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PUBLIC HEALTH IMPORTANCE

Prenatal care has been recognized as the cornerstone of our health-care system for pregnant women since the beginning of the twentieth century. During the first decade of the century, Mrs. William Lowell Putnam initiated a prenatal service at Boston Lying-In Hospital in which pregnant women were visited by a nurse every 10 days and instructed in self-care. Women were urged to report as early in pregnancy as possible. Meanwhile, in New York City, a program of organized prenatal care was begun in 1907 by Dr. Josephine Baker. In 1915, J. Whitbridge Williams found that dystocia, toxemia, and preterm birth could be reduced if prenatal care included instruction for the pregnant woman in personal hygiene, rest, and diet, along with a competent obstetrical examination (1). The approach to prenatal care was based originally on the detection and treatment of preeclampsia, and later, preterm birth. The emphasis in the delivery of prenatal care services has continued to change from focusing on conditions of the mother to conditions of the fetus, as disparities in birth weight and infant mortality have remained or increased.

A number of studies have indicated a relationship between the use of prenatal care services and birth outcomes (2–16). Adequate use of prenatal care has been associated with improved birth weights and the amelioration of the risk of preterm delivery (5,6,15). Inadequate use of prenatal care has been associated with increased risks of low-birth-weight births, premature births, neonatal mortality, infant mortality, and maternal mortality (1–4,9–11,13,14). Several researchers have suggested that the beneficial effects of prenatal care are strongest among

socially disadvantaged women (7,8,12,16).

The importance of prenatal care as a public health priority has been reinforced recently by a study in which investigators analyzed results from the 1980 U.S. National Natality Survey (NNS), the 1981 French National Natality Survey, a 1979 sample of Danish births, and a 1979–1980 survey performed in one Belgian province (17). The proportion of women who began prenatal care late (after 15 weeks of gestation) was highest in the United States (21.2%) and lowest in France (4%). Across all maternal ages, parities, and educational levels, late initiation of prenatal care was more frequent in the United States. Fewer financial barriers characterize the care delivery systems in the three European countries (18), which may explain why women of low-socioeconomic status begin prenatal care earlier there than they do in the United States (for additional information about related topics and surveillance activities, see the Contraception, Behavioral Risk Factors Before and During Pregnancy, Pregnancy-Related Morbidity, Pregnancy-Related Mortality, Low Birth Weight and Intrauterine Growth Retardation, Infant Mortality, and Pregnancy in Adolescents chapters).

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HISTORY OF DATA COLLECTION

Data from the U.S. Standard Certificate of Live Birth have been used in prenatal care surveillance since 1968, when a question about **the month of pregnancy that prenatal care began** was added to the certificate. Data on the number of prenatal visits have been collected and published since 1972.

Because birth certificate data on the total number of prenatal visits provide no information regarding the timing of visits, and because information on the timing of visits does not reveal whether care has been continuous, the Institute of Medicine in 1973 developed a composite index incorporating both the month of the first prenatal visit and the total number of visits into one summary utilization measure (19). Using guidelines from the American College of Obstetricians and Gynecologists, the Institute of Medicine adjusted timing and quantity of prenatal visits for length of gestation and combined the two measures to yield a measure of the use of prenatal care. Under this classification scheme, the use of prenatal care could be placed in three categories: adequate, intermediate, and inadequate.

This system was modified by Gortmaker in 1979 (4) and is now commonly used in the surveillance of prenatal care. It is called the Adequacy of Care Index or, more commonly, the Kessner Index. In 1987, Alexander and Corneley markedly improved the Kessner Index by categorizing pregnant women into six groups: those receiving no care, inadequate care, intermediate care, adequate care, and intensive care and those for whom such information is missing or unknown (20). The **intensive** group includes women who made a relatively excessive number of visits given the month that prenatal care began and the duration of pregnancy. Intensive, repeated use of prenatal care services is assumed to indicate potential morbidity or complications.

Over the past 15 years, birth certificate data have been used in numerous U.S. surveys of prenatal care. In the 1980 NNS, for example, the National Center for Health Statistics (NCHS) collected data from a representative sample of

9,941 birth certificates for 1980. Survey staff conducted detailed interviews with most of the mothers represented by those births, and they collected additional data from hospital and physician questionnaires.

During the 1982 and 1983 interviews conducted for the National Survey of Family Growth (NSFG), NCHS began collecting data on prenatal care and method of payment at delivery for women who had live births in the period beginning January 1979 (21). Several years later, in the 1988 National Maternal and Infant Health Survey (NMIHS), NCHS began studying risk factors such as inadequate prenatal care, inadequate weight gain during pregnancy, as well as smoking and alcohol and drug use during pregnancy (22). Maternal behaviors during pregnancy also are monitored via the Pregnancy Risk Assessment Monitoring System (PRAMS)—a state-based surveillance system, established by CDC in 1987, that uses mail and telephone questionnaires to solicit information from women. Thirteen states and the District of Columbia are participating in PRAMS (23).

CDC SURVEILLANCE ACTIVITIES

Vital Statistics

Data on prenatal care are collected on birth certificates filed in each of the states through their vital registration systems. Although vital registration is a state activity, NCHS promotes uniformity in the data collected via recommended standard certificates. These standard certificates are developed in cooperation with state vital statistics offices and providers and users of the information. They are revised about every 10 years.

The state data are provided on computer tapes to NCHS, which then compiles them into national data and disseminates them annually. The primary vehicles for dissemination are 1) the *Advance Report of Final Natality Statistics* (24), which contains summary tabulations; 2) *Vital Statistics of the United States, Volume I, Natality* (25), which contains detailed tabulations; 3) public-use computer tapes; and 4) periodic analytic reports.

Generally, national natality files are available within 18–24 months of the end of the data year. State-level data are available from all of these files. With only a few exceptions, all characteristics are shown, by state, in the published annual natality volumes, *Vital Statistics of the United States, Volume I, Natality (25)*.*

In surveillance activities that use data from birth certificates, prenatal care utilization is monitored by using one of four measures:

- **Some prenatal care vs. no prenatal care.** This is probably the least useful of the four prenatal care measures because of tremendous variability contained in the **presence of prenatal care category**.
- **Month or trimester of first prenatal care visit.** The month or trimester of the first prenatal visit provides more information about the opportunity to detect problems by virtue of how early in pregnancy the first visit occurs. However, this information alone provides no evidence of what occurs subsequent to the first visit. Heterogeneity exists within any group of women who begin prenatal care in the same gestational month or trimester because the number of visits can range widely. A recent investigation indicated that the timing of prenatal visits differs across racial and ethnic groups (26). Although the timing of the first prenatal visit has often been used as a measure of the adequacy of prenatal care received, it is limited because early care does not always mean continuous care.
- **Total number of prenatal care visits.** The total number of prenatal visits provides more information about the extent of

provider content. However, use of this variable by itself provides no information regarding the timing of the visits.

- **A composite measure such as the Kessner Index.** This classification system is better than the other three measures because it combines the month of the first prenatal visit with the total number of visits to establish a measure of the use of prenatal care (19).

Ongoing Surveillance

CDC oversees two ongoing surveillance systems that collect data on prenatal care—the NSFG and PRAMS. The NSFG is a probability household survey of females aged 15–44 years in the civilian noninstitutionalized population. In 1982 and 1983, 7,969 women were interviewed. In addition to garnering data on women’s reproductive and family planning histories, the NSFG also collects information on prenatal care and method of payment at delivery.

CDC established PRAMS to collect data on maternal behaviors that influence pregnancy outcomes. Thus far, Alabama, Alaska, California, the District of Columbia, Florida, Georgia, Indiana, Maine, Michigan, New York (excluding New York City), Oklahoma, South Carolina, Washington, and West Virginia have established 5 PRAMS programs (23). Through PRAMS, states conduct population-based surveillance of maternal behaviors during women’s pregnancies and during the early infancy of their children. PRAMS data also supplement birth certificate data and provide information that can be used to identify needs and target interventions. To allow multistate comparisons of PRAMS findings, states use standardized data collection methods. In each state, mothers are sampled monthly from a sampling frame of recently processed resident birth certificates. Mothers are then mailed a 14-page questionnaire 3–6 months after delivery. If no response is received, a second questionnaire is mailed; if the woman still does not respond, PRAMS staff attempt to administer the questionnaire by telephone. The questionnaire also asks detailed questions about the mother’s use of prenatal care. Collection procedures are described in detail elsewhere (23).

* Reports on the use of prenatal care based on natality files include data on mothers of live-born infants only. Thus, most of the findings reported in this chapter refer to live births. Because induced abortions are of little interest in studies of the use of prenatal care, only two minor problems arise with using the number of live births as an index of the number of pregnant women. First, mothers of multiple infants are counted more than once. Second, women whose pregnancies result in fetal deaths are not included at all. However, in the United States in 1991, 2.31% of live births were twins and 0.08% were triplets or higher order multiple births. Of pregnancies that progressed to 20 weeks of gestation, 0.73% resulted in fetal deaths and 99.23% resulted in live births. Thus, for the purpose of reports on the use of prenatal care, very little difference exists between proportions of *live births* and proportions of *women*.

GENERAL FINDINGS

The most detailed review of studies of risk factors for insufficient prenatal care is a report, issued by the Institute of Medicine in 1988, entitled *Prenatal Care: Reaching Mothers, Reaching Infants* (27,28). Much of the following discussion of variables related to the use of prenatal care is based on this report.

Demographic Risk Factors

RACE AND ETHNICITY

Among white women with live births in 1990, 79.2% began care in the first trimester of pregnancy, and 4.9% received late or no care. Black women were far less likely than white women to begin care early (60.6%) and twice as likely to receive late prenatal care (11.3%) or no care (4.9%) (29). Hispanic mothers were substantially less likely than non-Hispanic white mothers to obtain late or no care, but they were more likely than non-Hispanic black mothers to begin care late or not at all. Native American women were more likely than either white or black women to obtain late or no care. These racial differences are not likely related to race per se but instead to socioeconomic factors such as income, educational level, access to health care, and access to insurance.

AGE

Adolescent mothers are at a high risk of obtaining late or no prenatal care, with the greatest risk being among mothers <15 years of age (for more information, see the *Pregnancy in Adolescents* chapter).

EDUCATION

In studies of mothers with live-born infants, timing of the first prenatal visit is strongly associated with educational attainment. In 1988, 92% of mothers with at least some college education began care early in pregnancy, compared with 53% of mothers who had less than a high school education (25). The probability that a pregnant woman will obtain care late or not at all decreases steadily as her educational level increases.

BIRTH ORDER

The more children a woman has had, the more likely she is to obtain insufficient care or none at all.

MARITAL STATUS

In 1988, among women with live-born infants, unmarried mothers were more than three times as likely as married mothers to obtain late or no prenatal care (13.2% vs. 3.7%) (30). Unmarried white mothers were almost four times as likely as married black mothers to obtain late or no care; and unmarried black mothers were twice as likely as married black mothers to obtain late or no care.

POVERTY

Low income is one of the most important predictors of insufficient prenatal care. Women with incomes below the federal poverty level consistently show higher rates of late or no prenatal care and lower rates of early care than women with larger incomes.

GEOGRAPHIC LOCATION

Insufficient prenatal care is concentrated in certain geographic areas, most often inner cities and isolated rural areas. States vary in their rates of early and late entry into prenatal care, and great diversity in use of prenatal care can exist within states, counties, and cities (27,31–33).

TIME TRENDS

The most detailed analysis of national time trends available from NCHS is for 1970–1990 (29,32). Using birth certificate data of live-born infants, researchers examined national trends in prenatal care use among white and black mothers separately. The proportion of black mothers with early prenatal care (in the first trimester) increased each year during the 1970s, but the average annual percentage point increase for 1976–1980 (1.2) was smaller than that for 1970–1975 (2.3). The proportion of black mothers with early care declined from 62.4% in 1980 to 60.6% in 1990. For white mothers, average annual increases in

the proportion with early care were similar for 1970–1975 and 1976–1980 (0.8 and 0.6 percentage points). The proportion of white mothers receiving early care remained stable at about 79% between 1980 and 1990 (Figure 1).

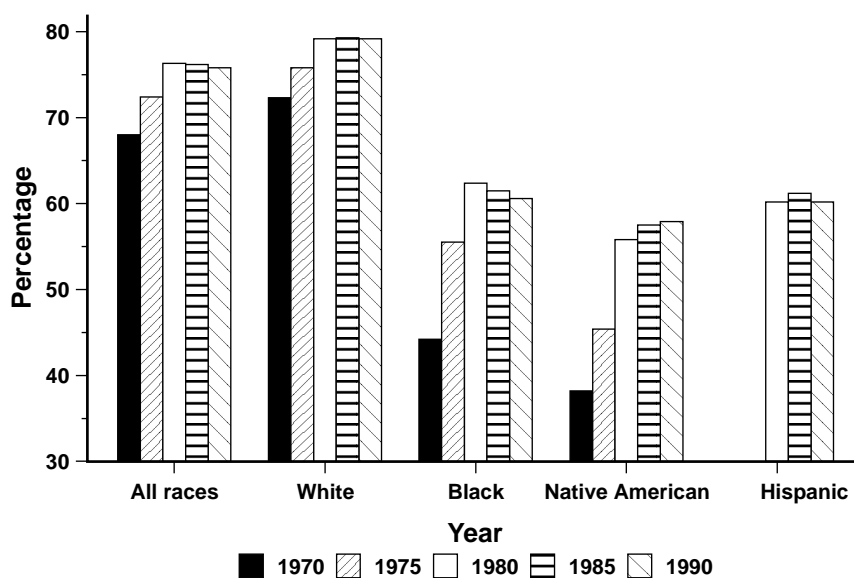
Barriers to Care

The Institute of Medicine report reviewed a great deal of literature on barriers to prenatal care and classified the known barriers into three groups: socioeconomic, system-related, and attitudinal (Table 1) (22,23). This literature has also been reviewed in detail by Goldenberg et al. (34) and Perez-Woods (35). National surveys of women’s use of prenatal care can be another rich source of information on barriers to care:

- Analyses of data from the 1980 NNS revealed that patterns of prenatal care among mothers of live-born infants varied widely among population subgroups (36). Mothers <18 years of age and unmarried mothers were the least likely to obtain first trimester care (49% and 56%) and the most
- An analysis of NSGF data collected in 1982 and 1983 revealed that three groups of women were more likely to begin prenatal care after the first trimester: women with no health insurance; women on public assistance (including Medicaid and state and local

likely to obtain care only in the third trimester or not at all (about 12% in each group). Women aged 18–19 years, blacks, Hispanics, poor women and women with little education also had disproportionately high levels of late or no care (7%–9%). In contrast, women who were married, white, and not poor obtained the most timely prenatal care. Compared with this subgroup of women, the population as a whole had twice the risk of obtaining inadequate prenatal care. Unmarried women ran the highest relative risk (five times the risk for women who were married, white, and not poor), followed by adolescents, Hispanic women, women with little education, poor women, and blacks (who had three to four times the risk for the comparison group).

FIGURE 1. Percentage of live-born infants whose mothers received early prenatal care, by race-ethnicity and year* — United States, 1970–1990



* Separate data on Hispanic births were not available for 1970 and 1975.
Source: NCHS, CDC. National natality files.

TABLE 1. Barriers to the use of prenatal care**I. Sociodemographic**

Poverty
 Inner-city or rural residence
 Minority status
 Age of <18 years
 High parity
 Non-English speaking
 Unmarried
 Less than high school education

II. System-related

Inadequacies in private insurance policies (waiting periods, coverage limitations, coinsurance and deductibles, requirements for up-front payments)
 Absence of either Medicaid or private insurance coverage of maternity services
 Inadequate or no maternity care providers for Medicaid-enrolled, uninsured, and other low-income women (long wait to get appointment)
 Complicated, time-consuming process to enroll in Medicaid
 Poorly advertised availability of Medicaid
 Inadequate transportation services, long travel time to service sites, or both
 Difficulty obtaining child care
 Weak links between prenatal services and pregnancy testing
 Inadequate coordination among such services as WIC and prenatal care
 Inconvenient clinic hours, especially for working women
 Long wait to see physician
 Language and cultural incompatibility between providers and clients
 Poor communication between clients and providers, exacerbated by short interactions with providers
 Negative attributes of clinics, including rude personnel, uncomfortable surroundings, and complicated registration procedures
 Limited information on exactly where to get care (phone numbers and addresses)

III. Attitudinal

Pregnancy unplanned, viewed negatively, or both
 Ambivalence
 Signs of pregnancy not known or recognized
 Prenatal care not valued or understood
 Fear of doctors, hospitals, procedures
 Fear of parental discovery
 Fear of deportation or problems with the Immigration and Naturalization Service
 Fear that certain health habits will be discovered and criticized (smoking, eating disorders, drug or alcohol abuse)

TABLE 1. Barriers to the use of prenatal care – continued**III. Attitudinal – continued**

Attitudes related to selected lifestyles (drug abuse, homelessness)

Attitudes related to inadequate social supports and personal resources

Excessive stress

Denial or apathy

Concealment

Source: Institute of Medicine (27, 28).

government assistance); and women with less than a high school education (21).²

- In 1986 and 1987, the U.S. General Accounting Office conducted a survey of 1,157 women who were uninsured or receiving Medicaid benefits, questioning them about their experience with prenatal care, including the number of visits, their timing, and the barriers and problems encountered. A multivariate analysis, which used the Kessner Index as the measure of accessibility of prenatal care, revealed the following findings (37):†

Enrollment in Medicaid and participation in state outreach programs increased women's access to prenatal care. Moreover, participants in state outreach programs had substantially better access to prenatal care than did Medicaid enrollees.

Six barriers to care were significantly related to the Kessner Index: financial problems, transportation problems, time conflicts, ambivalent feelings about pregnancy, the belief that prenatal care is not important, and a lack of knowledge about prenatal care.

Even after surveyors controlled for individual circumstances and attitudes, black and Hispanic women still had substantially worse access to prenatal care than other women participating in the survey.

- The National Maternal and Infant Health Survey (NMIHS) was a nationally representative sample of 9,953 women who had live births, 3,309 who had late fetal deaths (≥ 28 weeks of gestation), and 5,332 who had infant deaths in 1988 (22). Mothers were mailed questionnaires based on information from certificates of live birth, reports of fetal death, and certificates of infant death. Information supplied by the mother, prenatal care providers, and hospitals of delivery was linked with vital records data. Little has been published on the use of prenatal care from the NMIHS; however, an abundance of information on prenatal care is available from both the NMIHS Mothers' Questionnaire and the Prenatal Care Provider Questionnaire. According to data from the mothers' questionnaire, more than a third of live-born infants were born to women who received no prenatal care advice on smoking, alcohol, or drug use, and about half of these infants were born to women who received no information on breast-feeding. The amount of advice given differed by race, maternal age, and site of care (38).

The Case-Control Approach

In a recent study conducted in Cleveland, Ohio, investigators deliberately sought out 120 women giving birth who had received inadequate prenatal care (case group) and compared them with a sample of 120 women who had received adequate prenatal care (control group) at the same inner-city hospital (39). Using logistic regression analyses of the women's medical records, the

† Findings are based on all pregnant women.

researchers discovered that higher parity, an age of <30 years, an unmarried status, smoking, drug abuse, and residing in an area of low-socioeconomic status were independently associated with increased odds of not receiving adequate prenatal care. A similar case-control study design was used in a much larger investigation conducted by the Missouri Department of Health (40) (for details, see the Interpretation Issues section that follows).

INTERPRETATION ISSUES

The validity of prenatal care indexes depends on the accuracy with which gestational age and prenatal care variables are reported on the birth certificate (41–43). Several reports have demonstrated inconsistencies for those items between the birth certificate information and the information provided by the mother after delivery (44–46). Although those researchers have not determined the validity of the information on the birth certificate, the discrepancies raise concerns regarding the accuracy of prenatal care information recorded on the birth certificate.

In a recent NCHS study, analysts compared the reporting of variables related to prenatal care from the birth certificate and the 1988 NMIHS (46). They compared information from the NMIHS questionnaires, completed by mothers 6–30 months after delivery, with vital certificate data for the same births. Agreement ranged from 85% for the trimester of prenatal care among white women to 40% for the number of prenatal visits among black women. Approximately 60% of women recorded as initiating prenatal care during the second or third trimester on the birth certificate reported receiving earlier care in the survey. Women in high-risk groups (receiving late or little prenatal care and having a low level of education) had the lowest agreement rates.

Birth certificate information is often used in the surveillance of the use of prenatal care. The analysis just described raises questions regarding the accuracy of two variables often used in the creation of prenatal care indexes: the number of prenatal visits and the trimester of prenatal care initiation. In general, women reported on the maternal questionnaire receiving earlier prenatal

care and more prenatal visits than were recorded on the birth certificate. Several previous studies have demonstrated potential problems in the calculation and recording of gestational age (41,47,48), another variable that is commonly used in the creation of indexes of prenatal care. The validity of epidemiologic surveillance depends on the accuracy of the data being analyzed. Of great concern is that groups of women with delayed or small amounts of prenatal care are the least likely to have birth certificate data that correspond with information supplied by the mother. The differences described in the 1988 NMIHS study should be considered when performing analyses of prenatal care using vital statistics data (46).

A second potential limitation of using vital statistics data to examine the effects of the use of prenatal care is that the regular methods of surveillance provide information only on the quantity of care received rather than the content of prenatal care. Many of the studies examining the relationship between the use of prenatal care and birth outcomes were based on summary utilization measures, such as the Kessner Index. Few researchers had the opportunity to examine the content of prenatal care. Peoples-Sheps (49), among others, recognized that a significant shortcoming in studying the relationship between prenatal care and birth outcomes was the lack of information on the content of prenatal care.

In a 1989 report entitled *Caring for Our Future: The Content of Prenatal Care* (50), panel members of the Public Health Service Expert Panel on the Content of Prenatal Care went beyond what the published literature had covered by delineating which components should be included in providing the most effective prenatal care. Among their recommendations was a detailed listing of the components of prenatal care that included guidelines for physical examination, laboratory tests for risk assessments, information to gather for a health history, and health promotion activities such as the provision of advice. The panelists also included details on when, during pregnancy, each individual component should be provided. They noted that many prenatal care practices have not been studied and that many practices that were studied were not evaluated rigorously or with an adequate research design.

In a recent review of prenatal programs, Fink et al. indicated that much more progress in measuring the effectiveness of the content of prenatal care needs to be achieved (51). The authors noted that the criteria for determining the appropriate content of prenatal care remains an unsolved and major public health issue, one that is currently inadequately covered in literature on the prenatal care program.

The NMIHS included information on women's reports of initial prenatal procedures received and health behavior advice received throughout pregnancy, among mothers of live-born infants. An examination of the NMIHS data indicated that advice on prenatal health behavior is not a uniform feature of all prenatal care (38). Disparities by race, maternal age, and site of care are evident. Moreover, one third or more of the women surveyed reported receiving no prenatal advice on alcohol, tobacco, or drug use, and approximately 50% received no prenatal information on breast-feeding.

A second investigation using NMIHS data examined how receiving initial prenatal procedures and health behavior advice affected the risk of low birth weight (*Kogan, Alexander, Kotelchuck, Nagey, unpublished data, 1994*). The findings, based on mothers of live-born infants only, suggest that women who received sufficient health behavior information, as part of their prenatal care were less likely to deliver a low-birth-weight infant. In addition, females who were at a greater risk—such as teenagers or women with lower incomes—showed the greatest beneficial effects. Therefore, the quality of prenatal care services has an apparent effect independent of the quantity of prenatal services received. In the future, periodic surveillance surveys such as the NMIHS, will attempt to obtain more detailed information on the content of women's prenatal care.

In reviewing these findings, we must recognize that attempts to investigate the relationship between prenatal care and perinatal outcomes can have serious methodologic problems because women who receive adequate prenatal care differ greatly from those who receive inadequate care (Table 1). For example, in an analysis of the 1980 NNS data of mothers of live-born infants, Kleinman found that after adjusting the data for

race, age, parity, and education, married mothers who began care in the first trimester were 20% less likely to have smoked before pregnancy, 36% less likely to have had heavy alcohol consumption before pregnancy, and 60% more likely to have planned their pregnancies than married mothers who received late or no care (42). These differences result in serious **selection bias** in all evaluations of the association between prenatal care and pregnancy outcomes. Women who receive adequate prenatal care are a self-selected group. In evaluations of the effects of prenatal care, the factors associated with inadequate prenatal care—smoking, alcohol consumption, unplanned pregnancy, higher income and education, adolescent pregnancy—must be considered as potential confounding variables, because they are related to the receipt of prenatal care and to outcome measures such as low birth weight and perinatal mortality. However, the problem of self-selection involves more than just confounding, because self-selection cannot be fully measured and analytically controlled (43). The ways in which recipients and nonrecipients of prenatal care differ are not fully known (34). Even if we control for basic social and demographic variables, the two groups will probably differ in respects that have not been measured.

Another biasing factor that must be considered in evaluations of the effects of prenatal care on pregnancy outcomes is pregnancy curtailment (41,43). Women whose pregnancies are shortened by preterm delivery or induction of labor will have less of an opportunity to have prenatal visits. These women also have a greater risk of low-birth-weight births and perinatal mortality. Prenatal care indexes such as the Kessner Index were developed to control for this bias.

EXAMPLES OF USING DATA

States, cities, and local health departments have often used data on the use of prenatal care for program and policy planning. In this section, we describe several examples of such analyses.

New York City

In a multivariate analysis of 1981 live births in New York City, researchers studied the effects of

financial coverage (Medicaid vs. third-party insurance), maternal education, race, maternal age, and marital status on the start of prenatal care (52). Late or no prenatal care was found to be associated with both Medicaid coverage and an education of <12 years. For the most part, the association of race and age with late or no prenatal care could be explained by Medicaid coverage and education. In other words, Hispanics, blacks, and adolescents were more likely to have incomplete education and Medicaid insurance, and this resulted in their greater risk of receiving late or no prenatal care.

In another New York City study, conducted in 1992, investigators assessed the many barriers to prenatal care that involve deficiencies in the maternity care system, rather than the characteristics of individual women. The New York City Department of Health's Bureau of Maternity Services and Family Planning conducted a telephone survey to document whether or not prenatal health care providers were accessible by telephone (53). Bureau staff posed as women in their first trimester of pregnancy (with a positive pregnancy test) seeking prenatal care. Speaking in either English or Spanish, the bureau staff telephoned >115 providers and asked four questions:

- Can I get a prenatal care appointment? (If not, why not?)
- How soon can I get the appointment?
- Do I get to see a doctor at that time? (If not, how soon?)
- I do not have any health insurance. Is that OK?

The results of this study clearly demonstrated that women who rely on public services in New York City face grave inconveniences. The survey was conducted over a 2-week period with available bureau staff and equipment. This is a relatively inexpensive method for evaluating a prenatal care system, and health departments in other cities and states may want to consider carrying out similar surveys.

Missouri

Postpartum interviews with 1,484 primarily low-income women were conducted during 1987–1988 in three areas of Missouri with the highest rates of inadequate prenatal care. In this study, carried out by the Missouri Department of Health, women with live-born infants who received inadequate prenatal care were more likely to be black and unmarried, to have a higher parity, and to have less education than those who received adequate care (40). These women were also more likely to be poor and Medicaid-eligible, to have an unwanted pregnancy, to experience more stress and problems during pregnancy, and to have less social support than women receiving adequate care. In a multivariate analysis, race and marital status lost their statistical importance. The strongest predictor of inadequate prenatal care was not being aware of the pregnancy in the first four months. The investigators concluded that to improve the rate of adequate prenatal care, society must address poverty and wantedness of pregnancy.

Arizona

Mexican-Americans' use of prenatal care was the focus in an analysis of Arizona birth certificates of live-born infants issued in 1986 and 1987 (54). The adequacy of prenatal care was evaluated using the index designed by Alexander and Corneley (20). Mexican-Americans were much more likely to have inadequate or no care than were non-Hispanic whites. Moreover, Mexico-born Mexican-Americans tended to have less adequate care than United States-born Mexican-Americans.

North Carolina

The North Carolina Center for Health and Environmental Statistics studied data on approximately 45,000 North Carolina women with live-born infants who gave birth in 1989 and 1990 and received prenatal care in public health facilities; the study's purpose was to assess the effects of prior family planning services on adequacy of

prenatal care in a low-income population (55). Women who had used family planning services in the 2 years before conception were more likely to receive early and adequate prenatal care and to be involved in a food supplement program and maternity care coordination. The investigators advised that these findings must be interpreted with caution because of self-selection into family planning programs, but they concluded that family planning services may improve the use of prenatal health services among low-income women.

Tennessee

To investigate the effects of a 1985 Tennessee Medicaid regulatory change that expanded eligibility for pregnant women, investigators linked birth certificate files with Medicaid enrollment files (56). The findings based on women with live-born infants only, show the greatest Medicaid coverage increase occurred among white married women <25 years of age with <12 years of education; their enrollment increased 18%. However, in that group of mothers, as well as among all mothers studied, the authors observed no concomitant improvements in the use of early prenatal care. Analysis of the timing of enrollment relative to the beginning of pregnancy revealed that more than two thirds of the women who enrolled in Medicaid did so after the first trimester.

California

Beginning in 1989, California officials amended their birth certificates to include confidential information on the principal source of payment for prenatal care. This allowed analysts to use 1990 birth certificate data to study whether a lack of financial access was a significant barrier to prenatal care following major expansions of Medicaid eligibility (57). The findings, based on women with live-born infants only, show that compared with women who had private fee-for-service coverage, uninsured women were at an elevated risk of receiving no prenatal care, late care (after the first trimester), and too few visits. Women with Medi-Cal coverage had a high risk of receiving late care. The investigators concluded that, in spite of major Medicaid coverage

expansions, access to prenatal care was limited for women without private insurance.

Hawaii

The Institute of Medicine's report on prenatal care (27) suggested that the identification of geographic **hot spots**, where a high proportion of women had insufficient prenatal care, would be a fruitful avenue of future research. Hawaiian data have recently been used to address this issue. Patterns and predictors of the use of prenatal care in Hawaii were examined to identify census tracts with high levels of inadequate use of prenatal care services (33). Data were drawn from 1980 census reports and from 1979–1987 live birth files. The area-level methods used in this report may be useful to health-care planners in other areas.

FUTURE ISSUES

The year 2000 objective for prenatal care is to “increase to at least 90% the proportion of all pregnant women who receive prenatal care in the first trimester of pregnancy.” This objective of 90% is meant to encompass mothers of all racial and ethnic groups, including black, Native American, Alaska Native, and Hispanic women. Clearly substantial progress still needs to be made if this goal is to be reached (Table 2) (58).

Data from birth certificates in 1989 and subsequent years will be particularly useful for analyzing prenatal care. Questions about tobacco use, drinking, and weight gain during pregnancy have been added to the revised birth certificates. The new item on clinical estimate of gestation also may improve the data on gestational age. The item on the birth attendant now differentiates between lay and certified nurse-midwives, and the place of delivery is more fully delineated to provide more data on when care begins. Also, timing of the initiation of prenatal care can be analyzed in relation to weight gain, complications of labor and delivery, obstetric procedures performed, and abnormal conditions of the newborn. The revised birth certificate also contains information on prenatal technologies, including amniocentesis, tocolysis, and ultrasound. Indeed,

TABLE 2. Progress toward meeting the year 2000 national health objective for prenatal care in the first trimester

Race/ethnicity	Proportion of pregnant women receiving early prenatal care who deliver a live birth		
	1987 (baseline)*	1990*	2000 (target)*
All women	76.0	75.8	90
Black women	60.8	60.6	90
American Indian and Alaska Native women	57.6	57.9	90
Hispanic women	61.0	60.2	90

*From *Healthy People 2000 Review (58)*.

an analysis of the 1990 national natality file has already been conducted to investigate black-white differences in the use of these prenatal technologies (59). We also anticipate that future national surveys, such as the next NMIHS, will attempt to obtain more detailed information on the various components of prenatal care.

Prenatal care will continue to provide invaluable monitoring and support functions for pregnant women. Information obtained from state and national vital records as well as state and national surveys will help us to examine trends in prenatal care utilization and to delineate the prenatal procedures that are most effective for increasing a woman's chances for a healthy pregnancy.

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