons or of women ages 15–44 in poverty from the census. In Region IV we attempted to address this discrepancy by using the proportion of children ages 0–4 in poverty (which is higher than the proportion for total persons or for women ages 15–44) as a surrogate measure, but attempts to validate the results against standards such as postpartum surveys consistently showed that underestimation was occurring.

The data in table 1 help explain this discrepancy. For the eight States in Region IV, we compared the percentage of children ages 0–4 below 100 percent of poverty in the 1980 census (based on 1979 income) with a State-level estimate from the 1980 National Natality Survey (NNS) of the percentage of live births to women with family income in the 12 months prior to delivery of less than $12,000 (which is close to the Federal poverty level for an average size family) (*2*). We would expect the NNS estimates to be lower than the census figures, because the NNS data were available only on married women who, in general, are more advantaged financially than unmarried women (*3*). The estimates from the National Natality Survey, however, are consistently 40 to 50 percent higher than those from the census.

Clearly, this method of using the census data seriously underestimates the proportion of live

Table 2. Four methods of estimating the number of births to women below 200 percent of poverty level, 1987, Region IV States

State	Total births X NNS percent (Method A)	Total births X 1980 percent of children ages 0–4 in poverty (Method B)	Number of births to women with less than 12 years of education (Method C)	Number of births to black women (Method D)	Newacheck table 1[1] plus Medicaid births (Method E)
Alabama	20,309	14,949	15,707	20,292	17,880
Florida	48,670	37,115	42,532	42,198	50,116
Georgia	29,918	23,361	25,561	35,474	35,407
Kentucky	17,405	11,862	14,192	4,681	20,322
Mississippi	15,975	12,590	12,100	19,220	19,057
North Carolina	28,605	18,416	21,723	27,037	25,437
South Carolina	16,254	11,663	12,729	20,347	14,770
Tennessee	22,488	14,879	17,836	15,951	N.A.

[1] Births below 100 percent of poverty without reported Medicaid coverage, 1984–86 average; see reference 4.
NNS = National Natality Survey.

births to women in poverty. Having census data for 1990 will not solve this problem. At the State level, this underestimation of the poverty rate is a larger source of error than that associated with *changes* in the poverty rate since the 1980 census. Current Population Survey data show an average increase in the poverty rate in the Region IV States of 15 percent from 1980 to 1986.

In using Method 2 for estimating the Region IV population in need, there is also the issue that the proportion of women ages 15–44 in poverty may have changed since 1980. A more serious problem is that fertility rate for poor women is higher than the overall fertility rate. Most States do not have data to measure fertility rates for women at different levels of poverty. Unpublished census data cited by Newacheck suggest that poor women have a fertility rate 31 percent higher than that for all women (*4*). North Carolina data for 1986 and 1987 show that the crude birth rate for Medicaid eligibles is about twice the overall State crude birth rate.

A Comparison of Several Estimation Methods

Table 2 shows the results of several methods of estimating the number of live births to women below 100 percent of poverty for the eight Region IV States. In the first column (Method A), total 1987 births are multiplied by the NNS percents shown in table 1. In the second column (Method B), 1987 births are multiplied by the census percents in poverty for children ages 0–4 (also from table 1). The third column (Method C) shows simply the number of 1987 births where the mother's education was less then 12 years, calculated from birth certificates. Payne and Strobino suggest that years of education may be an adequate proxy for income in some situations (*5*). The fourth column (Method D) shows the number of births to black women, which we have found to be a rough proxy for births in poverty, at least in the southeastern States with a relatively large black population. The fifth column (Method E) uses an estimate developed by Newacheck (*4*) of the number of births to women below 100 percent of poverty without reported Medicaid coverage (using Current Population Survey and State fertility data) that is added to the number of Medicaid births in 1987 reported by each State.

The NNS and Newacheck methods (Methods A and E) produce similar estimates for each State and are consistently higher than the results of Methods B and C. The number of births of blacks (Method D) seems to be a fairly good proxy except in Kentucky, where the proportion of births to black women is very low. Both the NNS and Newacheck figures are probably underestimates, however, since the NNS estimate is based on data for married women only, and Newacheck uses a fertility rate in his calculations for all women rather than for women in poverty. Postpartum hospital surveys are probably the closest thing to a "gold standard" that we have in this area. A postpartum interview survey in South Carolina in 1986 estimated more than 21,000 births to women below 100 percent of poverty (*6*), which is substantially higher than most of the figures in table 2. In Texas, a postpartum survey produced an estimate of 100,000 (*7*) compared with 88,000 using the NNS approach. Similar discrepancies have occurred in other States with postpartum survey data.

Our current recommendation for State-level estimates would be to use the figures derived by Newacheck for births to women without reported Medicaid coverage added to State figures on Med-

Table 3. Two methods of estimating unmet need among women below 100 percent of poverty, Region IV States

State	Newacheck table 1[1]	Births with inadequate Kessner Index (1987)
Alabama	7,795	5,389
Florida	18,194	14,603
Georgia	9,407	10,146
Kentucky	7,398	4,170
Mississippi	7,407	2,989
North Carolina	8,932	5,956
South Carolina	5,241	6,949
Tennessee	6,719	5,890

[1] Births below 100 percent of poverty without reported Medicaid coverage, 1984–86 average, see reference (4).

icaid births (Method E) if an estimate of total births to women in poverty is desired. The Newacheck monograph presents data for 100, 125, 150, 175, and 185 percent of poverty, which will be very useful to States implementing Medicaid expansions at varying poverty levels. He also presents a technique for adjusting his figures (which are a 1984–86 annual average) for States that have implemented expanded Medicaid eligibility. Though Newacheck's estimates will be somewhat low, our analysis suggests that they do indicate a reasonable level of need.

Allocating State Estimates to Counties

Most States would like estimates of the need for subsidized prenatal care services on a county-by-county basis. Given the problems with census data previously noted, however, direct county estimates using secondary data would have an even larger degree of error. Also, changes in the poverty rate after the 1980 census may be substantial at the county level. In Region IV States that have compared population served by health departments with county estimates of births to women in poverty using the census method, the "percent of target population served" often exceeds 100 percent because the need is underestimated (or in some cases because the county health department is serving women above the poverty level). In counties where the calculated percent served is substantially less than 100, however, a real problem of underservice may exist. Current Population Survey data are barely adequate at the State level in many cases because of a small sample size and cannot be used to produce county estimates. Postpartum surveys also lack the sample size to produce valid county level estimates.

As an alternative, we suggest allocating an estimate derived at the State level back to counties. Ideally, we would like to do this using a poverty indicator, but no poverty data at the county level exist for the States after 1980. Birth certificate data may be used instead. For the 100 North Carolina counties, we compared the county's percent of the State total of children ages 0–4 below 100 percent of the Federal Poverty level in 1980 with the county's percent of the State total of births to women with less than a high school education in 1980. The Pearson correlation coefficient (r) between these two percentage distributions was .92, which indicates that the geographic distribution of births to women with low education is a good surrogate measure for the distribution of poverty in the State. (For births to women with less than 11 years of education the correlation was no better (5).) Therefore the percentage distribution across counties of births to women with less than 12 years of education could reasonably be used to allocate a State level estimate of the number of women in need of subsidized prenatal care services back to the counties in a State.

Estimating Unmet Need

Estimating unmet need presents additional problems, especially at the county level. If this means the number of births to women in poverty (at some level) who were not served by public programs, then data on current program participation must be derived. Number of new health department maternity patients registered may not be difficult to obtain in many States. This number could be subtracted from the total need estimate to derive the number not served by health departments. But if comparisons to estimates using birth certificate data are desired, then date of delivery of the health department patient should be available so that the same birth year is being compared. Outcome data, however, are not as readily available in State health department data systems. If an estimate is desired of births to women in poverty who were not served by health departments and who were also not on Medicaid, then some way of estimating Medicaid women not served by health departments must be found so that this number can also be subtracted from the need figure. In Kentucky, North Carolina, and South Carolina this estimate has been achieved by linking health department and Medicaid records to birth certificates, but not all States have this capability yet.

In table 3, two estimates of unmet need are

presented for the States in Region IV. Newacheck's estimate of births to women below 100 percent of poverty without reported Medicaid coverage is compared with the number of births with the Kessner Index of prenatal care (*8*) calculated as "inadequate." Inadequate prenatal care here means basically no care, care beginning in the third trimester, or less than five prenatal visits. Newacheck's estimates are generally higher, but this might be expected since his numbers include women in poverty who were served by health departments but were not on Medicaid. Births with inadequate prenatal care definitely represent a group of women in need of additional services.

It could be argued that if these women had insurance or some other form of subsidized prenatal care, then their prenatal care would have been better than inadequate. On the other hand, women with better than inadequate care would not be in need of subsidized prenatal care, or are in need and already have such subsidized care. Not all women with inadequate care will be below a specified poverty level, although one would expect that most will be.

A comparison within North Carolina suggests that the number of women with inadequate prenatal care according to this definition may be a reasonable *surrogate* for unmet need for women below 100 percent of poverty. If we take the highest estimate of total need for North Carolina in table 2 (Method A) and subtract an estimated 16,505 Medicaid births and 6,783 births estimated to be health department-assisted, not Medicaid, the result is 5,317, which is close to the inadequate Kessner Index figure of 5,956. In table 3 the Kessner figure for Mississippi is much lower than the Newacheck estimate, but Mississippi has one of the best levels of prenatal care adequacy in the region. South Carolina's Kessner figure is higher than Newacheck's estimate, while South Carolina's prenatal care indicators have been some of the worst in the region. The relative levels of these Kessner numbers are therefore congruent with what we know about the prenatal care situation in the two States.

Given the problems with county-level need estimates using secondary data sources and the lack of consistent county level information on women in poverty already served, the number of births to women with inadequate prenatal care according to the Kessner Index may be a practical surrogate measure of unmet need. It can be easily produced from birth certificate data at the county level on an annual basis. As women at higher poverty levels become eligible for subsidized services through the expansion of Medicaid, this measure should still be a reasonable proxy for the number of poor women in need of additional services. A similar approach was employed in a recent monograph from the Alan Guttmacher Institute (*9*), where a measure of inadequate prenatal care from birth certificates was used to target counties with a need for additional prenatal care resources.

The accuracy of prenatal care data derived from birth certificates has been questioned (*10,11*). For poor women with fragmented prenatal care, visits are likely to be underreported and month of initiation of care recorded later than was actually the case. Therefore the Kessner Index may overstate the level of inadequate care to some degree. Also, calculation of the Kessner Index may vary among States. In the Region IV perinatal data

Procedures Used to Calculate Inadequate Values on Kessner Index of Prenatal Care for Region IV Perinatal Data Network

The following steps are used in selecting "Inadequate Care" records from live birth files:

1. Delete all in-State nonresident events, keep all out-of-State resident events and keep all in-State resident events.
2. Regardless of the completeness of the date of last menstrual period (LMP), if the birth record indicates no prenatal care or prenatal care starting in the third trimester (>= 28 weeks), count that event as inadequate care and place in a separate file.
3. Delete all records missing month or year for LMP.
4. Impute 15 for records with missing day in LMP.
5. Create gestational age for all remaining records.
6. Delete all records with gestational age less than 18 weeks or greater than 48 weeks (implausible gestational age).
7. Based on remaining records, create a file of inadequate care records using the following criteria:

Gestation (weeks)		Number of Prenatal Visits
18–21	and	0 or not stated
22–29	and	1 or less or not stated
30–31	and	2 or less or not stated
32–33	and	3 or less or not stated
34–48	and	4 or less or not stated

8. Add records selected in step 7 to those in step 2. This will be the file of birth records with inadequate care.

project, detailed procedures were defined so that the Kessner numbers submitted by the eight States would be comparable. The procedures used before implementation of the new birth certificate in 1988 and 1989 are shown in the box. After implementation of the new birth certificate, clinical estimate of gestation has been used for those births where gestational age could not be calculated based on date of last menstrual period.

Conclusion

In summary, we recommend using the estimates developed by Newacheck (*4*), added to reported Medicaid births, to derive State-level estimates of the number of women in need of subsidized prenatal care services. These State estimates can be distributed back to counties using the percentage distribution of live births with less than 12 years of education. The number of births with inadequate prenatal care as defined by the Kessner Index can be used as a proxy for unmet need among women in poverty, at both the State and county level.

We have pointed to some of the problems involved in estimating the number of women in need of subsidized maternity services, given the lack of poverty information on birth certificates. While no ideal method can be recommended, we hope that our experience can help others avoid some of the pitfalls that we have discovered and suggest some practical alternatives to pursue. Periodic updates of Newacheck's estimates using the most recent Current Population Survey data would undoubtedly be helpful to the planners in many State maternal health programs.

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New York State's Two-Dose Schedule for Measles Immunization

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