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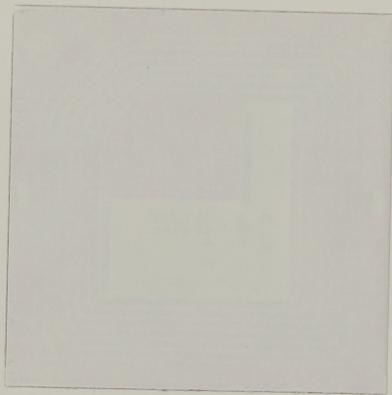
Volume VI:
Infant Mortality and
Low Birthweight

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Report of the Secretary's Task Force on

Black & Minority Health

U.S. Department of Health and
Human Services



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Volume VI:
Infant Mortality and
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Report of the
Secretary's Task
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SECRETARY'S TASK FORCE ON BLACK AND MINORITY HEALTH

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INTRODUCTION TO THE TASK FORCE REPORT

Background

The Task Force on Black and Minority Health was established by Secretary of Health and Human Services Margaret M. Heckler in response to the striking differences in health status between many minority populations in the United States and the nonminority population.

In January 1984, when Secretary Heckler released the annual report of the Nation's health, Health, United States, 1983, she noted that the health and longevity of all Americans have continued to improve, but the prospects for living full and healthy lives were not shared equally by many minority Americans. Mrs. Heckler called attention to the longstanding and persistent burden of death, disease, and disability experienced by those of Black, Hispanic, Native American, and Asian/Pacific Islander heritage in the United States. Among the most striking differentials are the gap of more than 5 years in life expectancy between Blacks and Whites and the infant mortality rate, which for Blacks has continued to be twice that of Whites. While the differences are particularly evident for Blacks, a group for whom information is most accurate, they are clear for Hispanics, Native Americans, and some groups of Asian/Pacific Islanders as well.

By creating a special Secretarial Task Force to investigate this grave health discrepancy and by establishing an Office of Minority Health to implement the recommendations of the Task Force, Secretary Heckler has taken significant measures toward developing a coordinated strategy to improve the health status of all minority groups.

Dr. Thomas E. Malone, Deputy Director of the National Institutes of Health, was appointed to head the Task Force and 18 senior DHHS executives whose programs affect minority health were selected to serve as primary members of the Task Force. While many DHHS programs significantly benefit minority groups, the formation of this Task Force was unique in that it was the first time that attention was given to an integrated, comprehensive study of minority health concerns.

Charge

Secretary Heckler charged the Task Force with the following duties:

- Study the current health status of Blacks, Hispanics, Native Americans, and Asian/Pacific Islanders.
- Review their ability to gain access to and utilize the health care system.
- Assess factors contributing to the long-term disparities in health status between the minority and nonminority populations.

- Review existing DHHS research and service programs relative to minority health.
- Recommend strategies to redirect Federal resources and programs to narrow the health differences between minorities and nonminorities.
- Suggest strategies by which the public and private sectors can cooperate to bring about improvements in minority health.

Approach

After initial review of national data, the Task Force adopted a study approach based on the statistical technique of "excess deaths" to define the differences in minority health in relation to nonminority health. This method dramatically demonstrated the number of deaths among minorities that would not have occurred had mortality rates for minorities equalled those of nonminorities. The analysis of excess deaths revealed that six specific health areas accounted for more than 80 percent of the higher annual proportion of minority deaths. These areas are:

- Cardiovascular and cerebrovascular diseases
- Cancer
- Chemical dependency
- Diabetes
- Homicide, suicide, and unintentional injuries
- Infant mortality and low birthweight.

Subcommittees were formed to explore why and to what extent these health differences occur and what DHHS can do to reduce the disparity. The subcommittees examined the most recent scientific data available in their specific areas and the physiological, cultural, and societal factors that might contribute to health problems in minority populations.

The Task Force also investigated a number of issues that cut across specific health problem areas yet influence the overall health status of minority groups. Among those reviewed were demographic and social characteristics of Blacks, Hispanics, Native Americans, and Asian/Pacific Islanders; minority needs in health information and education; access to health care services by minorities; and an assessment of health professionals available to minority populations. Special analyses of mortality and morbidity data relevant to minority health also were developed for the use of Task Force. Reports on these issues appear in Volume II.

Resources

More than 40 scientific papers were commissioned to provide recent data and supplementary information to the Task Force and its subcommittees. Much material from the commissioned papers was incorporated into the subcommittee reports; others accompany the full text of the subcommittee reports.

An inventory of DHHS program efforts in minority health was compiled by the Task Force. It includes descriptions of health care, prevention, and research programs sponsored by DHHS that affect minority populations. This is the first such compilation demonstrating the extensive efforts oriented toward minority health within DHHS. An index listing agencies and program titles appears in Volume I. Volume VIII contains more detailed program descriptions as well as telephone numbers of the offices responsible for the administration of these programs.

To supplement its knowledge of minority health issues, the Task Force communicated with individuals and organizations outside the Federal system. Experts in special problem areas such as data analysis, nutrition, or intervention activities presented up-to-date information to the Task Force or the subcommittees. An Hispanic consultant group provided information on health issues affecting Hispanics. A summary of Hispanic health concerns appears in Volume VIII along with an annotated bibliography of selected Hispanic health issues. Papers developed by an Asian/Pacific Islander consultant group accompany the data development report appearing in Volume II.

A nationwide survey of organizations and individuals concerned with minority health issues was conducted. The survey requested opinions about factors influencing health status of minorities, examples of successful programs and suggestions for ways DHHS might better address minority health needs. A summary of responses and a complete listing of the organizations participating in the survey is included in Volume VIII.

Task Force Report

Volume I, the Executive Summary, includes recommendations for department-wide activities to improve minority health status. The recommendations emphasize activities through which DHHS might redirect its resources toward narrowing the disparity between minorities and nonminorities and suggest opportunities for cooperation with nonfederal structures to bring about improvements in minority health. Volume I also contains summaries of the information and data compiled by the Task Force to account for the health status disparity.

Volumes II through VIII contain the complete text of the reports prepared by subcommittees and working groups. They provide extensive background information and data analyses that support the findings and intervention strategies proposed by the subcommittees. The reports are excellent reviews of research and should be regarded as state-of-the-art knowledge on problem areas in minority health. Many of the papers commissioned by the Task Force subcommittees accompany the subcommittee report. They should be extremely useful to those who wish to become familiar in greater depth with selected aspects of the issues that the Task Force analyzed.

The full Task Force report consists of the following volumes:

- Volume I: Executive Summary
- Volume II: Crosscutting Issues in Minority Health:
 - Perspectives on National Health Data for Minorities
 - Minority and other Health Professionals Serving Minority Communities
 - Minority Access to Health Care
 - Health Education and Information
- Volume III: Cancer
- Volume IV: Cardiovascular and Cerebrovascular Diseases
- Volume V: Homicide, Suicide, and Unintentional Injuries
- Volume VI: Infant Mortality and Low Birthweight
- Volume VII: Chemical Dependency
Diabetes
- Volume VIII: Hispanic Health Issues
 - Survey of Non-Federal Community
 - Inventory of DHHS Program Efforts in Minority Health

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SUBCOMMITTEE ON INFANT MORTALITY AND LOW BIRTHWEIGHT

INTRODUCTION

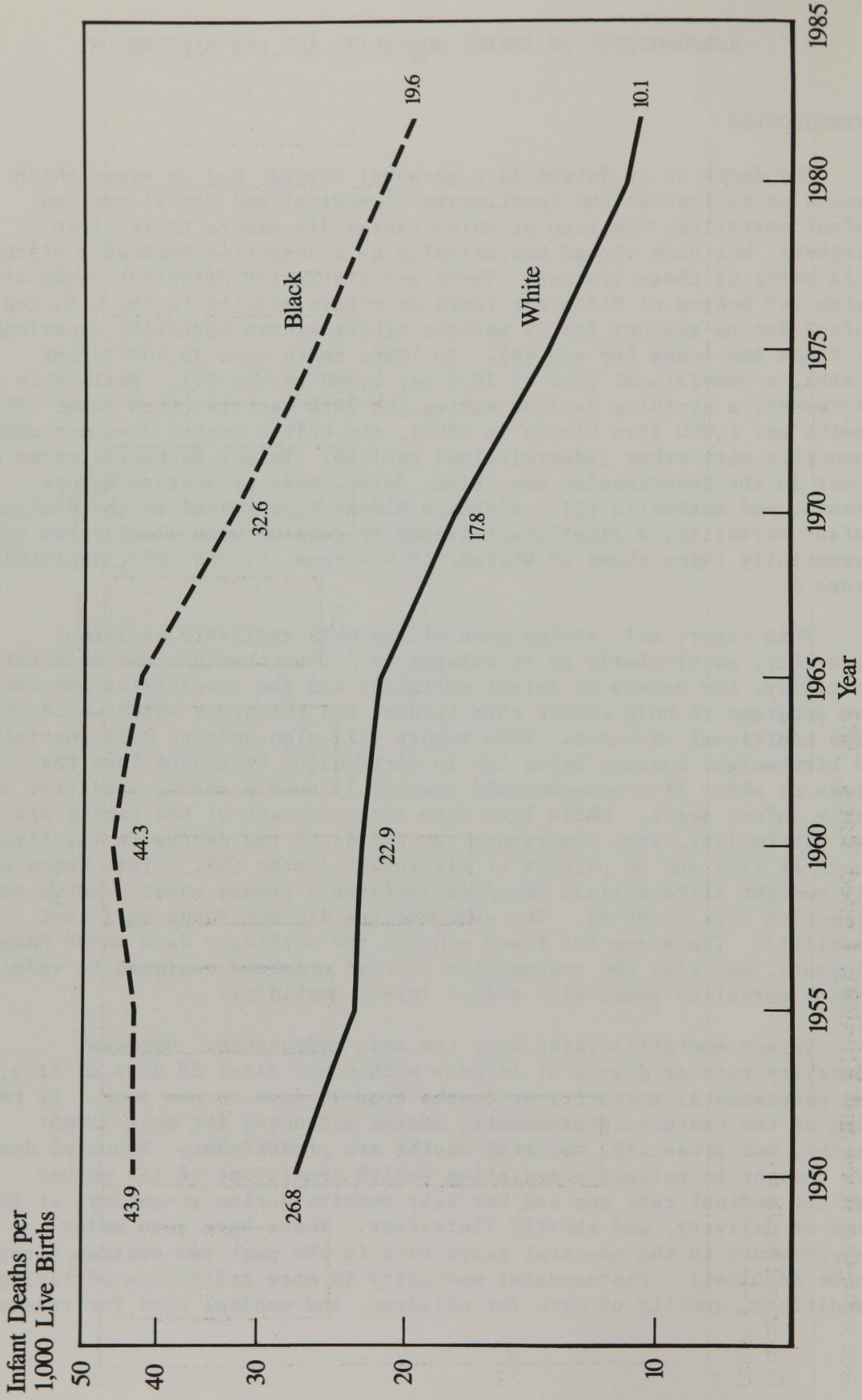
The death of an infant is a personal tragedy and an event which causes us to look at the functioning of medical and social systems. Infant mortality, the rate at which babies die before their first birthday, has been viewed historically as a sensitive indicator of the well-being of these systems. There are distinctly different risks of dying for babies of different races or ethnic origins in the U.S. today. Infant deaths account for 27 percent of the excess mortality experienced by Black Americans (by age 45). In 1983, there were 39,400 infant deaths, a provisional rate of 10.9 per 1,000 births (1). While this represents a striking decline during the 20th century (from about 100 deaths per 1,000 live births in 1900), the United States does not compare favorably with other industrialized nations. Infant mortality rates are lower in the Scandinavian countries, Japan, most of Western Europe, Canada, and Australia (2). Although Blacks have shared in the decline in infant mortality, a significant disparity remains with Black rates being essentially twice those of Whites, 19.6 versus 10.1 in 1982, depicted in Graph A.

This report will review much of the data available on infant mortality, particularly as it relates to low birthweight and neonatal mortality; the causes of infant mortality and the disparities observed; the programs to help reduce this burden; and the areas which would profit from additional research. This report will also address differentials in birthweight because being low in birthweight (weighing less than 2,500 grams or about five-and-one-half pounds) is such a strong predictor of early infant death. While less than seven percent of the babies are low birthweight, they contribute two-thirds of the deaths in the first month of life and 60 percent of all infant deaths (4). Also, there are birthweight differentials among racial/ethnic groups which deserve our attention (see Graph B). The subcommittee did not focus on infant morbidity. There are far fewer sources for morbidity data which hampers analysis, but also the presumption is that programs designed to reduce infant mortality would also reduce infant morbidity.

Infant mortality rates have two main components: neonatal mortality rate or deaths of infants within the first 28 days of life, and postneonatal mortality or deaths from 28 days to one year. At the turn of the century, postneonatal deaths accounted for most infant deaths, but presently, neonatal deaths are predominant. Neonatal deaths are thought to reflect preexisting health conditions of the mother and the medical care she and her baby receive during pregnancy, at the time of delivery, and shortly thereafter. There have been major improvements in the neonatal death rate in the past two decades (Graph C shows declines). Postneonatal mortality is more reflective of living conditions, quality of care for children, and medical care for treatable

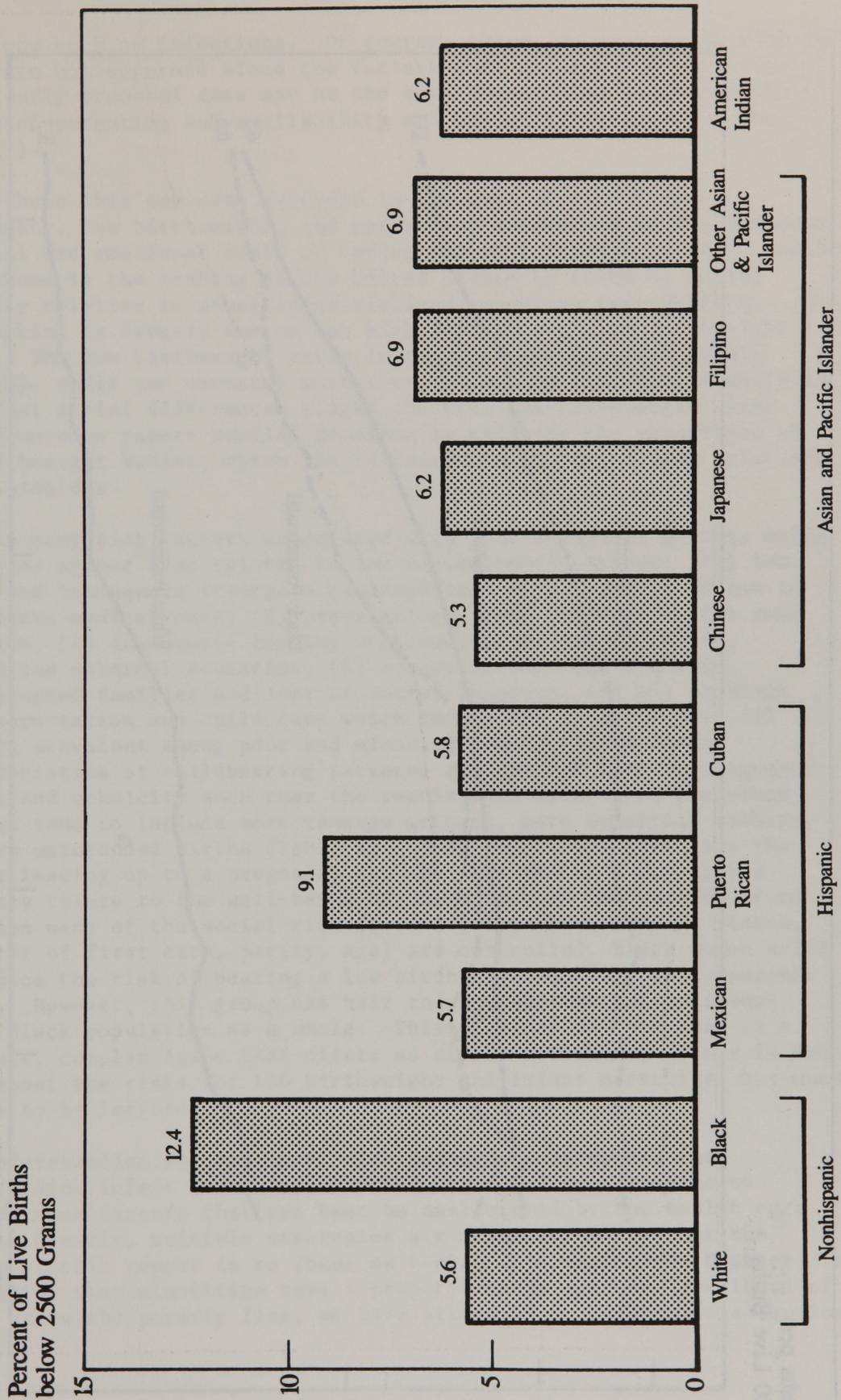
Graph A

Infant Mortality Rates, 1950-82



Source: National Center for Health Statistics.

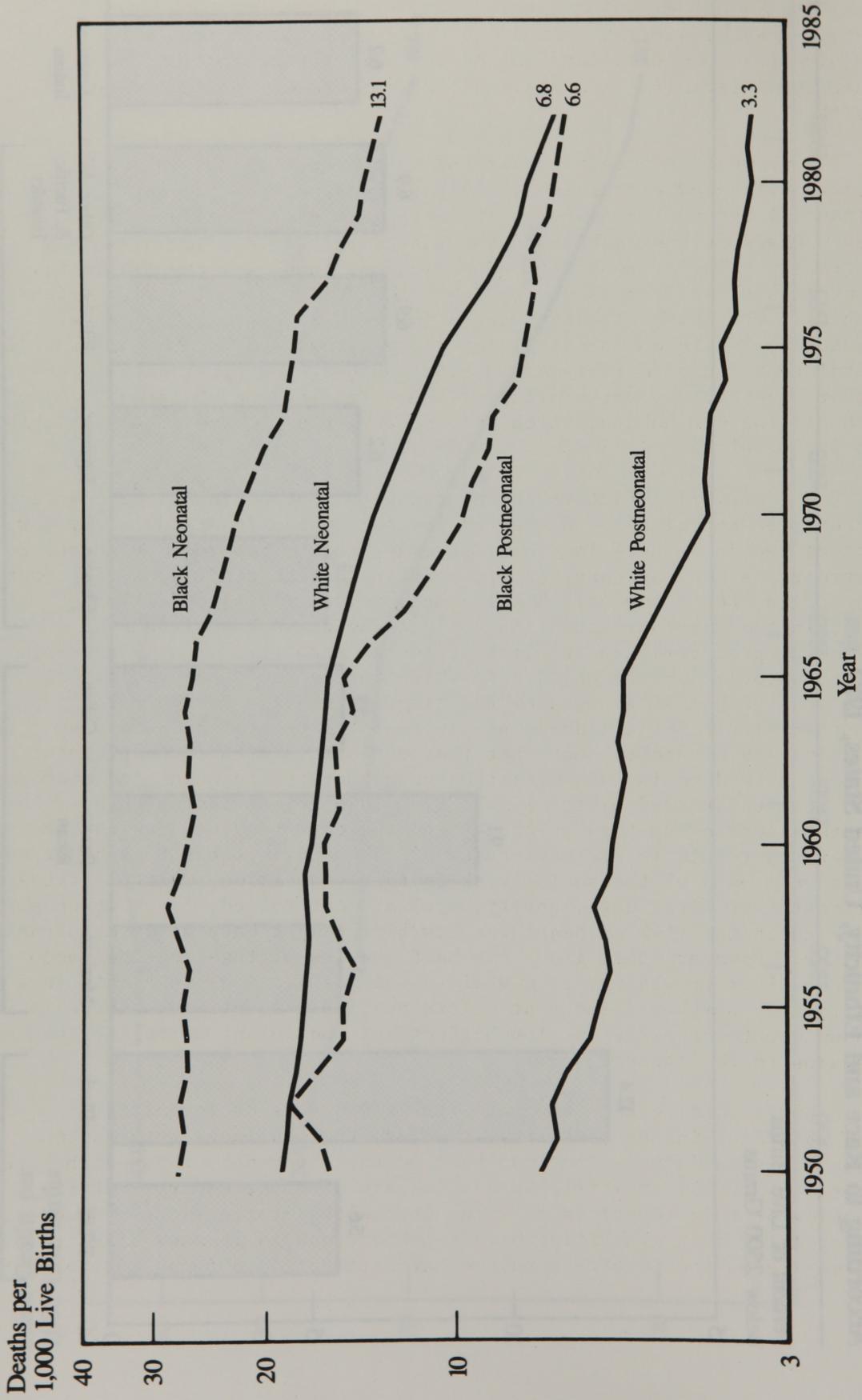
Graph B
**Low Birth Weight Ratios
 According to Race and Ethnicity, United States, 1982**



Source: National Center for Health Statistics.

Graph C

Neonatal and Postneonatal Mortality Rates, 1950-82



Source: National Center for Health Statistics.

conditions such as infections. Of course, these two sources of risk for babies are not separate since the factors that influence a woman to obtain early prenatal care may be the same things that influence the quality of parenting and availability and use of services after the birth (3).

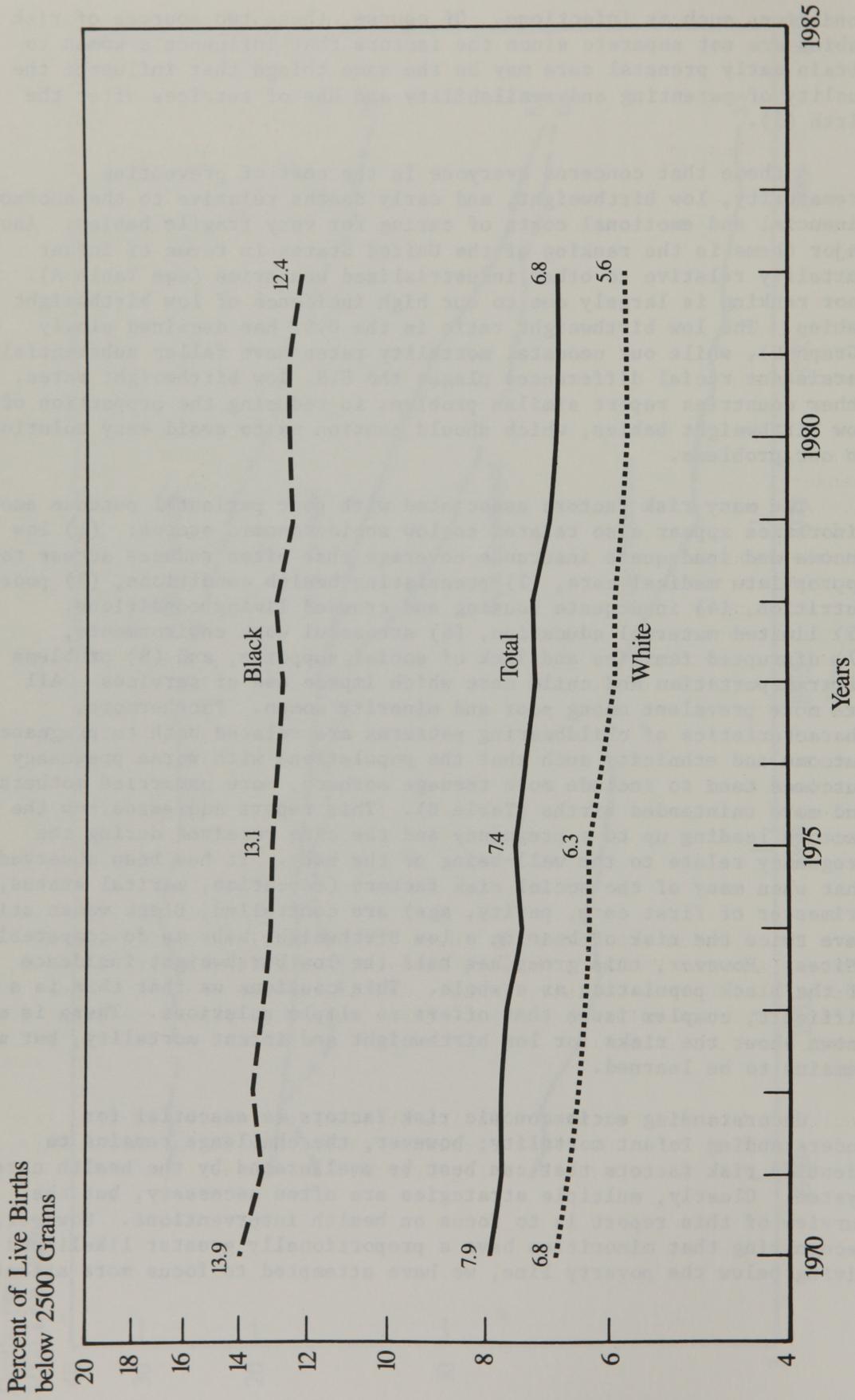
A theme that concerns everyone is the cost of preventing prematurity, low birthweight, and early deaths relative to the enormous financial and emotional costs of caring for very fragile babies. Another major theme is the ranking of the United States in terms of infant mortality relative to other industrialized countries (see Table A). Our poor ranking is largely due to our high incidence of low birthweight babies. The low birthweight ratio in the U.S. has declined slowly (Graph D), while our neonatal mortality rates have fallen substantially. Persistent racial differences plague the U.S. low birthweight rates. Other countries report similar problems in reducing the proportion of low birthweight babies, which should caution us to avoid easy solutions to our problems.

The many risk factors associated with poor perinatal outcome among minorities appear also related to low socioeconomic status: (1) low income and inadequate insurance coverage that often reduces access to appropriate medical care, (2) preexisting health conditions, (3) poor nutrition, (4) inadequate housing and crowded living conditions, (5) limited maternal education, (6) stressful work environments, (7) disrupted families and lack of social supports, and (8) problems of transportation and child care which impede use of services. All are more prevalent among poor and minority women. Furthermore, characteristics of childbearing patterns are related both to pregnancy outcome and ethnicity such that the populations with worse pregnancy outcomes tend to include more teenage mothers, more unmarried mothers, and more unintended births (Table B). This report addresses how the factors leading up to a pregnancy and the care received during the pregnancy relate to the well-being of the baby. It has been observed that when many of the social risk factors (education, marital status, trimester of first care, parity, age) are controlled, Black women still have twice the risk of bearing a low birthweight baby as do comparable Whites. However, this group has half the low birthweight incidence of the Black population as a whole. This cautions us that this is a difficult, complex issue that offers no simple solutions. There is much known about the risks for low birthweight and infant mortality, but much remains to be learned.

Understanding socioeconomic risk factors is essential for understanding infant mortality; however, the challenge remains to identify risk factors that can best be ameliorated by the health care system. Clearly, multiple strategies are often necessary, but the purview of this report is to focus on health interventions. However, in recognizing that minorities have a proportionally greater likelihood of living below the poverty line, we have attempted to focus more attention

Graph D

Low Birth Weight Ratios, 1970-82



Source: National Center for Health Statistics.

TABLE A

Infant Mortality Rates for the United States and Selected Countries - 1981¹

<u>Country</u>	<u>Infant Deaths per 1,000 Live Births</u>
Sweden	7.0
Japan	7.1
Finland	7.6
Norway	8.1
Netherlands	8.2
Denmark	8.4
Switzerland	8.5
France	9.6
Spain	10.3
Singapore	10.8
Canada	10.9
Australia	11.0
Belgium	11.7
New Zealand	11.7
United States	11.9
United Kingdom	12.1
German Democratic Republic	12.3
Austria	12.6
Federal Republic of Germany	12.6
Italy	14.3
Israel	15.1
Jamaica	16.2
Czechoslovakia	16.8
Greece	17.9
Cuba	18.5

¹Data for Jamaica are for 1978. Data for Switzerland and Canada are for 1979. Data for Finland, Norway, Denmark, Australia, United Kingdom, Federal Republic of Germany, Italy, Israel, and Greece are for 1980. Data for all other countries refer to 1981; of these, the U.S. figure is final and all others are provisional.

Source: National Center for Health Statistics: Health, United States, 1984.
DHHS Pub. No. (PHS) 85-1232. Public Health Service. Washington.
U.S. Government Printing Office, Dec. 1984.

TABLE B

Childbearing Patterns Among Racial/Ethnic Groups--1982
(By race/ethnicity of child)

<u>Age of Mother</u>	<u>White</u>	<u>Black</u>	<u>Hispanic</u>	<u><1 <2</u>	<u>Asian</u>	<u>American Indian and Alaskan Natives</u>
<15	4,153	5,395	1,288		88	126
15-19	357,948	140,534	60,369		6,278	8,749
20-24	958,509	207,640	115,275		23,872	15,364
25-29	961,053	143,748	90,393		36,303	10,236
30-34	503,847	69,781	47,999		26,394	4,886
35-39	136,664	21,341	18,056		8,146	1,627
40-44	19,027	3,966	3,809		1,351	287
45-49	853	236	201		131	14
Percent of Births <20	12.3	24.6	18.3		6.2	21.5
Percent of Births 35+	5.3	4.3	6.5		9.4	4.7
<u>Marital Status</u>						
Number of Out-of-Wedlock Births	355,180	335,927	86,488		8,642	14,998
Percent of Births Out-of-Wedlock	12.1	56.7	25.6		8.4	36.3
<u>Parity</u>						
Percent First Births	43.3	39.2	37.0		41.8	36.9
Percent 4+	8.6	14.2	16.4		10.7	17.0

<1 By Hispanic origin of mother

<2 Refers to births to residents of 23 States reporting Hispanic origins on the birth certificate. These states accounted for an estimated 95 percent of all births of Hispanic origin in the United States in 1982.

Source: National Center for Health Statistics

on health insurance and financing issues as they relate to improved pregnancy outcomes for minorities.

The sources of data for infant mortality are death certificates filed by states which are then reported to the National Center for Health Statistics. States vary in their reporting of other characteristics of mothers and infants which limits analysis of infant mortality by ethnicity. Other data sets, such as birth certificates and surveys, provide more data on ethnicity and include information on birthweight which is a major risk factor for infant mortality. Based on the review of literature and available data, four major issues need to be highlighted:

- The importance of family planning/pregnancy prevention among teenagers, a disproportionate number of whom are minorities.
- The importance of assuring early and continuous prenatal care and appropriate levels of maternity and newborn care to minority women.
- The importance of aggressive outreach, case management, and expanded patient education services for pregnant minority women.
- The importance of adequately financing the providers and hospitals that care for minority women, who are often uninsured or relying on Medicaid.

This report includes an overview (with references) of racial and ethnic variability in low birthweight and infant mortality. An analysis of programs designed to address these problems is included, with special reference to racial and ethnic populations. A distillation of the subcommittee's deliberations is included in the section on recommendations. Detailed reports appear in the appendix. Readers interested in going beyond this report may want to consult the section on related activities, as well as the bibliographies of the individual reports. A glossary offers definitions of frequently used terms and acronyms.

OVERVIEW

A wide variety of risk factors for low birthweight and infant mortality have been identified. Many of these appear related to the disparity between minority and White rates. For some of these risks, it is possible to intervene given present knowledge and existing programs, or modifications of existing programs. In other cases, the risk is not related to the disparity and/or we do not have adequate knowledge to intervene. In many of the latter cases, there is needed research which has been indicated in the report. It is difficult to discuss risks and interventions for all minority groups together, since they present different pictures in terms of low birthweight and infant mortality. Most research has dealt with Black-White differences and far less data

exist on American Indians, Hispanics, and Asians. This review will address each group separately. The recommendations apply to many minority groups, however, because a common denominator for risk is low socioeconomic status and inadequate access to health care.

BLACKS

The neonatal mortality rate (NMR) for Blacks (1982) is 13.1 (per 1,000 live births), almost twice the rate for Whites (6.8). The postneonatal mortality rate (PNMR) for Blacks is 6.6, twice the rate for Whites (3.3) (6). In 1983, 11,060 Black babies died before one year of age (1). Among Black women, the components of risk for infant mortality are three: increased risk of bearing a low birthweight baby; increased risk of neonatal death among normal weight babies; and increased risk of postneonatal death, regardless of birthweight, relative to Whites. These risks are related to the patterns of childbearing in that Black women are much more likely to bear a child as a teenager and to have an unplanned birth. A focal point for lowering infant mortality is to improve services designed to help women, especially teenagers, control their fertility. This is an area that has received considerable attention in recent years, and successful programs have been constructed in a number of sites. This report will not go into the family planning issues in depth, but references are provided. As Table B shows, Black women are at increased risk of teenage births, out-of-wedlock births, and high parity births, all of which are more likely to be unintended and associated with adverse perinatal outcome.

Pregnant Black women are less likely to receive prenatal care or more likely to receive it later in pregnancy than White women (5). The subcommittee holds the view that while research is clearly needed on the content of care and the interplay of individual behaviors and health service activities, the 1990 Health Promotion and Disease Prevention goals regarding pregnancy and infant health were sound in pointing to the importance of:

- Assurance that all populations are served by organized medical care systems that include providers who are trained to deliver prenatal and postnatal care on site.
- Adequate public financing for outreach, early and continuous prenatal care, deliveries, support services and intensive care when needed, and for continuing care of infants.

It is clear that barriers to care exist, and barriers to poor women are barriers to minority women. Financing issues weigh heavily among these barriers. Recommendations are made for ways to reduce these barriers.

While most agree that research is needed on the content of prenatal care, there is also agreement that poor/minority women are often at

high risk medically and require a larger package of prenatal care services. Moreover, care for high-risk women may require more attention to non-medical concerns such as transportation, child care, or health education. Recommendations are made about components of care that appear promising and service delivery approaches that could be tried, such as case management.

It appears that improvements in neonatal medicine may be partly responsible for the lack of a disparity between Black and White low birthweight babies in terms of neonatal mortality. It is also possible that there is a genetic role influencing birthweight that gives a different meaning to low birthweight for Blacks than for Whites. This issue deserves research attention. It is clear, unfortunately, that normal weight Black babies have far higher rates of neonatal mortality than White babies. This may reflect the prenatal care received, other health behaviors of the mothers, quality of care in hospitals providing routine obstetrical care, or other factors. To the extent that deaths occur after the baby has left the hospital, excess deaths may reflect living conditions or knowledge of health behavior on the part of the mother and family.

Postneonatal mortality rates are higher for Blacks for all major causes of death except congenital anomalies. Sudden Infant Death Syndrome, SIDS, is the leading cause of death, and research is continuing on the causes and treatment of babies at risk of SIDS. Accidents are another major cause of death and may also be related to living conditions and to knowledge of health behaviors or quality of child care (7). Among all groups, mother's education is strongly associated with infant mortality, presumably because it taps these dimensions, as well as access to well and sick baby health care services.

There are a number of specific risks regarding adverse pregnancy outcome, such as the role of stress or infection, that are suspected of influencing the gap between Black and White rates. Specific health conditions related to perinatal outcome among Blacks are discussed in the report. In many cases, research currently underway should add to the presumptive evidence for the effect of these factors or their relationship with race. For most factors, the relationship is not firmly identified. The subcommittee urges that further research address these factors, since definitive conclusions at this time are not warranted. The relationship of economic conditions to health, especially infant mortality, is another area that deserves further research.

HISPANICS

As the second largest minority group, Hispanics present a complex picture in terms of low birthweight and infant mortality. There is considerable variation within the Hispanic population, and while postneonatal mortality rates are elevated, the birthweight distributions are generally favorable. Subgroups must be discussed separately, however.

MEXICAN AMERICANS

As the largest component of the Hispanic population in the U.S., and given their geographic concentration, there are more data on Mexican Americans than on other groups. Infants born to Mexican American mothers have a relatively good birthweight distribution, which is somewhat surprising given their social and economic characteristics. Demographically, Mexican American women have fairly high rates of teen childbearing, and more high parity births. Their rates of out-of-wedlock childbearing are lower than those for Black women (but higher than those for Whites), and there is a greater tendency to be in a two-parent household than among Black mothers.

Only 58 percent of Mexican American mothers began prenatal care in the first trimester, less than for Blacks or Anglos (5). The neonatal mortality rate appears good in some analyses, but some studies suggest that rates are artificially low due to underreporting (8). However, recent studies suggest that, compared to Anglos, Mexican Americans have higher neonatal mortality at any particular birthweight (9).

This debate draws attention to the data and research needed to address the interrelationships among intrinsic birthweight distribution, health behaviors, and prenatal care, and the access to and use of health care services. For Mexican Americans, the question of how individual health endowments and behaviors affect perinatal outcome are complicated further by the role of migration. The selectivity of migration may mean that Mexican women who migrate to the U.S. represent a selected, or healthier, subgroup. Since many Mexican American women are of low SES, issues regarding access to subsidized care are extremely important to them and to the outcome of their pregnancies.

PUERTO RICANS

The birthweight distribution and hence infant mortality rates for Puerto Ricans is less favorable than for Mexican Americans. The low birthweight rate is 9.0 percent overall and 9.6 percent for U.S.-born Puerto Ricans. This is the highest for any Hispanic group. The proportion with low birthweight is between the rates for Whites and for Blacks. This is not too surprising since their childbearing rates are in many ways more like Black patterns than other Hispanics. For example, among Puerto Ricans, 48 percent of births were out-of-wedlock, but among Mexican Americans, it was only 14 percent. The economic circumstances of many Puerto Rican women are such that discussions about socioeconomic status, access to health care, health education, and behaviors discussed for Blacks apply to Puerto Ricans as well. Fuller understanding of the differences within the Hispanic population requires better data systems which collect information on ethnicity and also creative ways of dealing with small subpopulations.

CUBANS AND OTHER HISPANICS

Data on birthweight show favorable birthweight distribution for Cubans. The low birthweight rate for Cubans is 5.8 percent; it is somewhat higher among U.S.-born Cubans. This favorable distribution is not surprising given their apparently better socioeconomic status than that of Mexican American or Puerto Rican women. For example, Cuban women have a relatively low proportion of births occurring out of wedlock (14 percent) and high rates of use of prenatal care (80 percent beginning in the first trimester). It is not presently possible to construct mortality rates for Cuban births; moreover, much of the research does not provide sufficient information on ethnicity or a large enough number of cases to draw conclusions about Cuban or other Hispanic outcomes.

NATIVE AMERICANS

American Indian infant mortality national data indicate that birthweight distribution and neonatal mortality for American Indians are quite good and have shown improvement over time. These good outcomes are observed despite relatively poor patterns of prenatal care among American Indians with far more women receiving late prenatal care or no prenatal care at all. Birthweight has the predictable relationship with prenatal care--i.e., the earlier the care, the better the birthweight--but the level of care is depressed and birthweight is not. Clearly there is room for improvement in the receipt of prenatal care, but a number of questions are raised.

Unfortunately, postneonatal mortality is quite high. The reduction in postneonatal mortality should be a high priority. Special considerations for Native Americans are the high rates of death from accidents and the possible influence of diabetes or alcohol use on perinatal outcome or postneonatal deaths (10). As with all populations, health education, living conditions, and access to health care are especially important. Use of well baby care and the quality of sick baby care must be considered.

Data problems, evident for other subgroups, are even greater for Native Americans. The diversity within the Native American population and likely changes over time in the proportion of American Indians who so declare themselves in official documents create special problems. The Indian Health Service data systems are an excellent beginning for understanding infant mortality, but additional data would be highly desirable.

ASIANS/PACIFIC ISLANDERS

The Asian population within the U.S. is quite diverse and available data are often not adequate. In general, perinatal outcomes are good among Asian women with relatively low rates of low birthweight (6.5 percent). Chinese had the lowest rate (4.8 percent) and Filipino the

highest (7.4 percent). Asian mothers are less likely to be teenagers (6 percent versus 13 percent among Whites) or unmarried (7.8 percent versus 11.6 percent for Whites). Maternal education and socioeconomic status are relatively high and prenatal care patterns good with 75 percent beginning care in the first trimester. Southeast Asian refugees present a somewhat different picture, as well as a reminder to consider the variability within an ethnic group and the special needs that may occur even when the overall data appear quite favorable. Some groups, for example the Hmong, have cultural patterns of very early childbearing that may place them at greater perinatal risk.

While the attached reports detail the research on racial and ethnic variability in pregnancy outcome and infant mortality and the experience of intervention programs, the roles of socioeconomic status and access to care remain paramount. According to the 1990 Health Objectives for the Nation:

Of particular concern are the disparities in the health of mothers and infants that exist between different population subgroups in this country. These differences are associated with a variety of factors, including those related to the health of the mother before and during pregnancy as well as parental socioeconomic status and lifestyle characteristics. Although the precise relationship between specific health services and the health status of pregnant women and their infants is not certain, the provision of high quality prenatal, obstetrical, and neonatal care and preventive services during the first year of life, can reduce a newborn's risk of illness and death.

This report elaborates on some of the impediments to access to the types of health services described in the 1990 Objectives. It also offers research directions which would improve our understanding of the relationships among individual, societal, health service delivery, and financing factors which combine to influence the health of our nation's babies.

RECOMMENDATIONS

These recommendations are made in light of the need to reduce the disparity in low birthweight and infant mortality for racial and ethnic groups within our population. The effect of race and ethnicity on pregnancy outcome is mediated by factors such as a woman's education, control of fertility, access to and use of prenatal, perinatal, infant, and other health services, and health insurance coverage. This report addresses the channels through which race and ethnicity appear to operate. In most areas, there are not definitive studies which take into account the myriad factors which appear related to pregnancy outcome. In fact, such studies are likely impossible. Moreover, individual projects are unlikely to have all the factors included that

one would desire; as a result, improvements in outcomes are not as dramatic as one would hope. Regardless, the results presented here and the recommendations that are made are based on the subcommittee's assessment of the weight of evidence.

PREGNANCY PLANNING

Low birthweight and infant mortality rates would be favorably affected by reducing high risk pregnancies, many of which are unintended or unwanted by minority women, a large number of whom are teenagers. Unintended pregnancies per se appear more likely to result in less adequate prenatal care and perinatal outcome. Therefore, the subcommittee's recommendations are:

- Enlarge the content of health education for both provider and lay audiences, through a variety of channels, to emphasize personal reproductive responsibility. The Healthy Babies, Healthy Mothers coalition is an example of a public and private coalition to improve health knowledge and behavior regarding prenatal care and could be extended to address issues relating to reproductive responsibility.
- Continue efforts to develop and improve contraceptive technology to afford a wider choice of safe, efficacious contraceptive methods to women, especially taking into consideration the barriers to effective use of current methods.
- Communicate clearly the relative benefits and risks of fertility-regulating methods to potential and actual users, targeted particularly at minority women and adolescents.
- Actively promote and monitor access to services--both public and private--to help people regulate their fertility, especially high-risk women and men such as teens and minorities.
- Expand research on the factors associated with unplanned pregnancies, both in terms of non-use and inadequate use of fertility-regulating techniques, targeting high-risk women and men, especially minorities and teens.
- Undertake research to elaborate on the mechanisms by which planning status of pregnancies influences prenatal care and birth outcomes and infant well-being.

PREPREGNANCY CARE

Many risks associated with adverse outcome, e.g., low birthweight and infant mortality, can be identified before pregnancy. The concept of a prepregnancy risk assessment and subsequent health education deserves careful attention by researchers, providers, and policymakers.

- Within the context of general health care which is comprehensive and continual, opportunities exist to inform women and their partners of behaviors that can be initiated before pregnancy which influence the health of the baby. It is recommended that providers of health care incorporate this concept into their ongoing provision of health services.

PRENATAL CARE

Early, appropriate and comprehensive prenatal care should be obtained by all pregnant women. Some of these women can be served in public (federal, state, or local) programs, and others may receive their health care from private sources. All of these providers should take steps to see that high-risk women are served. The absence of prenatal care, or its initiation late in pregnancy, is clearly associated with adverse pregnancy outcome. While there are numerous research questions about the actual number of visits required and content of each visit (noted below), a pregnant woman should initiate prenatal care in the first trimester with a plan for continuous supervision throughout her pregnancy.

Unfortunately, barriers to obtaining early and continuous prenatal care appropriate to their risk status are more likely to be encountered by Black and other minority or high-risk women. Access to care appears to be significantly influenced by financial issues. Minority women are disproportionately low income and uninsured or dependent upon some form of subsidized care, particularly Medicaid and Title V-funded services. Consequently, the subcommittee observation that financial barriers are a major risk for poor prenatal care is coupled with possible approaches to reducing those barriers. The 1990 Objectives for the Nation in Pregnancy and Infant Health call for "adequate public financing for outreach, early and continuous prenatal care, deliveries, support services, intensive care when needed, and continuing care of infants." The following are possible mechanisms for achieving this goal:

- Assess the feasibility of increasing federal or state subsidized prenatal care coverage to decrease the size of the uninsured pool of pregnant women and children. This could be achieved by raising state-set AFDC payment levels, by adding optional categorically needy groups (e.g., pregnant women in two-parent families), by adding or extending medically needy programs, and by adding state only programs.
- Assess the feasibility of developing mechanisms to allow for interstate Medicaid eligibility to assure coverage of migrant women and their children, most of whom are minorities as well as low income.
- Encourage the use of the EPSDT for pregnant adolescents to provide comprehensive prenatal and maternity care.

- States, as the administrators of Medicaid, should review ways to shorten the length of time required to process Medicaid eligibility. Because pregnancy only lasts nine months and many high-risk women initiate care in the second or third trimester, mechanisms are needed to fast-track applications for Medicaid eligibility for pregnant women. In addition, lower cost efficiency improvements should be experimented with to improve physician participation, such as improving claims processing and changing reimbursement methods and amounts.
- Provide technical assistance to State Title V agencies and other maternal and child health providers interested in trying innovative financing and delivery approaches, e.g., applying for waivers, expanding their use of EPSDT, adding medically needy programs, adding optional and state-only categories of pregnant women and children, expanding optional benefits, and coordinating Title V with Title XIX reimbursement. Case management and standard setting are important areas that Title V agencies can provide or coordinate technical assistance to State Title XIX agencies.
- Continue to monitor changes in expanded eligibility resulting from CHAP in terms of characteristics of new eligibles, participation rates, use patterns, costs of care, and outcomes. Assess state efforts to inform potential new eligibles of changes in Medicaid.

Along with reducing financial barriers to maternal and infant care, there are modifications in present services that should be considered. Therefore, within what we currently know about maternal and infant care, it is likely that modifications in prenatal care could be made at this time. While research is not definitive, it appears that minority women may be in need of services not always available in subsidized maternal and infant care. Since reimbursement policies and practices exert enormous influence over the content of medical care, the following recommendations are made:

- Prenatal care benefits, regardless of type of provider, should be expanded to include other services that appear beneficial, such as prenatal vitamins, expanded nutrition supplements, psychosocial and health education services, and childbirth education classes.
- Funding sources, both public and private, should consider ways to eliminate arbitrary limits to prenatal care for high-risk women.
- Continue to encourage states to apply for Medicaid waivers to test the cost-effectiveness of "locking in" high-risk women into a case-managed system of care, expanding the package of reimbursed services, and experimenting with different delivery alternatives such as aggressive/passive case management, psychological

counseling, home visitation, and their impact on reducing risk factors and improving pregnancy outcome.

- Assess evaluations and consider replication of innovative state models of comprehensive prenatal care such as the California, Washington, D.C., New York, and South Carolina experiences.
- Efforts should be maintained to continue to regionalize care and refer high-risk women for delivery in the appropriate level of care. Level I and II hospitals should have improved capability to manage obstetric emergencies and deal with the transport of pregnant women and sick infants.
- Coordinate with ACOG and other professional organizations to assess the problems of malpractice insurance and limited participation in Medicaid and identify possible mechanisms to moderate physician liabilities from birth-related suits and increase their participation.

CONTENT OF CARE

Virtually all groups of scientists reviewing our current state of knowledge regarding perinatal outcome agree that more must be known about the content of prenatal care: What components of care have what effects? How do these components interact? What constitutes a minimal program of care? How should the components vary by risk status of the woman? Some recommendations that can be made at this time are the following:

- Expand provider and patient education regarding risk assessment and recognition of preterm labor along with appropriate tocolytic treatment and modification of prenatal care. Current randomized trials should be monitored. Other programs using these approaches should be evaluated.
- Evaluate programs to help providers offer smoking cessation education and patient's understanding of the risks. While smoking may not help to explain the Black/White birthweight differential, it has an adverse impact on the outcome of pregnancy for many minority women.
- Clarify the interplay of multiple drug and cigarette use on pregnancy outcome. Studies give conflicting reports on the profile of substance abusers, and research should be undertaken to assess the quantity and timing of drug and cigarette use in relationship to pregnancy.
- Multiple gestations, specifically dizygotic twinning, are twice as frequent among Blacks as among Whites in the U.S. and represent a source of risk for early delivery, low birthweight, and infant mortality. Routine screening with ultrasound imaging at

mid-pregnancy for Black women could result in modifications of the management of the pregnancy and delivery and reduce the losses incurred.

- Consider including more prenatal screening for conditions which affect the neonate and, in the case of hepatitis b, foster a carrier pool. Recent immigrants from Asia and other areas of the developing world are at increased risk for hepatitis b, and routine screening of Asian women for hepatitis HBsAg and prompt treatment of the neonate could greatly reduce this carrier pool. Black women are at risk for sickle cell disease which contributes to infant mortality. Maternal screening can facilitate prompt, targeted screening of Black neonates and lead to improved follow-up and counseling.
- Expand research to better understand the experiences, attitudes, and beliefs among women that make some disinclined to seek and continue care. Such findings have implications for better health education, provider education, and the delivery of health services.
- Expand research on the role of nutrition on pregnancy outcome. While results of evaluations of nutritional supplementation programs are difficult to interpret, it appears that pregnancy outcome is improved when adequate prenatal nutrition is assured.
- Increase attention of health service providers to the possibilities for intervention using counseling and other support services for non-medical risk factors (such as stress, type of employment, transportation/child care problems), since they may be more prevalent among minority/high-risk women.
- Develop a comprehensive education and information campaign on avoidable risks to maternal and fetal health during pregnancy to be aimed at minority pregnant women, health providers, and the general public.
- Develop a model state brochure for low-income pregnant women describing simply how and where to obtain Medicaid eligibility, the need for early care, and a list of providers accepting Medicaid. Assure that the message is delivered to high-risk groups in culturally appropriate forms.
- Set up a task force or commission a major report on the issue of uncompensated care for pregnant women and infants. Assess current state activities surrounding uncompensated care for this population.
- Continue to review and sponsor state and local mechanisms to investigate cases of infant deaths in areas with high or

changing infant mortality rates. This should result in a better understanding of the nature of difficulties in local maternal and infant health care systems, and the development of strategies that will provide opportunities for ameliorating such problems.

POSTNATAL FACTORS

The major causes of postneonatal mortality are Sudden Infant Death Syndrome, congenital anomalies, infections, and accidents. While there are increased risks of postneonatal mortality among low birthweight babies, the factors associated with postneonatal mortality are more predominately the health behavior in the family, socioeconomic conditions, and access to medical care. Several special issues can be highlighted, including issues of financing, medical insurance coverage, transportation, and education.

- Assess evaluation and consider replication of innovative models of active follow-up programs to support families of infants at high risk of postneonatal disease. Support groups in other disease areas have had documented successes. Their value in regard to assisting parents of high-risk infants should be evaluated.
- Many postneonatal deaths are due to injury. The recent improvements in seat belt protection for children should serve as a model for dealing with other causes of accidental death for infants. The 1990 Objectives for the Nation have been successful in influencing this area of risk to infants, and other areas (such as death by fire) could be considered at the mid-decade review.

RESEARCH RECOMMENDATIONS

The above recommendations regarding service improvements have been made on the basis of the weight of the evidence regarding differentials in low birthweight and infant mortality among minorities. In many areas, there are significant knowledge gaps; some are in the process of being filled, but others deserve attention.

- To better understand the interplay of social, biological, and environmental factors associated with low birthweight and the relationship of low birthweight to infant mortality among minority groups, research should address birthweight-specific mortality rates for minority groups; investigate the role of nutrition or generational effects as an influence on the relatively high low birthweight rates for apparently low-risk Black women; and attempt to explain the apparently favorable birthweight distributions found among Mexican American and Native American women.

- A wealth of data about Native Americans and their fertility and perinatal outcomes exists, albeit in imperfect forms. It is recommended that researchers able to conceptualize the meaning of ethnicity among American Indians, and familiar with the geographic distribution and cultural diversity of the American Indian populations, address the issues surrounding fertility patterns, use of prenatal care, and perinatal and infant outcomes. Expanded research on Native Americans is more likely to yield useful insights than is the simple oversampling of Native Americans in general surveys or statistical data bases.
- Asian Americans experience quite good perinatal outcomes. While some of this is undoubtedly the result of their socioeconomic and demographic characteristics, it is likely that their health behaviors along with biological factors contribute to the explanation. Research should be undertaken to better explicate these relationships. The results could possibly help reduce disparities within the Asian population and also serve to inform us about ways to avoid adverse outcomes for other groups. Research should also address problems that may be faced by subgroups within the Asian population, such as Indochinese refugees, where health needs and problems may be different from the Asian American population as a whole.
- Research has emphasized the perinatal period with far less attention to the factors associated with postneonatal mortality. It is recommended that there be increased research directed at the preventable causes of postneonatal mortality including the interrelationship of individual and familial behaviors; health care delivery factors; use of well and sick baby care; immunizations for babies; and sources of accidental death such as risks associated with substandard housing.
- Puerto Ricans experience higher incidence of low birthweight than other Hispanic groups. They also experience an unusual pattern of movement back and forth to Puerto Rico. Their geographic concentration in the New York City area should facilitate research on their socioeconomic status and use of health care services. The Puerto Rican Fertility Survey provides data that can be used to address many of these issues.
- Research is needed on the link between economic conditions and infant mortality to better specify the interplay between individual, financing and structural factors. For example, do different groups, low and middle income, respond differently to a recession in terms of reproduction and child health?
- The role of stress--physiological, psychological, and environmental--on pregnancy outcome is not well understood. It is quite likely that many minority women experience greater stress given

their greater risk of unplanned pregnancy, unmarried status, low economic status, and possibility of being employed in physically stressful jobs. It is recommended that research address not only the role of stress and women's resources to deal with stress, but specifically the possibility of racial/ethnic differences.

- Many research questions require pregnancy dating, but little is known about ways to improve the dating of pregnancy. Repeated sonograms are one approach, but there may be behavioral approaches as well. This would be a useful research tool for understanding group differences in perinatal outcome.
- Most of the large programs, like MIC, IPO, and WIC have only partially been evaluated. More complete evaluations of these programs should be undertaken. Evaluation techniques have not kept pace with the programs, leading to some specific recommendations regarding such evaluations:
 - The very nature of perinatal care incorporates several combined interventions occurring at the same time: patient education, medical examinations, lab tests, nutritional guidance, use of vitamins and iron, etc. Guidance on the evaluation of multiple interventions and use of multivariate analytical techniques is needed.
 - Control for behavioral (smoking, drinking, etc.) as well as socioeconomic or biological variables is needed in evaluations.
 - Assurance of adequate control or comparison groups is important. In existing studies, some controls are lower risk and others higher risk than intervention groups because of selectivity biases.
 - Evaluation should be built into new service programs from the beginning.
- Since the last large prospective study was 25 years ago, and reproductive and perinatal issues have changed, it is recommended that a small group of agencies primarily concerned with pregnancy and pregnancy outcome consider the feasibility of a national prospective observational study on the causes of low birthweight among minorities. A study that built upon a national sampling of pregnant women could be constructed to test emerging hypotheses about low birthweight, and other adverse pregnancy outcomes.
- Much of the data on infant mortality intervention is out of date, primarily conducted in the mid-1970's or before. With changes in the U.S. demographics, poverty populations, financing shifts, development of alternative treatment systems, regionalization of perinatal care, MCH program shifts and funding reductions, more

contemporary data collection and research are needed and plans should be sought to provide results rapidly.

RECOMMENDATIONS REGARDING DATA NEEDS

- States should be encouraged to modify their birth and death certificates to include better identification of ethnic groups, especially Hispanics (already available on the certificates of 22 states). Furthermore, the addition of certain new items of information could be extremely beneficial in monitoring and studying the factors affecting pregnancy outcome. In particular, the birth certificate should be expanded to include data on smoking, prepregnancy weight and height, type of delivery, induction of labor, and insurance coverage of both the mother and the newborn. In addition, the inclusion of the mother's social security number would greatly facilitate research which would link successive births to the same woman to look at repeat patterns of adverse pregnancy outcome. Many of these recommendations have already been implemented in certain states and have proven to be feasible and quite valuable.
- The National Infant Mortality Surveillance project done by the CDC in collaboration with NICHD, HRSA, NCHS, and the state vital registrars is developing a national data base of linked birth and death records for 1980 which will provide valuable data for analyzing infant mortality. The extension of this project is a micro-level linked birth and death record for all births and infant deaths and is planned by NCHS to begin with births in 1982. It is strongly recommended that this project begin with the 1982 birth cohort and be continued.
- Most of the published data on interventions is disaggregated by White and non-White. Hispanic, American Indian, Asian, and other minorities are not presented separately. More detail on race and ethnicity (especially within the Hispanic, American Indian, and Asian populations) should be collected, especially when data can be aggregated to permit analysis of relatively small groups.
- Data on insurance coverage of pregnant women should be improved: specifically, the average number of pregnant women eligible for and receiving Medicaid in a year, data on when insurance coverage begins in pregnancy, extent of coverage for components of care, and more detailed age breakdowns (e.g., under 18, 18-19, 20-24).
- The national fertility surveys, of which the National Surveys of Family Growth are the latest, provide rich data about factors influencing fertility behavior and perinatal outcome. These surveys have traditionally oversampled for Blacks, a practice which should continue. Efforts should be made for oversampling Hispanics, and in the absence of oversampling, techniques of

data pooling across surveys should be studied to increase our understanding of Hispanic outcomes. Special purpose studies such as the Mexico-U.S. border survey are valuable in their focus on special groups of high interest.

- The National Natality and Fetal Mortality Followback Surveys provide useful data about births and fetal deaths in a given year. They have the advantage of including detailed information from several sources. However, there are several improvements which would make these surveys even more valuable. First, every attempt should be made to include unmarried mothers in the maternal questionnaire followback, in those states where it is legal to do so. Second, the addition of an infant mortality followback component is crucial in order to obtain a complete picture of the factors influencing poor pregnancy outcome. Third, information on maternal complications and neonatal morbidity should include defined and expanded categories. Finally, the oversampling of Black and minority mothers should be considered.
- The National Longitudinal Survey-Youth Cohort of the Department of Labor, includes pregnancy histories, social and demographic background, infant care and feeding, and other data valuable for understanding reproduction and perinatal outcome. Since there is an oversample for Blacks and Hispanics, it provides a useful data set for comparative analyses. Data on insurance coverage related to maternal and child health could be improved. The collection of these data should be continued and their expanded use for research on perinatal outcome explored.

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GLOSSARY

AFDC: Aid to Families with Dependent Children refers to low-income adults and children who receive public assistance based on state financial eligibility requirements. These individuals are covered as a "categorically needy" group under Medicaid.

CHAP: The Child Health Assurance Program was implemented as part of the Deficit Reduction Act of 1984. States are now required to provide Medicaid coverage at regular federal matching rates to the following previously optional groups meeting AFDC income and resource requirements: (1) first-time pregnant women, from medical verification of the pregnancy; (2) pregnant women in two-parent families when the principal breadwinner is unemployed, from medical verification of pregnancy; and (3) children up to age five, born on or after October 1, 1983, in two-parent families.

EPSDT: The Early and Periodic Screening, Diagnosis, and Treatment Program was established as a mandatory Medicaid service by the 1967 Title XIX Amendments. States offer eligible children under 21 a program "to ascertain their physical or mental defects and such health care, treatment, and other measures to correct or ameliorate defects and chronic conditions discovered thereby." State programs not only contribute to the payment of needed services but also offer an outreach component, case management, screening, and continuing care.

HCFA: The Health Care Financing Administration was established to combine health financing and quality assurance programs within a single agency. HCFA is responsible for the Medicare program, federal participation in Medicaid, and a variety of other health care quality assurance programs.

HRSA: The Health Resources and Services Administration within the U.S. Public Health Service encompasses the following organizations: Indian Health Service (IHS); Bureau of Health Maintenance Organizations and Resources Development (BHMORD); Bureau of Health Professions (BHP); Bureau of Health Care Delivery and Assistance (BHCDA).

HRSA provides leadership and supports efforts to integrate health services delivery programs with public and private financing programs including health maintenance organizations. The Administration supports states and communities in their efforts to plan, organize, and deliver health care, especially to underserved areas and to mothers, children, the handicapped, migrant workers, and other groups having special health needs. Among its activities are those which address utilization of health resources; technical assistance for modernizing and replacing health facilities; improving education, training, distribution, supply, use, and quality of Nation's health personnel; and fostering increased development, application, and utilization of health promotion and preventive health measures.

IHS: The Indian Health Service, a component of the Health Resources and Services Administration, administers the principal federal health programs for American Indians and Alaskan Natives. The Service provides health services to approximately 987,000 American Indians and Alaskan Natives living on or near federal Indian reservations or in traditional Indian country such as Oklahoma and Alaska. The Service supports a full spectrum of health-related care including preventive services, outreach and transportation, inpatient care, manpower development and facilities support, renovation, and construction.

IPO: The Improved Pregnancy Outcome Project was initiated by the Office of Maternal and Child Health in 1976 as an effort to reduce infant mortality by building statewide systems of care for mothers and infants.

LBW: Low birthweight is below 2,500 grams or about 5-1/2 pounds.

MCH: Maternal and Child Health. This is used to describe maternal and child health programs at the federal, state, and local levels. When applied to Title V of the Social Security Act, it usually encompasses all activities funded under the Title including discretionary project grants for research, hemophilia, genetics, training, and service delivery improvement as well as the Block Grants to States which support programs for mothers, children, and handicapped children. The major focus of the Title V programs is preventive outpatient care except in the case of handicapped children where inpatient care is an integral part of the care regimen. When the term MCH is applied to state or local program activities, it may not encompass programs for the handicapped, as in some states these activities are administered separately.

MIC: Acronym for Maternity and Infant Care projects which were one of the five categories of projects funded under the "Program of Projects" authority of Title V of the Social Security Act. These projects were discretionary and focused on urban areas. They were designed to provide comprehensive prenatal, delivery, and postnatal care to low-income, high-risk mothers and infants (to one year of age). The last year of funding for these projects under the discretionary grant program was 1974. In 1975, all Programs of Projects were transferred into the Maternal and Child Health Formula Grants to States activity with state health departments assuming responsibility for their support and continuation. The states were required to assure that at least one of each of the kinds of five projects previously funded under the Program of Projects was "held harmless" in their jurisdiction. In 1981, P.L. 97-35 significantly amended Title V of the Social Security Act and contained a provision urging but not requiring states to continue support of the Programs of Projects. The other four types of projects are: Comprehensive Health Care for Children and Youth (C&Y), Dental Health Care for Children, Family Planning (FP), and Neonatal Intensive Care Projects.

The MIC terminology is still in common usage in state health departments and among providers and is generally used to describe services for high-risk mothers and infants.

Mortality Rates:

IMR: Infant mortality rate is the number of babies in a given calendar year who die before their first birthday, divided by the number of babies born in that calendar year.

NMR: Neonatal mortality rate is the number of babies dying before 28 days of life in a calendar year, divided by the number of babies born in that calendar year.

PNMR: Postneonatal mortality rate is the number of babies dying between 28 days and one year of life in a given calendar year, divided by the number of babies born in that calendar year.

BWSMR: Birthweight-specific mortality rate is the number of babies of a given birthweight dying in a calendar year, divided by the number of babies born at that birthweight.

NHIS: The National Health Interview Survey is a cross-sectional household survey of the civilian non-institutionalized population of the U.S. Data are collected on the incidence of acute illness and accidental injuries, the extent of disability, prevalence of chronic conditions and impairments, and use of health care services, in addition to information on basic demographic and socioeconomic characteristics of household members.

NICU: Newborn intensive care units are defined by the American Academy of Pediatrics as organized hospital units that deliver constant and continuous care to the critically ill newborn. These units are equipped with extensive medical technology and staffed by highly specialized physicians and nurses with close proximity or linkage to obstetric services. The facilities delivering neonatal care are classified into three levels of care, depending on the sophistication and scope of the services the facilities are equipped and staffed to provide.

NMCUES: The National Medical Care Utilization and Expenditure Survey is a 1980 survey of the U.S. civilian non-institutionalized population containing data on health status, access to and use of medical services, associated charges and sources of payment, and health insurance coverage.

Preterm Delivery: Delivery before 38 weeks of gestation.

SGA: Small for gestational age refers to babies whose weight is low relative to the length of the pregnancy.

SPRANS: Special Projects of Regional and National Significance refers to that component of the federal Maternal and Child Health program which funds discretionary grants in five areas: research, training, genetics, hemophilia, and other special projects.

Title V: The title of the Social Security Act is amended by P.L. 97-35, the Omnibus Budget Reconciliation Act of 1981, which authorizes support to assist states in their efforts to maintain and strengthen their leadership in planning, promoting, and coordinating health care for mothers, children, and handicapped children who otherwise would not have access to adequate health care. In each year, 85 to 90 percent (\$406.3 million in 1985) of the funds appropriated annually are distributed to states in the form of block grants. Such funds are intended to assist states in reducing infant mortality and the incidence of preventable diseases and handicapping conditions among children, in providing rehabilitative services for blind and disabled children under age 16 and in the treatment and care of crippled children. Ten to 15 percent of the funds are utilized to support Special Projects of Regional and National Significance (SPRANS) which address five major areas: (1) research, (2) training, (3) hemophilia diagnosis and treatment, (4) genetic diseases screening, counseling, and referral, and (5) other special projects designed to improve the delivery of services to mothers, children, and the handicapped.

Title XIX: Medicaid is the federally supported and state administered assistance program that provides medical care for certain low-income individuals and families.

VLBW: Very low birthweight is below 1,500 grams, or about three pounds.

WIC: The Special Supplemental Food Program for Women, Infants, and Children was enacted in 1972 to provide nutritious food and nutrition education to low-income pregnant, postpartum, and lactating women, infants, and children to the age of five who are determined to be at special nutritional risk.

RELATED ACTIVITIES

Concern with low birthweight and infant mortality is widespread and some activities are of special interest to the subcommittee. It is not within the scope of the subcommittee report to inventory all activities, many of which are taking place at the local or regional level. It is not the intention to list research projects or service delivery programs nor to duplicate the efforts of the inventories. However, some of them are of sufficient magnitude that readers of this report should be aware of them.

The PHS Inventory on Low Birth Weight

In September 1984, an Inventory of Department of Health and Human Services Activities Concerned with Infant Mortality and Low Birth Weight was prepared under contract and has been to the Office of the Assistant Secretary for Health. As might be expected, programs were distributed throughout the Department of Health and Human Services and cover research, services, demonstration, and evaluation projects. A total of 119 programs were listed.

The IOM Study of Low Birthweight

In February 1985, the Institute of Medicine will release a report that discussed promising opportunities for preventing low birthweight. Two years in development, the report discusses current theories of both prematurity and intrauterine fetal growth retardation, the twin contributors to low birthweight. The risk factors associated with low birthweight are outlined as are recent national and selected state trends in incidence. Against such background, some pathways toward prevention are described spanning health education topics, family planning, pregnancy risk identification and reduction, the effectiveness and content of prenatal care, public information issues, and, in each of these areas, various research topics. The cost-effectiveness of prenatal care for a specific group of high-risk women is also analyzed. The report is available in a full-length version and in summary form. Orders may be sent to the National Academy Press, 2101 Constitution Avenue, N.W., Washington D.C. 20418. Title: Preventing Low Birthweight.

International Collaborative Effort

The International Collaborative Effort on Perinatal and Infant Mortality (ICE) is a project sponsored by the National Center for Health Statistics to study factors responsible for the relatively high perinatal and infant mortality rates in the United States compared to other industrialized nations. The results of these activities are expected to provide guidance for Public Health Service programs designed to improve infant health and reduce the gaps that currently exist between racial, ethnic, and socioeconomic groups in the United States and between the U.S. and other countries. The ICE planning group includes members from the National Center for Health Statistics, the Centers for Disease

Control, the Health Resources and Services Administration, the National Institutes of Health, and the Association for Vital Records and Health Statistics. Researchers from the Federal Republic of Germany, Great Britain, Israel, Japan, Norway, and Sweden are also represented.

Low Birth Weight Prevention Work Group

A PHS Low Birth Weight Prevention Work Group was organized in March of 1984. The work group, comprised of representatives of key PHS organizational components which have maternal and child health responsibilities, reports to the Assistant Secretary for Health. The mission of the group is to formulate and articulate a cohesive PHS strategy with policy and program options for reducing the number of low weight births and the rate of infant mortality in the U.S. The work group has served as an immediate source of expert scientific and policy advice for the Assistant Secretary for Health in matters relating to infant mortality and low birthweight rates. It has facilitated communication among agencies resulting in strengthening and coordinating programmatic efforts.

Infant Mortality Review Teams (IMR teams)

In response to the continuing interest in issues surrounding infant mortality, the PHS is sponsoring several approaches, including Infant Mortality Review Teams (IMR teams). Under the leadership of the Low Birth Weight Prevention Work Group, a cadre of health professionals will be assembled as an IMR team to provide, upon request, expert assistance to states to conduct geographically focused infant mortality reviews and investigations of conditions associated with high or changing infant mortality. The consultant team, composed of members from the public and private sectors, will utilize definitive protocols and technical assistance in a consultative and advisory role to the state health authority. This case-by-case analysis approach is designed to assist state health departments to gain a better understanding of the nature of local difficulties in reducing infant mortality; to gather precise information concerning local maternal and infant health care systems; and to develop strategies that will provide opportunities for ameliorating local problems. The role of states is vital in addressing the problems of infant mortality. Complementing the many state activities to improve infant health already underway, IMR teams have the potential to provide specific information to allow the health community to take prudent action.

Conference on Intergovernmental Options for Reducing Infant Mortality (September 13-15, 1984)

The Intergovernmental Health Policy Project under the auspices of the Assistant Secretary for Planning and Evaluation brought together key state, local, and federal officials to discuss infant mortality, and related issues. A report is planned. The PHS Inventory of Low Birth Weight initiatives (noted above) was distributed at that meeting. Contact person: Doug Reese, Intergovernmental Health Policy Project, (202) 872-1445.

Infant Mortality and Low Birth Weight Among Minority Groups in the United States:

A Review of the Literature

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INFANT MORTALITY AND LOW BIRTH WEIGHT AMONG MINORITY GROUPS
IN THE UNITED STATES: A REVIEW OF THE LITERATURE

Infant mortality in the United States has declined dramatically since the beginning of the century. The infant mortality rate has fallen from over 100 infant deaths per 1,000 live births in the early 1900s (77) to a provisional rate of 10.9 deaths in 1983¹ (73). Despite these improvements, infants still die at higher rates than any other age category under 60 years. Black infants die at almost twice the rates of white infants (77). The disparity between black and white infant mortality had narrowed somewhat by the mid-1970s, but continuing improvement is not evident (157). The persistent disparities in infant mortality among different racial and ethnic groups in the United States and the determinants of these disparities is the focus of this paper.

The decline in infant mortality since 1900 has been erratic. The infant mortality rate (IMR) fell to 29.2 by 1950 (156), then leveled off during the 1950s and early 1960s before dropping again after 1965 (15). Each decline in the infant mortality rate corresponds to a major change in the different components of infant mortality: neonatal mortality (deaths between 0 and 28 days) and postneonatal mortality (deaths from 28 days to one year). Neonatal mortality primarily reflects preexisting biologic conditions of the mother, physiological changes during pregnancy, and the medical care she receives during pregnancy, all of which affect the well-being of the fetus and the neonate (155). Neonatal deaths, the major component of infant mortality today, have declined very rapidly since the mid-1960s. This decline accounts for three-quarters of the recent improvement in infant mortality. Postneonatal mortality implies an adverse milieu for the infant and reflects infectious diseases or accidents (155). In the early 1900s, postneonatal deaths accounted for one-half to two-thirds of infant deaths (12). Improvements in sanitation, infectious disease control, literacy and education, as well as rising living standards helped reduce the proportion of postneonatal deaths to one-third of all infant mortality by 1953² (12,40).

Most U.S. neonatal mortality is the result of prematurity. Prematurity is usually defined as low birth weight, a weight at birth of less than 2,500 grams (5 pounds, 8 ounces).³ Low birth-weight infants represent 6.8-7.0 percent of all live births per year in the United States (22,99). They are almost 40 times more likely to die in the neonatal period than normal weight infants and account for two-thirds of neonatal deaths (99,138). Black infants are more than twice as likely to be of low birth weight than white infants (1980: 12.5 versus 5.7 percent)⁴ (147). From 1977 through 1979, blacks accounted for 16.5 percent of all live births, 30 percent of all low birth-weight infants, and 28 percent of all infant deaths (99). Low birth weight is a major contributor to infant mortality⁵ either as a direct risk factor, or as an intervening variable acted upon by medical, biologic, demographic, and socioeconomic risk factors.⁶

Low birth weight is blamed for the relatively poor international ranking of the United States in infant mortality. In 1950, the U.S. had the sixth lowest infant mortality rate in the world (166). The U.S. currently ranks 17th in the world in infant mortality, behind most of Scandinavia and Western Europe, Japan, Canada, Hong Kong, Australia, and Singapore (156,157). A 1973 comparison of selected countries showed the U.S. ranking second behind Hungary in the number of low birth-weight and very low birth-weight (less than 1,500 grams) newborns.⁷ When only black births were considered, the U.S. low birth-weight rates were approximately 15 percent higher than Hungary's rates. White U.S. births showed somewhat better results with the U.S. ranking fifth in low birth weight and second in very low birth weight (74). Thus, the poor U.S. infant mortality rate is the product of the poor birth-weight distribution relative to other developed countries, and this weight distribution varies among racial and ethnic groups within the United States.

The influence of the poor overall birth-weight distribution on infant mortality is further illustrated in comparative studies between the U.S. and Scandinavian countries. Erickson and Bjerkedal applied Norwegian birth weight-specific fetal and neonatal mortality rates (mortality rates for a specific birth-weight category) to the U.S. birth population from 1967 to 1978. These "expected" U.S. fetal and neonatal mortality rates were higher than those actually observed (38). Guyer et al. standardized Massachusetts 1969-1978 neonatal mortality rates to the Swedish birth-weight distribution during that same period and found reduced adjusted mortality rates in Massachusetts compared favorably to Sweden despite a crude neonatal mortality rate in the state that was 58 percent higher than Sweden's. In other words, the U.S. actually has lower birth weight-specific neonatal mortality rates than either country, but a worse birth-weight distribution that accounts for the less than impressive U.S. infant mortality rate.

Several authors use findings such as those of Erickson and Bjerkedal and Guyer et al. to support claims that the decline in infant mortality in the U.S. since the mid-1960s derives more from reductions in birth weight-specific mortality, especially for the low birth-weight infant, than from changes in the low birth-weight rate (113). These researchers further reason that improvements in birth weight-specific mortality are the result of advances in obstetric care (for example, Caesarian sections, particularly for breech babies, and electronic fetal monitoring) and neonatal medicine (for example, neonatal intensive care units) rather than any changes in medical, socioeconomic or demographic factors likely to influence birth weight (113,163). Not all investigators agree. The improved infant mortality rates have also paralleled the extensive social legislation and cultural changes that began in the 1960s (157).

There also have been some changes in the birth-weight distribution during this time period. The U.S. low birth-weight rate has declined 14 percent between 1965 and 1977 (74). David and Siegal found that 34 percent of the decline in the neonatal mortality rate in North Carolina

from 1968 to 1977 was due to heavier, less premature newborns. These findings paralleled those of the earlier reports in a six state study and from a California study (33).

The shift towards bigger babies and longer gestations in the North Carolina study occurred predominantly among the white population. An almost identical disparity was noted in the California study and in an analysis of the U.S. data from 1966-1976 (33). The reasons for this disparity in weight shifts between white and black births were not entirely clear, but according to the authors, probably represent a difference in some maternal health-related trend between the races (like access to care) with a minor contribution from a recording artifact (33).

Different populations may exhibit normal variations in birth-weight distribution; that is, 2,500 grams may be an inappropriate cut-off point for low birth weight in a given population. Rooth contends that mean birth weight differs from country to country because of different population traits like maternal health, nutrition, and smoking patterns. Birth-weight data from a number of countries over several years all displayed a Gaussian (normal) birth-weight distribution for 95 percent of all live births. The birth-weight distribution of late fetal and early neonatal deaths differed from those of the live birth group. The mean birth weight of a country's live births can be determined from the 50th percentile point on the distribution curve. Two standard deviations below that point defined the subgroup of different, low birth-weight infants. This subgroup was not part of the Gaussian distribution and accounted for most of the perinatal (fetal and neonatal) mortality in each country. This point, two standard deviations below the mean, described the low birth-weight cut-off for a particular curve. In this analysis, Sweden maintained a low birth-weight definition of less than 2500 grams. The cut-off point was lowered for several countries, including the United States and Hungary (129). In other words, in some populations, infants born at weights somewhat below 2,500 grams are at the lower end of the normal distribution of live births and share the generally good prognosis of that normal group. Indeed, this is borne out clinically. The analysis, therefore, suggests that, for example, some of the maldistribution of racial or ethnic birth weight may be a normal variation, as described below.

Wilcox and Russell expanded Rooth's design. They described the complete birth weight distribution of three British data sets from 1935-1946, 1960-1969, and 1970 (almost 70,000 singleton births) by three parameters: the mean and the standard deviation of the predominant distribution and the proportion of births in the residual distribution. The predominant distribution was comprised of largely term births and suggested orderly biologic processes that resulted in normal outcomes. The residual component described small preterm births and suggested less organized, perhaps pathologic, influences that spawned abnormal outcomes⁹ (160).

Cunningham et al. constructed intrauterine growth curves and derived neonatal risk estimates by birth weight and gestational age for ethnic and racial groups, sex, and other parameters using 1966-1970 vital record data for California newborns. Considerable variation in neonatal mortality rates existed among ethnic and racial lines. Mean birth weights and gestational ages also differed. For example, Chinese female singleton live births displayed the lowest neonatal mortality rate (6.61), while black males from multiple gestations had the highest (100.65). This is a fifteen-fold difference. As will be seen later, racial differences were not the sole cause of the great disparity, as multiple gestation--and sex--impact on neonatal mortality as well.

Alexander et al. utilized 1975-1980 South Carolina vital record live birth-infant death cohort data to examine birth weight-gestational age-specific neonatal mortality rates. Black and other races (predominantly black) were born one week earlier and at a birth weight 270 grams lighter than white infants. Blacks grew more rapidly in weight earlier during the gestation than whites. By 35 weeks gestation, the differential growth pattern disappeared. Subsequently, white median fetal growth and birth weight were greater than black (and other races) fetal growth and birth weight. Birth weight-specific mortality of blacks and other races was less than white neonatal mortality, below 3,000 grams. Thus, although infants of black and other races were younger and lighter at birth, on the average, they displayed better survival at these supposedly "adverse" weight and age parameters, in accordance with the work of Rooth, and Wilcox and Russell. The authors interpreted the results as signifying that birth weight and gestational age may not precisely represent the true maturity and viability of a particular infant. For example, black infants display an absolute mortality risk based on their birth weight and gestational age, but also a relative risk when compared to the total birth weight-gestational age distribution. The authors concluded that slight, persistent, and consistent variations among population subgroups were thus rooted in biologic factors (1).

The speculation of biologic or genetic roles in birth weight should not be overemphasized. Racial and ethnic minorities have historically held unfavorable positions in American society, especially in terms of income, education, occupation, and access to medical care (41,166). Moreover, the apparent growth retardation found by Alexander et al. may represent something other than, or in addition to, a genetic variation. For example, poor nutrition or poor maternal health can adversely affect the period of rapid fetal growth (third trimester) and both can be exacerbated by poverty. As will be discussed below, pregnancy outcome is the result of complex interactions among a variety of determinants of which genetic endowment is but one.

Low birth weight is simultaneously a measure of pregnancy outcome and a determinant of other pregnancy outcomes like neonatal (or postneonatal) survival or death. The role of birth weight as a risk factor for infant mortality has already been discussed. Low birth weight is one of many

primary risk factors (determinants) that directly impact on the fetus and on the pregnancy. Secondary risk factors affect the fetus through maternal demographic characteristics and socioeconomic status, past obstetrical history and performance, and her overall health. Tertiary risk factors involve community characteristics like the type of services offered and access to those services. Risk factors at each level interact with other risk factors at the same level and with risk factors from other levels. Categorization of the risk factors or determinants is not merely a heuristic tool, but also highlights levels where interventions can effect extensive changes via risk factor interactions.

Direct precursors include medical illnesses that occur during pregnancy, pregnancy-induced conditions like pre-eclampsia, and chronic medical diseases exacerbated by the pregnancy. Multiple gestations and fetal anomalies impact on pregnancy outcome, and psychological stresses may also play a role. Nutrition and weight gain are other examples of primary determinants.

Illnesses during pregnancy implicated in poor pregnancy outcomes like low birth weight include urinary tract infections, pulmonary disease, and appendicitis (66). Amniotic fluid infections are direct precursors for poor pregnancy outcome and occur more frequently in blacks than whites (104). Genital mycoplasma and ureaplasma infections seem to be associated with premature delivery, perinatal (fetal and neonatal) morbidity and mortality compared to non-infected or non-colonized infants (69,81). The incidence of infections is generally higher among those of lower socioeconomic status (SES), which means that minorities can be at increased risk for poor pregnancy outcome from these risk factors. Pregnancy-induced complications like pre-eclampsia, anemia, placental abnormalities, and polyhydramnios have been implicated in preterm births and low birth weight (9,63,66). Blacks and Puerto Ricans display higher incidences of premature rupture of membranes and placental growth retardation than whites (104). Gestational diabetes and less severe chronic diabetes result in large-for-gestational age weight infants who are at increased risks for poor pregnancy outcome and congenital anomalies (63,66). Native Americans have a higher incidence of diabetes than most other groups. Maternal genital anomalies, especially incompetent cervix, are associated with low birth weight and infant mortality through preterm delivery (63,66).

Preexisting conditions like heart disease, renal disease, endocrine disorders, including diabetes, sickle cell anemia, and chronic hypertension, increase the risk of low birth weight and neonatal mortality¹⁰ (63,66). Again, racial, and ethnic predisposition to certain diseases magnifies the risk for that group. Diabetes in native Americans has been noted. Blacks have high incidences of sickle cell anemia, chronic hypertension, and heart disease. Asians appear to be at risk to transmit hepatitis B virus.

Congenital anomalies play a small but significant role in prematurity but are a major cause of neonatal and postneonatal death (63,66). Death rates from congenital anomalies are similar (or slightly lower) in blacks compared to whites (35,157). Congenital anomalies appear to be a problem for native Americans and are possibly related to the high rates of diabetes and/or alcoholism (see section on native Americans) in this population (5).

Multiple gestations increase the risk of poor pregnancy outcome, as illustrated in the California neonatal mortality risk tables of Cunningham et al. (32). Multiple gestation increases the risk of both low birth weight (66) and preterm delivery (63). In a recent study analyzing records from Minnesota and Norway, multiple gestations comprised less than 2 percent of all deliveries, but accounted for 10 percent of all perinatal deaths, usually due to preterm delivery (58). Multiple gestations are more frequent among black births (24.1, 1980 data) than whites (18.5) or Asians (15.1) (147). Not surprisingly, blacks suffer more adverse outcomes from multiple gestation than whites. In the study of Norwegian and Minnesotan births, multiple gestations delivered prior to 33 weeks gestational age reached almost 30 percent in blacks and other races in Minnesota compared to 11-13 percent in Norwegian and Minnesotan whites. Although the data should be interpreted with caution because of the small numbers of black and other race births in the study, it is of interest that two-thirds to nine-tenths of perinatal deaths for multiple gestations occurred in that group that delivered prior to 33 weeks (58).

Coitus during pregnancy, especially during the latter stages of pregnancy, is another possible risk factor for low birth weight. It is thought that intercourse acts either by increasing urinary tract or amniotic fluid infections through transport of pathologic bacteria and/or stimulation of uterine contractions. No definitive studies exist (15).

Psychologic precursors for poor pregnancy outcome include stress and maternal attitude toward pregnancy. Stress may act through complex biochemical and physiologic reactions in both the mother and the fetus (15,63,110). Stress is thought to be exacerbated by the effects of low socioeconomic status (110), again disproportionately affecting minority groups in this country. Stress has two components--the stress itself (life crises) and the woman's own ability to cope, including her "assets" like a strong social support network of family and friends. While no relationship seems to exist between poor pregnancy outcome and stress or assets alone, women under stress who have high psychosocial assets had only one-third the pregnancy complications as those with low assets in a small study of military wives (109). A larger study showed similar, but less strong, relationships (106).

Unwanted pregnancies appear to be associated with poor pregnancy outcomes like low birth weight (63). A prospective study found that women with negative attitudes toward pregnancy displayed higher perinatal

death, congenital anomalies, postpartum infection, and hemorrhage than those with positive outlooks (83).

Psychologic stress was linked to infant mortality in a recent examination of unemployment (a secondary or tertiary precursor) in Michigan and Detroit. As unemployment rose to double digit figures in Michigan (a situation that usually impacts the greatest on minority groups) in the late 1970s and early 1980s, state infant mortality rates rose from 12.8 to 13.2 in 1981, the largest state increase since World War II. Detroit's IMR increased slightly to 21.8 with one subcommunity reporting a rate of 33. Stress from unemployment was compounded by funding cutbacks in social support programs like food programs, family planning projects (resulting in an estimated 9,700 unintended pregnancies), health department clinics and so on. Walk-in patients to one Detroit hospital's obstetric department doubled from 1980 to 1982. More than one-half (55 percent) had received no prenatal care, and many had no insurance. The offspring of these women were significantly smaller at birth, were delivered at earlier gestations, and spent one to one-and-a-half days longer in the hospital. Thus, a combination of psychosocial stress and decreased social support on a community level were associated with a worsening of pregnancy outcome, particularly among the less well-off and recently unemployed (121).

Physical stress may adversely affect pregnancy outcome. Long working hours, standing for long periods of time, heavy lifting or physical exertion, lack of leisure time, and extended commuting times have all been suggested, but not proven, as potential risk factors. A French study of women delivering in maternity hospitals in a large city and a small town found five sources of fatigue that exhibited significant associations with preterm delivery (posture, work on industrial machines, physical exertion, mental stress, and environment). As the number of high fatigue scores increased from 0 to 5, premature births increased from 2.3 percent to 11.1 percent. The fatigue factors may work in tandem with existing medical conditions to worsen pregnancy outcome (90). The problem with this study, and some of the others that examine stress and pregnancy outcome, is that the women were surveyed after delivery when the outcome was already known. Women who suffered adverse pregnancy outcomes would undoubtedly emphasize any possible stressful prenatal exposures in an attempt to find an explanation for the outcome, thus biasing the results. Further, preferably prospective, studies are needed to confirm the associations suggested by Mamelle and other authors. These proposed job-related risk factors would have greater import on those who work at physically stressful jobs, usually those in lower socioeconomic groups. Again, minorities would be disproportionately affected.

Certain occupations may be more prone to adversely affect pregnancy. Hoffman and Bakketeig's analysis of births and perinatal deaths in Norway and Minnesota revealed higher risks for preterm births in women with clerical or sales and manufacturing jobs. Lowest risks were associated

with housewives or unemployed mothers and women in the agricultural and fishing industries. The authors cite similar findings from a study of Finnish data that used first trimester fetal loss or spontaneous abortion as the outcome indicators (58). The Mamelle study found increased risks of prematurity associated with shop staff, shopkeepers, medico-social staff, unskilled workers, and cleaning staff as opposed to executive staff, teachers, office staff, and skilled workers (90). The flaws of this study have been noted. Although occupation and poor pregnancy outcome appear to be linked, particularly in terms of lower echelon and more manual types of employment, better designed studies are needed to clarify the proposed association.

The role of toxic exposure in the workplace during pregnancy is controversial and suffers from inconclusive and poorly designed studies. Toxins are believed to act through several mechanisms including direct effects on the fetus through exposure of the mother (teratogenic effects) and alteration of maternal and paternal genetic structure (mutations, transplacental carcinogenesis). Lead, DBCP (a pesticide product), vinyl chloride, and hydrocarbons are thought to cause spontaneous abortions in nonexposed wives of male workers by changing genetic material in the sperm (60,91,144). Lead is also a teratogenic agent (18,60). These compounds particularly affect workers in industrial plants, again impacting those of lower socioeconomic status. Toxins also affect women in more traditional female jobs like nursing where exposure to infectious organisms, X-rays, and anesthetic gases can adversely affect pregnancy outcome (167). More and better designed research is needed in all aspects of toxic exposure in the workplace and its role in pregnancy outcome.

Substance abuse is thought to adversely affect the fetus. Effects of cigarette smoking, alcohol ingestion, legal and illegal drug usage, and caffeine consumption have attracted much research and speculation.

Cigarettes have long been implicated as a major risk factor for low birth weight (9,63,66). A review of studies on smoking noted that the weight distribution for offspring of smoking mothers is sloped downward, with a mean shift of 150-250 grams. The proportion of births less than 2,500 grams was approximately doubled for smokers' infants. There was no similar shift for gestational age. Weight reduction appeared to be directly proportional to the number of cigarettes smoked and independent of various maternal demographic factors (15,173). This was illustrated in a study by Rush and Kass who examined smokers and nonsmokers, blacks versus whites. They found that smokers and blacks had more low birth-weight infants (132).

Several authors believe that increased incidences of bleeding, placental abnormalities, and premature and prolonged rupture of membranes vary directly with the level of maternal smoking (173). Rush and Kass found 86 percent excess perinatal mortality among black smokers compared to 11 percent excess in white smokers. A literature review in that same study revealed a 34-percent excess in perinatal mortality among smokers' offspring. The highest losses were in blacks and among the poor (132).

Although blacks appear to suffer more adverse effects from smoking than whites, it is not clear that the outcomes are related to smoking prevalence among blacks. In several studies, blacks smoke less than whites (but more than Hispanics) (124,149). Smokers were more typically white mothers under 25 years old and with a high school education or less (124). In a California study from the 1960s, 38 percent of white women smoked during pregnancy; 32 percent of black women; 24 percent Mexican American; 14 percent Oriental (149). More recent statistics (1980) show that slightly more black women over 20 years old currently smoke (30.8 percent) than white women (29.5 percent). Furthermore, black smokers are found in the lower categories of cigarettes smoked (less than 15 cigarettes a day: blacks, about 70 percent of all black women smokers aged 20-34; whites, 30.0 percent) (52). Amount of smoking does not appear to be the reason that blacks display more smoking-related perinatal casualties. The relationship between cigarette smoking and birth weight needs more clarification.¹¹

The effects of alcohol on the fetus are mediated by a combination of the amount ingested, the timing of ingestion relative to the pregnancy, and the continuity of consumption (15,66). The fetal alcohol syndrome (FAS) is one example of an adverse alcohol-related pregnancy outcome. First described by Jones et al. in 1973, it incorporates a unique set of features including growth retardation, a small head circumference, and various anatomic anomalies (64). Mills et al. found that newborn birth weight decreased sharply with increasing alcohol intake. The reduction in mean birth weight compared to nondrinkers was 14 grams for less than one drink per day to 165 grams for three to five drinks per day (102). A small group of heavy drinkers in another study who reduced alcohol consumption before the third trimester (the period of rapid fetal growth) delivered larger infants than those who continued their heavy drinking throughout pregnancy (130). However, not all investigators agree that small amounts of alcohol alone has a major effect on birth weight (150).

Profiles of drinkers in these various studies are contradictory (or taken from different subgroups). In one study, alcohol abusers were older, multiparous women, currently unmarried, with poor past obstetrical histories including excessive fetal anomalies (possibly FAS?). They were more likely to smoke cigarettes and abuse other drugs. They exhibited increased risks during labor and delivery, and their offspring suffered higher incidences of fetal distress and neonatal depression (140). In a study of married women, drinkers were older than 25 years of age and highly educated. More whites drank than blacks; blacks drank more than Hispanics (108). The Mills study also noted drinkers more often to be white, between 20-34 years old, married, smokers, highly educated, of low parity, and to have hypertension and one or more miscarriages (102). More recently, among women delivering in a large urban hospital in Massachusetts, 82 percent were found to have consumed alcohol during pregnancy, 3 percent consumed alcoholic beverages more than 20 times per month, and 3 percent consumed more than 20 ounces per month (166).

When drinking and smoking were examined together, Prager et al. found among married mothers drinking to be more prevalent than smoking, but women more often cut back on their drinking than on cigarette smoking (124). Mills et al. noted that as cigarette smoking increased, birth weight decreased across all drinking categories. Likewise, increased alcohol consumption decreased birth weight in all smoking categories (102). However, as noted above, one researcher feels alcohol effects on birth weight are not substantial (150).

Psychoactive drugs, and prescribed and over-the-counter drugs can result in low birth weight (15,66). Studies on the effect of caffeine yield mixed results. One survey of 800 American households associated heavy caffeine consumption with increased pregnancy loss and complications (166). Another connected increased consumption with increasing rates of prematurity, but heavy coffee drinkers also tended to smoke, and this was felt to be the overriding factor for the outcomes observed (149). Other studies have not found significant relationships between caffeine consumption and poor pregnancy outcome (166). Most of these studies were retrospective and based on interview results. As with other risk factors, more work is needed to elucidate the proposed linkages between coffee consumption and pregnancy outcome.

Weight gain during pregnancy is an important precursor for birth weight (66). Very small or very large weight gains during pregnancy appear to be detrimental for the fetus, but there is no reliable or valid method to predict specific weight gain for a given pregnant woman and her fetus. For most women, 20-30 pound weight gains provide optimal environments for the fetus (166).

High-risk nutrition groups include pregnant teens, who have their own growth-related nutritional requirements, are at an age when thinness is of utmost importance, and are not apt to follow nutritious diets. Minority groups, particularly blacks and Hispanics (see below), with high numbers of teen births are susceptible to nutritional deficits. Other high-risk groups include women with uncontrolled diabetes and those with iron or foliate deficiencies (as may occur with prolonged use of oral contraception (166). Supplementation of protein, megavitamins, and minerals is a controversial topic.

A recent Massachusetts report on WIC participation noted improved pregnancy outcomes including a decrease in incidence of low birth weight (6.9 versus 8.7 in those not enrolled in WIC); neonatal mortality rate, and inadequate prenatal care and slightly increased gestational ages in those enrolled in WIC. Demographic stratification by subgroups revealed enhanced pregnancy outcome in higher risk groups--pregnant teens, unmarried women, and Hispanics from Puerto Rico (78). WIC-related research is controversial, particularly in methodology (131). It is not evident that weight gain per se is the source of the positive outcomes observed in studies like these. A variety of socioeconomic factors are most likely interwoven with the nutritional effects of participation.

Prepregnancy weight is probably the more critical variable regarding nutrition and pregnancy outcome (66). Low birth weight was as high as 26 percent in blacks and 15 percent in whites when prepregnant weight was below 100 pounds (66). Naeye noted that Puerto Ricans in the Collaborative Perinatal Project experienced more placental growth retardation than Anglos. This difference disappeared when women with prepregnancy weights less than 101 pounds were excluded. Placental growth retardation appeared to be a function of low maternal weight prior to conception (104). Studies from the same laboratory suggest that women with low prepregnancy weights do have lighter placentas than heavier mothers (166).

Utilization of prenatal care is another primary determinant of pregnancy outcome. Kessner, using 1968 data from New York City, demonstrated that adequacy of prenatal care, measured by the timing of the initial visit, the number of visits, and the hospital service type, was associated with better pregnancy outcomes in groups of women with and without social and medical risks (70). Several other studies have shown improved neonatal and infant survival and higher birth weights in groups with early initial visits and adequate numbers of visits (43,126). In Alameda and Contra Costa counties in California, offspring of women with adequate prenatal care weighed an average of 197 grams more than those without adequate care. The effect was greater for black infants and infants of shorter gestation (139). Differentials in pregnancy outcome associated with perinatal care were greater among high-risk subgroups like those in the California study and socially disadvantaged women (43,45). Selection bias is a problem in most studies attempting to document links between utilization of care and health outcomes. Women who use the programs may be more motivated to take better care of themselves and thus may be in better health than those who do not seek out services. The attributes of the women who seek out care may be more important contributions to good pregnancy outcome than the care itself.¹²

Utilization patterns for prenatal care vary across racial and ethnic categories. In 1980, almost 63 percent of black women began care in the first trimester of pregnancy compared to 76.3 percent of white and 75 percent of Asian mothers (147). Native Americans in 1982 exhibited different patterns of first trimester care depending upon which of their parents were Indians. For example, if both parents were Indians, 57 percent began care in the first trimester; father only, 68 percent; mother only, 55 percent (5). Hispanics in 1981 also showed differing utilization patterns according to subgroup. Cubans showed the best first trimester utilization (80 percent); followed by Mexican Americans, 60 percent; Central and South Americans, 58 percent; and Puerto Ricans, 54 percent (151).

Percentages of little or no care also vary. Among black women, 3 percent had little (beginning during the third trimester) or no care; whites, 1 percent; Asians, 6 percent (147). For native Americans with

both parents being Indians, 12 percent; father only, 7 percent; mother only, 15 percent (1982) (5). For Hispanics, the little or no care percentages ranged from a low of 4 percent for Cubans to a high of 16 percent for Puerto Ricans (151). Low birth weight and neonatal mortality rates correspond roughly to these percentages. For example, among Hispanics, Cubans show less pregnancy pathology than Puerto Ricans; whites and Asians show fewer adverse outcomes than blacks. However, Mexican American and Native American figures do not correspond as well as the ones noted above. These will be discussed in later sections.

Secondary precursors include maternal demographic characteristics, maternal health, subculture identity, and, especially, socioeconomic status. Approximately 60 percent of premature deliveries are associated with low socioeconomic status (SES) (66). The mechanisms are obscure. Studies consistently show malnutrition, small stature,¹³ lack of education, psychologic and physical stress (as discussed in the preceding section), lack of insurance, and others--most markers for low socioeconomic status--to impact on pregnancy (66). Infants born to poverty display relative risks of neonatal and postneonatal mortality 1.5 times that of infants not born to poverty (44). Generally, studies looking at markers for low socioeconomic status have found increased incidences of poor pregnancy outcome with low socioeconomic status (9,41,53,63,66,135,138).

Maternal age has its greatest impact on pregnancy outcome for women younger than 20, or older than 34 (81). Neonatal mortality rates for the children of teen mothers are 1.5 times as high as for the children of mothers older than 20. Evidence suggests that this is due to the large number of low birth-weight teen deliveries (100). Teen mothers are at risk from both biologic and socioeconomic factors. Biologic problems include physiologic immaturity for pregnancy and nutritional requirements for the mother's own growth which compete with the needs of the fetus (74). Socioeconomic factors include reduced levels of education and economic well-being. Teens are more likely to be unmarried, to have an unplanned pregnancy, and their limited occupational skills and familial resources lead often to welfare dependency, or dependency on their family of origin, usually their mothers. The occurrence of an unplanned and often unwanted pregnancy frequently leads the adolescent to attempt to hide the pregnancy until it can't be denied, thereby delaying the initiation of prenatal care to the second or third trimester. The question of the role of biologic maturity versus socioeconomic disadvantage has been addressed in some studies in which teens were given high quality prenatal care, often case-managed, and their outcomes monitored. These studies indicate that with interventions to deal with the social aspects of an early pregnancy, outcomes can be quite good (101,6). A recent program for teenagers in St. Paul has brought the low birth-weight rate for a high-risk group down to that observed for the U.S. as a whole.

This research seems to minimize the role of biologic immaturity as a factor influencing pregnancy outcome. Two things should be kept in mind, however. First, these programs tended to focus attention on nutritional needs. This does not mean that the teenagers are not nutritionally deprived, but that it can be ameliorated through a prenatal care program. Second, most teens are not sexually active (and therefore at risk of pregnancy) until two years post menarche. Teens who experience menarche at younger ages are likely to be sexually active at younger ages, but at all ages there is a hiatus between menarche and the risk of pregnancy (170).

The effect of maternal age on infant outcome does not end with the birth. Babies of teen mothers, even healthy ones, exhibit some deficits in cognitive development, lower IQ scores, and social adjustment problems compared to children of older mothers. Much of this is a function of the social characteristics of the young mothers and is mediated by the living conditions young mothers and their babies experience. When the mother is living alone, her baby is at greater risk of developmental disadvantages than if she has the support of other adults, e.g., the baby's grandmother or father. The infants of teen mothers are also at increased risk of health problems, and postneonatal mortality (100).

Maternal age distributions vary across racial and ethnic categories. The median age for blacks giving birth in 1980 was 24.2 years; whites, 25.9; Asians, 28.0 (147). Certain Southeast Asian groups (for example, the Hmong) have large percentages of adolescent mothers (59,146), but most have very low proportions (Chinese, Japanese) (59,146). Hispanics also have high percentages of adolescent births compared to Anglos (147). Thus, some minority groups are at increased risk for poor pregnancy outcome based on age distributions of childbearers.¹⁴

Parity is associated with pregnancy outcomes. First pregnancies often show higher rates of morbidity and mortality because of pregnancy complications like toxemia and labor and delivery difficulties that occur more often during first pregnancies than with subsequent ones. Parity over five or six in this and other studies is apparently linked with poorer pregnancy outcome (166). The risks of high parity are exacerbated by short birth intervals, especially for teens delivering their third (or more) child (58). Short birth intervals are also associated with adverse pregnancy outcomes regardless of parity (53,63,66). Parity is generally higher in blacks (147), Hispanics (151), and some Southeast Asian groups. (59,146)

Past obstetrical performance affects the current pregnancy. A reproductive history of two or more previous fetal losses (138), previous low birth-weight infants, and a history of previous live-born-now-dead children seems to increase chances for poor pregnancy outcome (66). This can result in a type of vicious cycle as women at high risk for one poor pregnancy outcome increase their risks for additional poor results.

Maternal education is often used as a marker for social class. Lack of a high school education is a major problem for teen parents and their offspring as discussed earlier (6). Low educational attainment is generally associated with worse outcomes, but the magnitude of this association varies with age and birth order. The major differences in infant mortality and morbidity occur in offspring of mothers older than 20 years of age with less than 12 years of schooling compared to those of mothers in the same age group with 12 or more years of education (74). Bross and Shapiro suggest that education is an indirect risk factor for neonatal mortality (through low birth weight), but a direct precursor of postneonatal mortality (20).

Blacks generally have completed fewer years of schooling than whites (147); Hispanic women, fewer than Anglos and non-Hispanic blacks (147). Asians as a group are both more likely to have finished college than any other racial group but are also more likely to have completed only grade school than either blacks or whites (see section on Asians) (147). Father's education and occupation is another possible risk factor for the general well-being of the infant, probably as a marker for socioeconomic status.

Out-of-wedlock births, like education, is an often used marker for low socioeconomic status. It is a significant risk factor in teen pregnancy (6). Out-of-wedlock births are generally associated with poor outcomes (66), although the effect may be greater for whites and Hispanics than for blacks where married and unmarried women may share other similar traits (29). White unmarried women were found to have a 90 percent greater risk of preterm low birth-weight infants; marital status did not affect the risk of preterm low birth-weight infants among blacks in analyzed data from the computer bank of the Obstetrical Statistical Cooperative from 1970 to 1976. The effect on term low birth-weight infants was the opposite. Unmarried black women had an 80 percent increased risk for term low birth-weight infants; the effect of marital status on term low birth-weight infants was negligible for whites (66). These findings need to be replicated, but as noted in an earlier section of the paper, few investigators have examined preterm and term low birth weight separately. Generally, out-of-wedlock infants show poorer outcomes than the offspring of married women both from direct effects and indirectly through other variables like low birth weight, age, and socioeconomic status.

In 1980, the out-of-wedlock birth ratio for blacks was 55 percent for black births; whites, 11 percent for white births; Asians, 8 percent for Asian births (147). Approximately 46 percent of Puerto Rican, 20 percent of Mexican and 10 percent of Cuban births are out-of-wedlock births. Again, certain minority groups in this country display higher values for an important precursor of poor pregnancy outcome.

More remote or tertiary risk factors are those community traits that influence the social, political, cultural, economic, and physical

environment of the mother. American and international studies have demonstrated associations between low birth weight and other poor pregnancy outcomes and community socioeconomic characteristics like urban crowding, low per capita income, low per capita energy consumption and food allowance, low newspaper circulation, lack of radio and TV, and low density of physicians (63,128,148). Variations in infant mortality across locales are thought to be secondary to the interplay between maternal socioeconomic and demographic characteristics, community characteristics noted above, and local obstetric, pediatric, and community health services (14). For example, in a study published in the mid-1970s, lower perinatal mortality rates were found in a California county with a strong health department versus counties with traditional medical care and medical foundation systems despite the heavier load of risk factors for perinatal mortality in that county (105). Another study that looked at community support systems found that the presence of M & I projects and community health centers seemed to lead to decreases in black neonatal mortality, while organized family planning clinics and WIC seemed to improve white neonatal survival. The legalization and increased utilization of abortion were the most important factors in reducing neonatal mortality in both races (46,47,48). Liberal rules in Medicaid financing of newborn care also appeared to be an important factor for favorable black outcomes, while liberal rules for Medicaid financing of prenatal care were related to better white neonatal outcomes (46,47). Women on Medi-Cal (in California), especially minority ethnic groups, appeared to have better access to prenatal care and showed improved perinatal outcomes than women not on Medi-Cal in a recent study using state vital records from 1968 and 1978 (107).

Cultural norms influence how much of a community's health care system is utilized, but cultural norms interact with socioeconomic realities. Black mothers did not seek out care to the same extent as white mothers did in a recent study, but the authors noted that mothers of low education, regardless of race, did not seek out care as much as those with high levels of education (45). Limited access to care for Hispanics in the Southwest was associated with some cultural phenomena, but seemed to be more influenced by low income, education, and lack of health insurance (2). Mexican Americans, blacks, and Anglo females living in poverty areas in Los Angeles all displayed the usual noncultural barriers to utilization of preventive services for themselves and their children. These barriers--financial, lack of insurance, and so on--were reinforced by alienation, feelings of powerlessness, hopelessness, and social isolation, all characteristics of poverty. Thus, while ethnic, racial, religious, and other cultural differences in utilization of health services were important for health outcomes, poverty seemed to exert the greatest direct and indirect effects on utilization of services and health outcomes (24).

Discrimination against minority groups is considered by some to be the most important determinant of poor health outcomes in these groups. Discrimination is compounded by a loss of cultural identity and

traditional support systems as minority groups attempt to adopt the life-style of the dominant culture, which leaves them more vulnerable to stress and other pressures. Proponents of this theory point to the better perinatal outcomes for Mexican-born Hispanic women compared to American-born Hispanic perinatal outcomes in several areas of the U.S. as proof (11). Others attribute these findings to migration theories (healthier people tend to migrate and produce healthier offspring) or underreporting of perinatal mortality, particularly in South Texas (93,107,133). These will be discussed in the section on Hispanics.

POSTNEONATAL MORTALITY

The preceding discussion focused on immediate pregnancy outcomes such as low birth weight and neonatal mortality. Similar risk factors are in operation throughout infancy. Many of the same risk factors affect the infant during the postneonatal period.

Before discussing individual risk factors, it would be helpful to look at available figures for postneonatal mortality in the U.S. The provisional 1983 postneonatal mortality rate is 3.6 per 1,000 live births. This is less than one-half the rate of 8.7 in 1950 and somewhat decreased from the 1970 PMR of 4.9.¹⁵ In 1982, the white PMR was 3.3; black, 6.6¹⁶ (73). Between 1960 and 1982, the white postneonatal mortality rate fell from 5.7 to 3.3; the black rate from 16.5 to 6.6 (73). The postneonatal mortality gap between black and white infants has decreased more than the neonatal gap during this period (75). This decrease is thought to be largely due to improved infectious disease control (71).

Other ethnic and racial groups show elevated postneonatal mortality rates compared to white rates, even though these groups have favorable neonatal mortality rates, comparable to the white neonatal mortality rates. Native American postneonatal mortality rates remain high. Postneonatal mortality contributes the majority of deaths during the first year of life for native Americans, unlike other groups in the U.S. where neonatal deaths predominate. Hispanics also exhibit higher postneonatal mortality rates than neonatal rates (93). A report from Texas based on data from the early to mid-1970s estimated the Hispanic postneonatal mortality rate to be 60 percent higher than the Anglo rate (125).

The standard explanations for the worse postneonatal mortality is that environmental factors are the major contributors to postneonatal mortality. Racial and ethnic minorities are exposed to more adverse environmental conditions because of their poor socioeconomic status. Other factors, however, also contribute to racial and ethnic differences, and these include biologic and other direct factors described for neonatal outcomes.

Low birth-weight infants display elevated mortality rates during the postneonatal period, although the effect is not as strong as during the neonatal phase of the infant's life (99,138). Low birth-weight infants are five times more likely to die during their first year than normal weight infants and account for 20 percent of postneonatal deaths (despite being only 6.8 percent of all births) (99). Very low birth-weight infants die at 20 times the rate of normal weight infants and account for 25-30 percent of postneonatal deaths¹⁷ (99). The elevated low birth-weight rate particularly of black infants is thought to influence postneonatal survival. Hispanics, native Americans, and Asians, on the whole, exhibit low birth-weight rates similar to whites, so other explanations are needed to account for elevated postneonatal rates in these groups. Early studies noted that low birth weight effects on postneonatal mortality are influenced by socioeconomic factors (99,135,138).

Gestational age, not unexpectedly, is also thought to impact on postneonatal survival. For any birth weight category, the longer the duration of pregnancy up to 42 weeks gestation, the better the survival rate (99). Any risk factor that predisposes to preterm delivery, such as amniotic fluid infections (more prevalent in blacks), maternal cervical incompetence, or multiple gestation (also more common in blacks), would thus affect postneonatal survival.

Congenital anomalies are a major postneonatal cause of death. Blacks and whites have similar death rates from congenital anomalies (35,157), although anomalies are the second leading cause of death for white postneonates and the third for blacks (137). Native American infants have increased numbers of congenital anomalies (5).

Maternal smoking adversely affects the health of the infant. A Finnish study found higher mortality up to five years of age in offspring of smokers. These infants were hospitalized more often, especially under one year of age, had longer hospitalizations, and visited the doctor more frequently (112). Maternal alcohol and caffeine ingestion also show negative impacts on the infant's health.

The most striking risk factors for postneonatal mortality are those that come under the secondary or tertiary categories. These risk factors include maternal age, parity, education, socioeconomic status, and access to care.

Maternal age was found to be a risk factor for postneonatal mortality by Shah et al., with higher postneonatal mortality rates among offspring of younger mothers (135). Shapiro et al. found consistent disadvantages during the postneonatal period among women under 18 years of age, particularly among normal birth-weight infants (138). Maternal age was also inversely related to infant accidental death in a review of fatal childhood accidents in North Carolina and Washington State from 1968-1980 (159). Long-term hazards of adolescent parenting have been

discussed in earlier sections. Obviously, those minority groups with a high number of teen births, like blacks and Hispanics, are at increased risk.

Parity was also associated with postneonatal mortality in Shah's study (except for fourth order births). The review of accidents in North Carolina and Washington revealed a direct relationship between parity and infant accident mortality (159).

Low educational attainment has been linked to postneonatal mortality in all the studies cited above that examined education per se (99,138,199).

Shah looked at socioeconomic status based on census tracts' median rents. Infants of low socioeconomic status had higher risks of dying than infants of higher status groups, with the largest differentials between the lowest and highest groups (135). These findings paralleled those of Pharoah in Great Britain. Class V (lowest) infants in Scotland, England, and Wales displayed increased rates of postneonatal mortality than those of higher classes. The gap in postneonatal mortality rate between those in the lowest and those in the highest classes had narrowed after a brief increase (120). As noted above, postneonatal mortality rates between blacks and whites appear to be narrowing in this country.

Access to medical care plays an important role in postneonatal health. Kovar has claimed that although the poor show improved access based on contacts per person, many still do not receive enough medical care relative to need. Differences exist between children of poorly educated parents and children of parents with above average education in terms of adequacy of care, use-disability ratios, and activity limitation due to chronic conditions. Using this last criterion, black children and children in large families were also less likely to receive adequate care (79). Absence of insurance and finances has greatest impact on preventive care that is important to the well-being of infants. Cultural patterns of care utilization have been discussed and continue to operate during this period of life. The psychological effects of poverty also play a role in the seeking out of support services beyond the traditional economic barriers.

Early recognition of illness in this age group may also be a determinant for postneonatal survival. A preliminary report from the British postneonatal multicentre study has attempted to implicate the failure of parents and physicians to recognize major and minor signs and symptoms of illness prior to sudden and unexpected death in infants up to two years of age as a risk factor for postneonatal death. Of children in this age group who died unexpectedly and suddenly at home, 59 percent had shown terminal symptoms. Forty-eight percent of these symptoms were major, but only 17.4 percent had been seen by a physician within 24 hours before death. The researchers concluded that deaths of young children could be prevented if both parents and physicians were more aware of the

importance of nonspecific symptoms as matters of life-threatening illness (143). The preliminary report did not examine financial and structural barriers to care and the roles of psychologic stresses associated with poverty.

It would be helpful to discuss some of the leading causes of death during the postneonatal period and to examine the racial and ethnic differences seen in these causes. Sudden infant death syndrome (SIDS) is the leading cause of death for whites and blacks in this age group. SIDS will be discussed below. The second leading cause of death for white postneonates is congenital anomalies; for blacks, it is infections with congenital anomalies third. Respiratory infections are the primary source of infectious death for any race; gastrointestinal infections are the second leading infectious cause of death in black infants only¹⁸ (71). Infections are obviously preventable causes of death; their prominence in minority groups like blacks and native Americans is related to questions of access to care and socioeconomic factors.

Deaths related to injuries, particularly homicides, have increased in blacks and whites. Mechanical suffocation remains the leading cause of accidental death in this age group. Motor vehicle accidents are the second leading cause of death for white infants; fires for black infants. This again reflects socioeconomic differences in terms of ability to purchase automobiles and the types of residences families can afford. Homicide is the third leading accidental cause of death in blacks. The homicide death rate for blacks is 3.7 times that for whites¹⁹ (62,71). Accidental death is a leading cause of mortality for native Americans, including infants (5). Minor causes of death in this age group include perinatal conditions (5 percent of all deaths) and neoplasms (1 percent) (71).

Sudden infant death syndrome (SIDS) is the leading postneonatal cause of death, accounting for at least one-third of postneonatal deaths up to one year of age. The incidence is two deaths per 1,000 live births or approximately 7,000 deaths per year (7). Its peak incidence occurs at one to four months of age with over 90 percent occurring before six months of age. Other observed attributes include higher rates for low socioeconomic status, male sex, and low birth weight; occurrence during cold weather months; and silent death, most likely during sleep (7). Possible risk factors include prematurity, a sibling who died of SIDS, a twin, a history of recent, mild upper respiratory tract infection, inadequate prenatal care (of the mother), and race other than white (7). Other suggested but not validated factors or attributes in the literature include lack of breast-feeding; short pregnancy interval; maternal narcotic addiction (150) and cigarette use; maternal or paternal age less than 20; unwed mother; maternal ABO type of O or B; pregnancy complications like diabetes, hypertension, or epilepsy; illness during pregnancy; previous fetal loss (4,116,136). There appears to be a longitudinal difference in the U.S. with rates decreasing from west to east. There are no latitudinal disparities. An urban/rural dichotomy appears to exist (116).

Several etiologic mechanisms have been proposed. These include some kind of failure in the development or maintenance of normal respiratory control; a sleep disturbance, particularly sleep apnea; the presence of one or more biochemical defects, for example, in carbohydrate metabolism or in neurotransmitters; or an interaction of one or more infectious agents with a particularly susceptible immunologic or other defense system (7), as postulated in recent work on *Clostridium botulinum* toxin and organisms (150). Multiple etiologies are probably involved (7) and may involve interactions between the physiologic derangements listed above and environmental and other stressors like mild upper respiratory tract infections, fevers, temperature extremes, and so on.

Hypotheses forwarded that are not supported by current investigation include an association with DPT vaccine, an allergic reaction to house dust mites, and misclassification of infanticide as SIDS cases (150).

Ethnic variations are startling. Asians have the lowest rate of 0.5 deaths per 1,000 live births; native Americans, the highest at 5.93.²⁰ The black rate is 5.04; Alaskan natives, 4.5 (136). The national rate is between 1.5 and 2.0 per 1,000 live births (7). The reasons for the differences are not clear but probably involve the interactions between physiologic abnormalities and socioeconomic and environmental stresses alluded to earlier.

BREAST-FEEDING

A relevant issue in postneonatal health is the role of breast-feeding. Among breast milk's proposed attributes are its anti-bacterial and anti-viral properties (158), especially against *E. coli*, *Shigella*, *V. cholera*, and protozoa (111). It is unclear whether this protection is due to the inherent specific immunologic properties of breast milk or to nonspecific defense factors (111). Regardless of the etiology of breast milk's anti-infectious properties, breast-fed infants are reported to demonstrate lower morbidity and mortality than non-breast-fed infants (158). Breast-fed infants appear to be less susceptible to gastroenteritis (28). Respiratory infections, meningitis, and gram-negative sepsis are reported to occur less frequently among breast-fed infants (28). A study of Canadian Eskimos demonstrated an incidence of otitis in children breast-fed until one year old, one-eighth that of children bottle-fed (28). Allergic-related symptoms and illnesses have also been reported as less frequently occurring in breast-fed infants (28,111,158).

Although breast-feeding had declined in popularity in the U.S., especially since the Second World War (28,55,56), it has again increased since 1971 (94,95,96). Although it is commonly believed that this increase is mostly among women of higher education and income (28), at least one series of studies has disputed this claim²¹ (94,95,96). The highest incidence of breast-feeding was among the college-educated in these reports, but the largest and most rapid increase in breast-feeding occurred among the less educated, lower income women and in those women

attending public health clinics (94,95,96). This pattern held for all age groups of infants examined and for the duration of breast-feeding (94). Earlier studies showed somewhat different results. One study based on the 1965 National Fertility Study (before the recent rise in breast-feeding) noted a curvilinear pattern for maternal education and breast-feeding, with the highest incidence among those with the least and the most education (56). A later study based on the 1973 National Survey of Family Growth revealed a change in the pattern. The curve was now J-shaped, with a sharp decline in breast-feeding among those mothers with less education compared to the earlier data set (55). The earlier study had noted an increased likelihood for black and Latin mothers to breast-feed compared to white, Anglo mothers. This was felt to reflect social and not ethnic/racial variables (56). The 1973 study showed less tendency to breast-feed among blacks and Hispanics (55). Generally, there was a strong association, with breast-feeding among women who were college graduates, worked as professionals, or were married to professionals (55). A Canadian study also found breast-feeding more prevalent in families with higher incomes and more education (168).

BLACKS

Although blacks demonstrate adverse infant survival outcomes, black infant mortality rates have improved, falling from 43.9 per 1,000 live births in 1950 to 19.6 in 1982 (73). The black neonatal mortality rate has fallen from 27.8 to 13.1; postneonatal, from 16.1 to 6.6 over the same period (73). Changes in birth-weight distribution have been minimal in blacks during this period (33,163).

Black/white differentials still exist in pregnancy outcome measures. The corresponding rates for whites for the above figures during the same period show an infant mortality rate decline from 26.8 to 10.1; neonatal mortality rate, 19.4 to 6.8; postneonatal from 7.4 to 3.3 (73). Black/white disparities in postneonatal mortality have decreased relatively more than the corresponding disparities in neonatal mortality (that is, the percentage reduction in postneonatal mortality has been greater for black while the percentage reduction in neonatal mortality has been greater in whites). As a result, the latest data show that postneonatal mortality disparities are about the same as neonatal mortality (75). The black infant mortality rate will not meet the 1990 Public Health Service objectives for races other than white, 12.0 per 1,000 live births. The percentage decrease needed to obtain this goal, 43.9 percent, would exceed the entire decrease from 1970-1980 of 34.4 percent. White and native Americans have already met the 1990 infant mortality objectives (77).

The objectives for low birth-weight proportions put forth by the Public Health Service are 5 percent overall and 9 percent for subgroups by 1990 (77). Again, whites and native Americans are under target while black low birth-weight proportion is still almost twice that of other groups (77). The 1982 low birth-weight rate for blacks was 12.4; for

whites, 5.6 (147). Low birth-weight proportion ranged from 11.7 in black mothers over 30 years of age to 14.0 in teenagers²² (152). In 1982, black infants accounted for 16 percent of all live births; 30 percent of all low birth-weight infants; and 34 percent of all very low birth-weight infants (99).

Blacks demonstrate increased risks for poor pregnancy outcome because of increased incidence among blacks of many of the risk factors discussed in the text.²³ Primary risk factors that are particularly pertinent in the black population include amniotic fluid infections (104) and chronic diseases like hypertension, diabetes, and sickle-cell anemia. Blacks showed increased incidences of premature rupture of membranes and placental growth retardation compared to white mothers in one study. Once established, amniotic fluid infections, large placental infarcts, abruptio, and postnatal infections were more lethal in black women than white women (104). Multiple gestations occur at higher rates in blacks, 24.1 per 1,000 in 1980, than whites, 18.5 (147). The study of preterm delivery in Norwegian and Minnesotan data showed an almost three-fold increase among black multiple gestations than white (58).

Almost 63 percent of black mothers began prenatal care in the first trimester of pregnancy during 1980 versus 76.3 percent of white mothers. Almost 3 percent of black mothers had no care compared to 1.5 percent of white mothers. The average number of visits was 9.9 for blacks and 11.4 for whites (147).

Important secondary risk factors include maternal age, parity, educational attainment, and out-of-wedlock births. In 1980, the median age for blacks giving birth was 24.2 years versus 25.9 years in whites. Twenty-seven percent of black mothers were less than 20 years old compared to 14 percent of white mothers. Fifteen percent of black mothers were older than 30 while 20 percent of white mothers were in this age category (147).

Blacks displayed higher parity than whites in 1980. Approximately 15 percent of black births were fourth order or higher; 9 percent of white births had similar birth order. Forty percent of black births were first order versus 44 percent in whites (147).

Educational attainment, closely linked to maternal age, also displayed racial disparities in the 1980 data. Fewer black mothers had 16 or more years of schooling, 6.3 percent, than white, 15.6 percent, or Asians, 30.2 percent. Sixty-four percent of black mothers completed 12 or more years of schooling while 80 percent of white mothers did. Median years of school completed were 12.3 for blacks and 12.6 for whites (147).

Out-of-wedlock birth ratio for blacks in 1980 was 553 per 1,000 black births. The corresponding figures were lower for whites, 110 per 1,000 white births, and Asians, 78. A difference between out-of-wedlock black and white births was maintained across all age groups (147).

Out-of-wedlock births and maternal education are two markers for low socioeconomic status. A relatively higher proportion of blacks live near or below poverty levels. Thus, income, lack of health insurance, cultural norms, psychological barriers associated with poverty, and discrimination have been cited as major impediments to the health care system for blacks (and other minority groups) (11,24,79). Most studies have shown that increased participation of blacks in (for example) prenatal care improves outcome (43,45,141,142), although this was not the case in one study from North Carolina (114). These have been discussed in the text.

While much has been made of the elevated low birth-weight rate in blacks and its contribution to black infant mortality, overemphasis of the low birth-weight issue obscures other causes of infant mortality. Several investigators have shown higher birth weight-specific and gestational age-specific mortality rates above 3,000 grams (1,10). Data from California and Georgia showed optimal survival rates for black infants occurred at weights approximately 500 grams below white optimal survival weights. However, optimal-weight mortality rates for blacks were twice the rates of whites at the white optimal weight. Thus, within normal weight ranges, blacks demonstrated higher neonatal mortality. The authors suggest that improvements are needed not only in the prevention of low birth weight in blacks, but also in the care of black term infants (10). This leads back to issues of access to care, especially for those in lower income brackets. In short, although low birth weight is a crucial component of black infant mortality, the contribution of deaths of normal-sized infants cannot be overlooked.

Black postneonatal death rates are also problematic. The leading cause of death for black postneonates, as in whites, is SIDS. Black SIDS rates are over twice the national rate, 5.04 versus 1.5 to 2.0 per 1,000 live births (7,136). Infections are the second leading cause of death in this age group for blacks as opposed to congenital anomalies in white postneonates (71). This suggests that a large proportion of black postneonatal death is due to preventable causes and, again, raises the issue of access to care. Congenital anomalies are the third leading cause of postneonatal deaths for blacks. The three leading causes of accidental death for black postneonates are mechanical suffocation, fires, and homicides (71). Motor vehicle accidents are not as prominent in black postneonatal mortality as in white postneonatal mortality. This is probably related to general differences in socioeconomic status between the two groups.

HISPANICS

Data on Hispanics have increased in recent years. Problems persist in data collection. Most studies rely on Spanish language or surname to identify Hispanics, but Hispanic origin items are more appropriate and accurate. Over time, the collection of ethnicity data has become more standardized and is more available for research and other purposes.

Hispanics are a diverse group, and the major subgroups--Cuban, Puerto Rican, and Mexican--have different patterns of low birth weight and infant mortality as well as different life-styles. Generally, Puerto Ricans resemble blacks in family structure and infant outcome data; Cubans resemble white non-Hispanics (Anglos); with Mexicans falling in-between. Foreign-born Hispanics display better pregnancy outcomes than U.S.-born Hispanics. As with other ethnic groups, variations in pregnancy outcome indicators are interrelated with socioeconomic issues, poverty, and cultural norms and expectations.

Low birth-weight percentages from 1981 illustrate group differences. Overall low birth-weight rates were 5.6 for Mexican Americans; 5.8, Cubans; 9.0, Puerto Ricans; and 5.7, other Central and South Americans. U.S.-born low birth-weight percentages were Mexican, 6.3; Puerto Ricans, 9.6; Cubans, 6.6. Foreign-born Hispanic values are lower: Mexican, 5.0; Puerto Rican, 8.6; Cubans, 5.8. The same relationship between U.S.- and foreign-born Hispanics persisted for preterm births, except that Cubans displayed the lowest percentages among the ethnic subgroups (152). Anglo and black low birth-weight rates for the same year are 5.7 and 12.7, respectively. The relatively good birth-weight distribution of Hispanic births occurred despite disadvantageous characteristics of most of the ethnic subgroups.

One-fourth of Hispanic births were out-of-wedlock. This contrasted with 9.8 Anglo and 57.1 black, non-Hispanic (referred to as black in the remainder of this discussion). The ratio between Hispanic and Anglo out-of-wedlock births increased in older age groups, especially above the age of 30. Puerto Ricans exhibited the highest percentage (48 percent), thought to reflect the high incidence of consensual relationships among Puerto Rican women. Cubans have the lowest illegitimacy rate (14 percent) (151).

Hispanic women had poorer educational attainment than Anglos and black women, as measured by number of years of education. Approximately one-half of all Hispanics had 12 years of schooling versus 83 percent of Anglo women and 64 percent of black women. The overall percentage belied ethnic variations among Hispanics. Among Cubans, 73 percent completed 12 years of education; Puerto Ricans, 46 percent; Mexicans, 38 percent; Central and South American mothers, 61 percent. Educational attainment was directly related to maternal age, with teen mothers completing less years of education, and Hispanic mothers tending toward younger age groups (151).

Hispanics were also less likely to begin prenatal care in the first trimester than were Anglos or blacks. Again, there were differences among the subgroups with 80.1 percent of Cuban mothers beginning care in the first trimester; 60.1 percent, Mexican; 58.3 percent, Central and South American, and 54.2 percent, Puerto Ricans. This contrasted with 81.5 percent Anglo and 61.5 percent black. More Hispanics received little or no prenatal care than Anglos or blacks, 11.6 percent versus

3.6 and 9.9, respectively. Puerto Rican percentages of little or no care were highest at 15.8 percent; Cubans, the lowest at 4.2 percent. Hispanic mothers also had a lower median number of visits (11.1) than Anglos (11.5), but more than blacks (10.7). Not unexpectedly, Cubans had the highest number of visits at 11.5 and Puerto Ricans, the lowest at 9.3 (151).

Most Hispanic births were physician-attended hospital births (92.1 percent). However, Hispanics were more likely to use midwives (3.6 percent of births) than were Anglos (1.3 percent) or blacks (3.5 percent). Puerto Ricans used midwives the most (4.3 percent); the other subgroups' use ranged from 3.7-3.8 percent. Midwife births were less likely to occur in-hospital than those for Anglos or blacks (65 percent, 79 percent, and 95 percent, respectively).

Recent research on the Mexican American population indicates unexpectedly low adverse neonatal outcomes, as highlighted above, despite adverse living conditions, out-of-wedlock births, and poor prenatal care. In 1981, except for mothers 30-34 years old, Mexican American mothers showed consistently lower low birth-weight percentages than Anglos. Studies in Texas suggested that the favorable neonatal mortality rates were spuriously low, the result of migration selection and underregistration of deaths (93,123). In migration theory, women who migrate, for example from Mexico to Texas, are in better health than those who stay. Since the neonatal period reflects physiologic and biologic antecedents, these women have healthier offspring (93). Underregistration occurred for a variety of reasons, according to the investigators. These included underreporting of deaths due to misrepresentation of Mexican nationals as Texas residents; underreporting of fetal and neonatal deaths by lay midwives to avoid censure and reprimands from the established medical profession; the (misplaced) value put on a child's U.S. birth certificate by migrants; fear of authority contact by illegal aliens (123); and a large number of home births and shoebox burials even in cities like Houston that are not directly on the U.S.-Mexican border.

Recent work in California has suggested that the paradoxical neonatal outcomes are not spurious but are the results of the more favorable birth-weight distribution among Mexicans illustrated earlier. When U.S.-born and Mexican-born women were separated, the latter, who have shorter birth intervals, higher parity, and worse patterns of prenatal care, displayed low birth-weight rates below those of Anglos while native-born Hispanics had higher low birth-weight rates than either group. Underreporting of low birth weight was not a problem because the births occurred in-hospital (162). Recent data from Cook County (cited earlier) were similar. Out-migration was not a major factor in Illinois (11). Overall, good IMRs for Hispanics (slightly above Anglos and much lower than blacks) have been found in places as diverse as Houston, Cook County, California, and Colorado.

Explanations for the good birth-weight distribution and neonatal outcomes included better nutrition, lower smoking and ethanol abuse, and more parenting than blacks (162), and maintenance of strong cultural norms that lend social support against the effects of poverty and discrimination, especially among the foreign-born. However, with the exception of lower smoking and drinking, social and environmental cushions should exert some influence on postneonatal mortality rates. This has not been the case. Postneonatal mortality rates exhibited the expected positive relationship to poverty and Spanish surname in at least one study (93). A report in Texas estimated that postneonatal mortality was 60 percent higher for Mexican Americans in Texas than for Texas Anglos in the early-mid-1970s (125). Although out-of-wedlock births are lower than in the black population, they are substantially higher than in the Anglo population. Parenting may not be as important a factor as some claim. Others have questioned the stability of the Mexican American family, especially regarding the role and treatment of women.

As noted above, postneonatal mortality is relatively higher for Hispanics vis-a-vis other ethnic groups and considering the low birth-weight and neonatal death rates. This may be due in part to a structural alienation of Mexican Americans from mainstream Anglo society that spills over into the health care utilization patterns of the group. Language differences exacerbate cultural differences and work against health care utilization. Familism alternatively encourages and discourages use and seeking out patterns for the health system. Cuaranderismo complements health care system use, a finding consistent with a Galveston study that noted an integration between folk and conventional medical systems among Hispanics (26,125). Finances and lack of health insurance are also major barriers to health care, according to one author, more so than cultural differences (2). Poverty-related psychological stresses are also important as noted previously (24). Generally, Mexican Americans use less preventive and dental care than the U.S. population and are more dissatisfied with their care (2).

Puerto Ricans generally display higher mortality and low birth-weight rates than other Hispanic groups. Their rates are closer to, but not as high as, the black population (152). A study in Puerto Rico noted large declines in IMR since the 1955 rate of 55.1. In 1981, IMR in Puerto Rico was 18.5, although, as in the United States, pockets of very poor outcome still exist. The rate of decline of infant mortality decreased in the 1970s. The U.S./Puerto Rico gap between infant rates reached its lowest point in 1975; it has since widened. Fifty-six percent of all infants who died in Puerto Rico were of low birth weight. Since the 1950s, neonatal mortality rates have exceeded postneonatal rates (97).

Postneonatal mortality rates in Puerto Rico have declined from 29.5 in 1955, to 17.3 in 1965, and 3.5 by 1980. Surprisingly, the researchers found stronger links with SES for neonatal deaths (35 percent) than

with the postneonatal deaths (19 percent).²⁴ How representative the Puerto Rico figures are relative to Puerto Ricans living in the U.S. is unknown (97).

Little is known about Cubans. Florida, where the majority of Cubans in the United States live, does not collect ethnicity data for mortality rates. Birth certificate data that are available from 1981 have been summarized above.

NATIVE AMERICANS

Native Americans are a diverse group with 430 sovereign nations, a population of 1.6 million, and diverse life-styles (5). The IHS has made available data on native Americans, with most coming from vital statistics data derived from birth and death certificates.

Native Americans as a whole have shown tremendous improvements in infant and neonatal mortality rates. The overall infant mortality rate in 1954-56 was 62.7 per 1,000 live births. By 1978-80, it was 14.6, a 76 percent decrease (5). Available tribal information supports trends. The Hopi infant mortality rate in 1942 was 180. By 1978, it was 19.9 (51). The Navajo infant mortality rate in 1966 was 52; in 1978, 15.2 (21).

The decline in neonatal mortality may be related to the distribution of births by birth weight. The low birth-weight percentage is 6.5 overall. Women below 25 years of age have reduced percentages of low-weight births compared to the U.S. white women in this age group, but the reverse is true for women over 25. Indian women over 40 have a low birth-weight rate of 11.8 percent (5). Data from Oklahoma revealed a state Indian low birth-weight rate of 5.5 versus a black rate of 11.6 and a white rate of 6.4 (67).

Better low birth weight is usually a function of better prenatal care. However, figures from 1982 show that the percentages of mothers entering care early are lower than almost all racial and ethnic groups in the U.S. When both parents were Indians, 56.8 percent of pregnant women began care in the first trimester; only the mother Indian, 55.0 percent; father only, 68.5 percent (5). Only the last category displayed early care percentages that compared favorably to blacks who have among the worse percentages of women starting care in the first trimester (63 percent in 1980). Low birth-weight percentages did not correspond to care percentages. When both parents were Indians, 5.7 percent of infants born were less than 2,500 grams; mother only, 6.4 percent; father only, 6.8 percent. However, within each subgrouping, those with better patterns of care had fewer low-weight births (5). The question arises as to whether the lower percentages of babies under 2,500 grams in the two groups with worse care utilization is an artifactual result. Native Americans have a high incidence of diabetes which often results in larger-sized babies. Women with less care may be having babies larger

than 2,500 grams because of poorly controlled diabetes. These babies, despite their adequate birth weight, would display higher morbidity and mortality risks than smaller babies of mothers without diabetes or with well controlled diabetes.

Despite the good progress in lowering the neonatal mortality rate, postneonatal death rates are still high and may be rising relative to overall U.S. rates (88). Postneonatal rates of death are 1.7 times the U.S. rate in 1979 (7.2 versus 4.2) (5). Unlike overall U.S. data, native American postneonatal deaths contribute the bulk of the infant mortality. These findings are similar to those of a Canadian study of Cree-Ojibwa (169). In Oklahoma, postneonatal mortality accounts for 55 percent of the total Indian infant mortality rate versus 46 percent in whites and 63 percent in blacks (67).

The poorer postneonatal rates suggest that access to prenatal care and delivery services is better than access beyond the neonatal period. In a study of Navajos, newborns had shorter hospital stays at birth than for the U.S. newborns (2.7 versus 4.3 days); but those that died as postneonates had longer hospital stays at birth than those who survived. Environment, health history, and utilization variables were not significantly different between deaths and survivors in this study. Ultimate causes of death were susceptibility to infection and congenital anomalies (perhaps related to alcohol or diabetes). Navajo postneonates died from diarrhea and respiratory disease at 8.2 and 2.8 (1976-78) times the U.S. rates, respectively (21). A Canadian study of Cree-Ojibwa showed similar high rates of gastroenteritis and pneumonia as well as meningitis as causes of death in the postneonatal period (169).

The Canadian study notes SIDS as a major cause of death, which was not noted in the Navajo study. Native Americans have the highest ethnic subgroup SIDS rate of 5.93 per 1,000 live births (136). A recent seven-year retrospective record review in Oklahoma disputes these high rates. The Oklahoma Indians' SIDS rate was 2.3 versus 1.8 in whites and 3.1 in blacks over this time period. SIDS constituted a higher percentage of postneonatal deaths in Indians (20 percent), however, than in white or black deaths (14 percent each) (67).

Accidents are the leading cause of death among native Americans, and a major cause in the infant age group (5).

Congenital anomalies are also a major cause of death for infants, according to the Navajo study. Associations with alcohol abuse or diabetes are postulated. A recent, small clinical study of gestational diabetes in Pima Indians found that perinatal mortality, toxemia, macrosomia, and Caesarian sections varied directly with glucose concentrations, but congenital malformations and prematurity did not vary in this manner. The percentages of pregnancies associated with large-for-gestational-age infants increased as blood glucose concentrations rose in the third trimester, but the association lost

its significance when maternal weight and age were controlled. Large-for-gestational-age babies did demonstrate a perinatal mortality 4.5 times and a stillbirth rate 6.0 times other babies in the study (119). The study is not conclusive by any means and suffers from its small size (51 pregnancies). However, this and other studies point out the need for further research on the effects of diabetes and alcohol on pregnancy outcomes in native Americans.

Analysis of American Indian outcomes is somewhat hampered by the difficulty in disaggregating data by residence, either rural-urban or reservation-nonreservation, or even the likelihood that one individual of Indian descent will be so classified.

ASIANS

As with other groups, Asians are not a homogeneous population. Because the number of Asians in the United States is relatively small, vital statistics and other related data are often incomplete.

Generally, non-Hawaiian Asian mothers are older than black or white mothers. In 1980, only 6 percent of Asian mothers were less than 20 years of age compared with 14 percent of white mothers and 27 percent of black mothers. Approximately one-third of Asian mothers were over 30 years of age compared to whites (20 percent) and blacks (15 percent). Hawaiian mothers had the lowest median age (24.4); followed by Chinese (29.4); and Japanese (29.2) (147).

The birth order distribution was similar for Asians and whites. Forty-two percent of Asian births were first order; 10 percent of births were fourth or more (14 percent of black births fall into the latter category; 9 percent of white births). Hawaiians demonstrated the highest fourth order births (14.6 percent); Chinese (5.2 percent); and Japanese (4.7 percent), the lowest (147).

Where maternal education data were collected, Asian women were two to three times more likely than either whites or blacks to finish only grade school; yet they were also more likely to finish college at twice the rate of whites and five times the rate of blacks. Ninety-five percent of Japanese women finished high school (147).

Asians had less frequent out-of-wedlock births: 78 per 1,000 versus 110 per 1,000 for whites and 553 for blacks. There was a sevenfold difference between the lowest group, the Chinese, and the highest, Hawaiians (147).

Seventy-five percent of all Asians began prenatal care during the first trimester; 6 percent received little or no care. The Japanese were more likely to begin care early and less likely to have received little or no care. The rates of early care and little or no care fell between similar rates for blacks and whites, but were closer to the

latter. As education increased, there was a greater tendency to begin prenatal care earlier (147).

Asians have historically had low rates of multiple gestations. In 1980, the Asian multiple gestation ratio was 15 per 1,000 births compared to 19 in whites and 24 in blacks.

Asian low birth-weight rates were slightly higher than the white rate in 1980: 6.5 percent versus 5.7 percent. A breakdown of the rates revealed Chinese had the lowest rate, 4.8 percent; Japanese, 6.2 percent; and Filipino, 7.4 percent, the highest rate among all Asian subgroups. Maternal education does not explain the low birth-weight ratios in Asians relative to other ethnic groups.

A unique problem for Asian Americans is the extent of hepatitis BsAg carriage. The U.S. rate is 0.1-0.5 percent, but higher rates are found in persons from hyperendemic areas. In the U.S. this includes Asian ancestry groups. Pregnancies should be managed according to guidelines for vertical transmission screening and prophylaxis (27).

Southeast Asians present a different picture from the groups above. An early study of refugees arriving in 1979-80 found offspring born in the U.S. had a favorable mean birth weight (3,175 grams) and low birth-weight rate (5.7) compared to 1976 figures of 3,340 grams and 7.1, respectively. The refugees had lower Caesarian section rates, but a higher incidence of cephalopelvic disproportion and pre-eclampsia. A chart review, however, found underreporting of complications to vital statistic centers including size-date discrepancies and parasitic infections. In addition, there was concern voiced that the initially good outcome parameters for refugees would worsen if the group experienced downward social mobility with moves into urban areas (of a rural population) and loss of short-term social program funding associated with refugee states (34). Subsequent studies have supported the findings of good pregnancy outcomes in Southeast Asian refugees. Despite greater maternal and infant risk factors (especially among the Hmong) like high parity, large percentages of adolescent and older mothers (greater than 30 years old, but also a significant proportion older than 40), and lower weight gain during pregnancy, pregnancy outcomes in terms of low birth weight and mortality were adequate in these later studies (59,146). Investigators in both these studies did note that Southeast Asian infants were generally smaller than offspring of comparison groups (59,146). Another study recently presented compared ethnic subgroups of refugees to each other and to non-Asians. Low maternal weight gain, short stature, smoking, and not attending prenatal classes were found to be the most significant risk factors for low birth weight. All but smoking characterized the Southeast Asian groups. Generally, however, pregnancy outcome for all subgroups was acceptable. Mean gestational age was 38.6 for the refugees; 39.4, non-Asians. Mean birth weight was 2,999 grams for the Southeast Asians; 3,284 grams, non-Asians. There was a 136-gram difference between the lightest refugee

group (Mien) and the heaviest (Hmong). The Khmer displayed the largest percentages of women gaining less than 15 pounds during pregnancy. Average weight gain for Southeast Asians was 22.5 pounds (non-Asians, 32.9 pounds), and was not associated with parity or age (103). It will be interesting to see if pregnancy outcome indicators change as the refugees adapt to life in the United States.

Infant mortality is still a major problem in the United States. Its causes are multifactorial and include medical and biologic as well as socioeconomic and demographic determinants. These act directly on infant mortality or indirectly through low birth weight. Low birth weight, a weight of less than 2,500 grams at birth, is a major component of infant mortality. Low birth weight distribution, and not weight-specific mortality, is the main reason for the relatively poor U.S. international ranking of infant mortality rate.

Different racial and ethnic groups in the U.S. exhibit different birth-weight distributions and mean gestational ages. Some postulate that this is the result of genetic variation among these different groups. Thus, the cut-off for low birth weight should be adjusted for each subgroup. For example, black babies are born lighter and earlier than white babies, but have better birth weight-gestational age-specific mortality rates at these lighter weights and earlier ages. However, black babies have worse specific mortality rates at normal weights, suggesting other important risk factor contributions to black infant mortality. Hispanics display good birth-weight distribution; however, this may partially mask worse weight-specific mortality rates as well. Thus, although low birth weight is a crucial determinant of infant, and especially neonatal, mortality, any focus on improvement of the problem should emphasize not only improvement of low birth-weight distribution, but also the care and environment of the term infant. Any genetic contribution to birth-weight distribution is modified by other determinants of infant mortality and by access to health care.

Postneonatal mortality often, but perhaps simplistically, is used to reflect exogenous factors on the infant's life. Although SIDS is the major cause of death for all racial and ethnic groups in the U.S., other major causes of death in minority groups are often preventable, for example, infections in both blacks and native Americans. Access to care as well as environmental and socioeconomic factors, are crucial issues for improving preventable postneonatal mortality.

Ethnic variations in infant mortality and its components--neonatal and postneonatal mortality--still exist in the United States. The causes are multiple and interrelated. Solutions must effect not only improved access and utilization of medical or health care, but also structural social, economic, and environmental changes in American society.

FOOTNOTES

1. Mortality rates, unless otherwise indicated, will assume 1,000 live births.
2. Investigators have recently questioned the use of neonatal and postneonatal mortality as proxies for endogenous and exogenous causes of death, respectively. Poston and Rogers examined causes of death in matched birth and death records of infants less than 365 days old born in New Mexico between 1974-77. They found endogenous causes to predominate through the first seven days of life, then fall sharply and remain low throughout the entire first year. Ninety-five percent confidence bands of the curves determined for each cause of death converged at about the 18th day of life, not the 28th day. Ninety-three percent of all deaths from 0 to 18 days were endogenous; 82 percent of endogenous deaths occurred during this period. Less than one-half of deaths (46.5 percent) between 29 and 365 days or between 19 and 365 days (44.5 percent) were exogenous in origin. Endogenous causes of death thus predominated during the first year of life (122).

The study suffers from the exclusion of sudden infant death syndrome cases in the analysis. The authors justified the exclusion on the grounds that SIDS accounted for only 14 percent of infant deaths in the New Mexico data set. Sudden infant death syndrome is the leading postneonatal cause of death nationwide. It is highly unlikely that SIDS was a minor cause of death in New Mexico. This exclusion biased the results by decreasing the number of exogenous deaths. It is also unclear how the authors dealt with endogenous-exogenous interactions, for example, a premature infant with residual lung disease dying from pneumonia in late infancy. Nevertheless, the authors' call for a reevaluation of the current use of the terms neonatal and postneonatal mortality is deserving of more attention.

Eberstein and Parker also looked at causes of death during the first year of life in linked birth and death records for a 1975 cohort of live births in Florida. Exogenous causes of death such as accidents and infectious diseases contributed to neonatal as well as postneonatal deaths. The authors suggest that cause of death analyses might better distinguish endogenous and exogenous deaths than the neonatal/postneonatal dichotomy now used (35).

Most of the literature is still based upon the use of neonatal and postneonatal mortality as proxies for endogenous and exogenous causes of death, respectively. The practice will be continued in this paper.

3. This usage obscures the different prognosis of low birth-weight infants who are preterm (less than 38 weeks gestation at birth) and those who are term. The distinction is not often made in the literature. At least one good analysis of the different risk factors for preterm and term low birth-weight infants exists (66). A recently published study examines the postnatal growth and development of term low birth-weight versus term normal weight infants (153).

Birth weight has long been used to signify prematurity rather than estimated gestational age because birth weight was considered to be the more reliable variable. Birth weight is an objective measurement; gestational age relies on the judgement of the examining health professional. For the past several years, neonatologists and pediatricians have been increasingly using gestational age as the primary criterion of "prematurity" based on protocols like the Dubowitz chart.

4. Low birth-weight rates for other ethnic and racial groups (Hispanics, Asians, native Americans) approximate white rates. Actual figures appear in later sections of the paper dealing with the individual subgroups.
5. The discussion is not meant to mitigate the effects of a preterm delivery (less than 38 weeks). As mentioned in footnote 3, until recently, birth weight was the main criterion for prematurity. Investigators now more often are looking at or suggesting the use of bivariate distributions of birth weight and gestational age (1,32,160). However, intrauterine growth curves and neonatal risk estimates by birth weight and gestational age constructed in California using 1966-70 state vital record data seem to indicate that for a given gestation, birth weight strongly influences neonatal mortality. Gestational age for a given birth weight, on the other hand, showed less dramatic influence on the neonatal mortality rate (32). Similar work in South Carolina by Alexander et al. using 1975-80 state vital record live birth-infant death cohort data supports this finding (1).
6. For example, Bross and Shapiro showed that maternal age, race, birth order, education, and prior obstetric history (risk factors for poor pregnancy outcome, to be discussed later in the text) affect infant mortality both directly and indirectly through low birth weight. All but education directly affected neonatal mortality and all but birth order directly affected postneonatal death. Indirect effects could modify direct effects (20). Cramer also demonstrated that the relationship between six socioeconomic and ethnic factors (maternal age, live birth order, race, Spanish surname, marital status, and education) and early neonatal death was the result of direct effects of the individual risk factors and the indirect efforts of these factors through birth weight on

neonatal mortality. For example, blacks displayed relatively high neonatal mortality rates through direct and indirect associations while the higher direct risks for neonatal mortality in Hispanics are compensated by relatively lower indirect risks (larger babies). For Hispanics and Anglos, illegitimate births displayed high neonatal mortality due entirely to indirect effects of an unfavorable birth-weight distribution. Cramer suggests, on this basis, that public concern should focus on birth weight and not marital status per se (29).

7. A great deal of the low birth weight-related mortality and morbidity actually occurs in these very low birth-weight births (99). They are almost 200 times as likely to die in the neonatal period compared to normal weight infants, and they account for one-half of all neonatal deaths. As with low birth weight, blacks have higher very low birth-weight rates. Almost 2.5 percent of all black births fall into this category versus 0.9 percent of white births. Blacks account for 34 percent of all very low-weight births (99). In North Carolina, 71 percent of infants weighing less than 1,000 grams at birth in 1980 died in the neonatal period versus 0.2 percent of normal weight infants (23).
8. This analysis explains the apparent paradox of lower female neonatal mortality rates compared to male rates despite lower female birth weights. More females (7.2 percent) weigh below 2,500 grams than males (6.7 percent). However, if the respective birth-weight curves are interpreted using the means and standard deviations, the female curve has a lower mean but fewer births in its residual distribution than the male curve (2.9 percent) (161). Although black birth-weight distribution is worse than white birth-weight distribution, at weights below 2,500-3,000 grams, black birth weight-specific neonatal mortality is lower than the corresponding white rates at these weights (1,10,23,32).
9. Wilcox and Russell looked at birth weight-specific mortality in a similar manner to their birth-weight distribution curves using two very large data sets from the U.S. vital statistic records. Mortality was greatest at the lowest and highest birth weights, reaching a minimum within the most frequent (normal) birth weights. Weight-specific mortality was thus described as the sum of three separate risks--one independent of birth weight (risk at normal ranges), one decreasing (risk at lower weights), and one increasing (risk at higher weights) linearly with birth weight. Weight-specific neonatal mortality curves for specific causes of death, like pneumonia, congenital anomalies, and birth injuries, displayed curves similar in shape to the birth weight-specific mortality curves. Infants at the extreme birth weights are apparently more vulnerable to a wide range of insults, and not merely to a few select life threatening conditions. In other words, there is a general susceptibility to perinatal problems at the

extreme ends of birth-weight distribution, rather than a cumulative effect of specific low or high birth-weight causes of morbidity and mortality. Since more low-weight than high-weight infants are born, more infants of low birth weight are susceptible to these general perinatal problems (161). Recent data from the U.S. suggest that the rise in birth-weight mortality at the higher end of the weight curve is not as dramatic as Wilcox and Russell found in their data set (Centers for Disease Control, unpublished data).

10. Technically, preexisting medical conditions are secondary precursors because they are maternal characteristics separate from (although often exacerbated by) the pregnancy. This illustrates the overlap and somewhat arbitrary categorization of the three-level model for precursors or risk factors.
11. Whether smoking acts through nicotine directly or through secondary mediators like nutritional deficits is unclear (15). Recent work has shown trivial acclimatization to carbon monoxide poisoning by fetuses of smoking mothers. The human fetus apparently cannot physiologically accommodate to maternal cigarette smoking and is thus more susceptible to adverse effects of cigarettes (25).
12. Bragonier et al. claim that the content of prenatal care has not changed substantially over the past two decades except in the quantity offered. Prenatal care, according to these authors, still focuses on medical parameters and crisis management for complications (15). However, comprehensive programs that include services beyond medical care do exist and appear to improve pregnancy outcome. For example, a comprehensive prenatal care project that included medical, social, nutritional, educational, and outreach services improved pregnancy outcome indicators for high-risk women compared to a similar group of women using routine medical prenatal care (141).

Not all evaluations of broad spectrum prenatal programs have yielded positive results. An evaluation of a North Carolina IPO project in two counties revealed increased participation in prenatal care by the rural black population without a concomitant effect on low birth-weight rates. The authors suggested that a lack of intensity and/or quality of care; a more high-risk population relative to controls; or a failure to adopt more recent methods to deal with preterm delivery may help explain the failure of program impact (114). One of these new methods is an intensive program of early identification of high-risk pregnancies, close high-risk follow-up, instruction of the pregnant women in the recognition of the signs of preterm labor, in-service training for the obstetric staff to recognize and treat preterm labor, and more aggressive tocolytic therapy. In a pilot study, the program resulted in more women receiving long-term tocolytic therapy, a significant decline in preterm delivery, and a mean delay of six weeks in those who

still delivered preterm (resulting in heavier, more mature babies) (30,31,54). This approach is now being assessed in a randomized clinical trial sponsored by the March of Dimes.

13. Some authors have attempted to link maternal birth weight with offspring birth weight. A middle-class Buffalo cohort of the Collaborative Perinatal Project yielded a positive association between the birth weights of the mother and of the infant. Mothers with lighter birth weights, for example, 4-5.9 pounds, had lighter babies (in 4-5.9 group, 170 grams lighter) than mothers who weighed greater than eight pounds at birth. However, there were no offspring with birth weights below 2,500 grams among women with birth weights below four pounds. The problem with the study is that recall of maternal birth weight is not very accurate and many low birth-weight infants from the maternal birth cohort would not have survived. Whether lower class mother-infant pairs would display similar patterns was not demonstrated (72).
14. A Japanese researcher recently showed that the decline in infant mortality in Japan has coincided with an increased concentration of childbearing between the ages of 20-39 years. He noted a similar but somewhat lesser shift had occurred in Sweden concomitant with its decrease in infant mortality. The shift has been only minor in the United States. Indeed, all 16 countries ranked above the U.S. in infant mortality have greater than 90 percent of their births delivered among the 20-39 year old maternal group, while only 84.8 percent of U.S. births fall into this category. The countries ranked below the U.S., however, have percentages of births in this age category greater than or similar to the U.S. percentages (157). This theory needs more in-depth study to support it.
15. Sweden and other Scandanavian countries have remarkably low PMRs, in the low 2.0s. These may represent the bottom line for postneonatal mortality; that is, an irreducible level caused mainly by congenital anomalies, which account for one-third to one-half of Scandanavian postneonatal deaths (120).
16. Black PMR did not fall from 1981 to 1982. Between 1980 to 1981, there was an unusually large decline in black PMR of 9.6 percent. On the average, the 1980-82 decline in PMR has been 5 percent per year. This is higher than the 1970-80 3-percent-per-year decline (73).
17. Several questions arise in connection with the mortality and morbidity of very low birth-weight infants during the postneonatal period. The first is whether the advanced technology that allows some of the smallest babies to survive beyond the neonatal period is preventing or merely postponing death (50,171). A recently published three-year evaluation of survivors of one neonatal intensive care unit found that 3.8 percent of the discharged infants

died during this time. The actual PMR for this group was 29, approximately seven times the general population (134). The small numbers involved in this study limit the accuracy of the figures and the generalizability of the findings. Another local study in upstate New York noted increasing PMRs from 1968-1979, almost entirely due to deaths in the 501- to 1,500-gram birth-weight category (171).

The second question involves the morbidity of these very small infants, with particular attention to neurologic sequelae, developmental delay, chronic pulmonary disease, and so on. Recent reviews of the literature suggest that, for example, neurodevelopmental handicaps seem to be decreasing among this group of very low birth-weight infants, but that these infants still have up to three times the likelihood as normal-weight infants to demonstrate adverse neurologic outcomes (99). A small, single NICU follow-up study found improved postdischarge development (and survival) in babies with a birth weight of 800 grams and was cautiously optimistic about long-term consequences. Again, the study is limited by its size (8).

A third question related to the very low birth weight is that of cost-effectiveness of NICU care. While it is generally felt to be cost-effective (22), questions remain concerning the cost-effectiveness of aggressive care for the smallest infants (50,80,99).

18. For most causes of death, black rates are two to three times white rates. Congenital anomaly death rates are approximately equal in both races, but for gastrointestinal disease-related deaths, the black-white ratio is close to four. This is based on 1981 data (157).
19. Homicide is often overlooked in this age group. Neonaticide, defined as homicide at less than one week of age, often involves parents and occurs predominantly in rural areas. Neonaticide comprises 3 percent of all childhood homicides. There is a victim predominance of males and whites and an offender predominance of females and whites. Higher rates of neonaticide occur in the Northeast and South. Infanticide, homicide between one week and one year, is more like other childhood homicides. Male victims and offenders are more frequent; whites are more frequent in both categories. There is an urban predominance. The highest incidence is in the North Central states. For both types of homicide, the predominant cause of death is body force (62).
20. Kaplan et al. dispute the native American figures. Their study in Oklahoma, discussed in the section on native Americans, found a SIDS rate of 2.3 per 1,000 live births in Oklahoma. This rate was intermediate between whites and blacks in that state. However, SIDS

cases accounted for a larger proportion of postneonatal deaths among native Americans than among black or white postneonatal death (67).

21. The Martinez studies were based on mail and telephone survey and suffer from non-response and recall bias as well as a sampling procedure that eliminated 30 percent of the available population (55,94,95,96).
22. As noted in the text, the standard definition of low birth weight--less than 2,500 grams--may be inappropriate for blacks, particularly when birth weight-specific mortality is considered. Blacks have better birth weight-specific mortality than whites at weights below 2,500-3,000 grams. This will be discussed later in the section.
23. Boone examined a very high-risk inner-city black subpopulation in Washington, D.C. This group of women disproportionately and repeatedly contributed adverse outcomes to the general health statistics of the area. Standard secondary characteristics of age, education, and marital status failed to predict poor pregnancy outcome in this population where educational levels are uniformly low and most of the reproductive segment is young and unmarried. Neither drug abuse nor venereal disease distinguished normal from very low birth-weight babies, although alcoholism, low maternal weight at delivery, hypertensive history, migrant status (from Virginia, North Carolina, South Carolina), ineffective contraception, lack of prenatal care, a history of violence, especially physical violence, and poor psychological adjustments and social support systems did distinguish the very low birth-weight group. Interestingly, these women used community services like medical care, but were not adequately identified as high risk by the providers they saw and their health status was poorly documented in hospital charts and the like (13).
24. Socioeconomic variables included school years completed for those over 25 years old; distance from an urban center; and inadequate housing (97).

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Evaluation of Interventions to Reduce Racial Disparities in Infant Mortality:

Key Intervention Components

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KEY INTERVENTION COMPONENTS

Several key components are consistently found in the program interventions aimed at reducing infant mortality among minorities. These interventions, described below, are directed at the individual woman, her family, her community, and the system providing and paying for her care. The regional development of perinatal care, although not explicitly defined as a key component, is clearly the underlying system that is essential to the success of each and every intervention (AAP/ACOG, 1983).

While the jury is still out on the individual impact of each strategy for decreasing low birthweight (LBW), neonatal mortality (NM), and/or postneonatal mortality (PNM) among each minority group, the combination of strategies or the multidisciplinary approach characterizing these demonstrations is often associated with improved outcomes and worthy of expanded evaluation and replication.

These comprehensive interventions have contributed to reducing many of the medical and nonmedical risk factors associated with LBW, NM, and PNM. In particular, they have resulted in more appropriate utilization of prenatal, maternity and newborn services as well as in increased adoption of preventive actions in nutrition, psychosocial problems, smoking, drinking, physical exercise, recognition of premature labor, compliance with medical regimens, parenting skills, and family planning.

The following is a listing of the key intervention components:

1. Carefully targeting of high risk areas, using matched birth and death certificates and special needs assessment surveys.
2. Aggressive outreach for case finding, using Title V agencies, health departments, WIC, welfare offices, etc.
3. System of case management to assure appropriate referrals and continuity of care.
4. Standardized risk assessment of pregnant women.
5. Expanded patient education services, including nutrition counseling, psychosocial counseling, alcohol and drug abuse prevention, smoking cessation, stress reduction, physical exercise, birth education, premature labor prevention, parent education, etc.

6. Program of home visiting during and after the pregnancy.
7. Extensive follow-up (for one year) of mother and infant, emphasizing family planning and early identification of infant problems.
8. Active participation and coordination by multidisciplinary teams of obstetricians/gynecologists, neonatologists, pediatricians, nurse midwives, nurse practitioners, and lay health visitors.
9. Active involvement of advisory committees with provider and community participation in the design and implementation of interventions as well as in perinatal audits that evaluate the outcomes.
10. System of service linkages with regionalized obstetrical and neonatal services, Title V and XIX agencies, WIC, family planning, etc.
11. Expanded insurance/payment options, for example:
 - a) expanded insurance eligibility through Medicaid or special state funds or joint federal/state funds, to cover additional categories of needy pregnant women, and/or
 - b) expanded package of prenatal care and infant benefits, including more prenatal care visits, nutrition supplements, psychosocial counseling, health education, vitamins and other drugs, birth education and some newborn follow-up, and/or
 - c) increased amount and timeliness of reimbursement for providers to encourage their participation, and/or
 - d) changes in the methods of reimbursement, using prospective payment or capitation (other than global fee unadjusted for risk), and/or
 - e) allowance of reimbursement for care delivered by nurse midwives and nurse practitioners.
12. Development/adoption of standards for regionalized obstetric and newborn care.
13. Continuing education and training of providers, particularly in behavioral sciences.

14. Plans for ongoing systematic evaluation of process (organization, utilization, and payment for services), outcome (changes in maternal knowledge, attitudes, and behaviors), and impact (changes in LBW, NM, and PNM).

Each of these key components combined represents a comprehensive system of care that is likely to result in reduced LBW, NM, and PNM. Unfortunately, the maximum and minimum set of program components necessary to reduce LBW, NM, and PNM among minorities is unknown. That is, we do not know if all fourteen key components are essential or only seven out of the fourteen or which combinations are needed to achieve decreases in infant mortality. The relative importance of the multidisciplinary team or the presence or absence of home visiting or the extent of insurance coverage or the critical patient education services (psychosocial counseling or smoking cessation) has not yet been determined. However, particular attention should be focused on aggressive outreach (#2), systems of case management (#3), expanded patient education services (#5), and expanded insurance/payment options (#11).

Although there is a general lack of definitive program evaluation from which to judge effectiveness, it is clear, however, from the sheer weight of the literature and of reports of maternal and child health programs that a multidisciplinary approach with expanded medical, psychosocial and system-wide interventions is essential for reducing racial disparities in infant mortality. In addition, it is also evident that the "technologies" to evaluate the impact of multiple interventions on LBW, NM, and PNM among minorities are very limited.

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Evaluation of Interventions to Reduce Racial Disparities in Infant Mortality:

Health Insurance Coverage of Maternal and
Infant Care For Minority Women

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HEALTH INSURANCE COVERAGE OF MATERNAL AND INFANT CARE
FOR MINORITY WOMEN

I. Introduction

Since both socioeconomic status and use of prenatal services represent two significant risk factors associated with infant mortality among minorities, additional attention is being devoted to financing issues and insurance coverage in this report. The major areas covered in this section are: 1) the relationship of income and minority status to insurance coverage, 2) the disproportionate number of minorities, primarily women and children, with limited (Medicaid or insured only part of the year) or no insurance coverage, 3) the impact of insurance coverage on utilization of health services and physician and hospital participation, and 4) a review of current efforts and recommendations for improving insurance coverage and increasing provider involvement.

This section begins with an overview of insurance status -- uninsured, Medicaid-only, privately insured -- among Blacks, Hispanics (including Mexican Americans, Puerto Ricans and Cubans), and Whites. The following section focuses on Medicaid since it is the most important source of payment for low income women. The increasing burdens of uncompensated care for providers who care for low income women and their children are then described briefly followed by a listing of selected research gaps related to insurance coverage of maternal and infant care. The final section deals with recommendations to improve financing of maternal and infant care for minority women and their children.

II. Overview

No insurance or limited insurance results in reduced utilization of health services (Wilensky and Walden, 1981), particularly preventive services (Anderson et al., 1981; Bullough, 1972). In addition, persons with limited insurance are less likely to have a usual source of care (Kasper and Barrish, 1982, Butler et al., forthcoming in Pediatrics).

These findings are critical to understanding and ameliorating some of the non-medical risk factors associated with the disproportionately high rates of infant mortality among minorities. In other words, adequate health insurance protection is necessary to encourage improved access and more appropriate use of prenatal, intrapartum and postpartum services.

Not only is insurance essential for the pregnant woman and her infant, increasingly the literature and anecdotal reports are citing its importance for assuring physician and hospital participation in caring for low-income women (Mitchell and Shurman, 1982).

III. Insurance Status of Minorities

A. Uninsured Populations

The absence of health insurance coverage leaves the individual subject both at financial risk arising from uncovered medical care costs and increased health risks arising from postponed utilization of medical care services. Both these risks are likely to be greater for minorities and for the poor than they are for the rest of the population. (Wilensky and Walden, 1981).

Minorities are far less likely to be insured than Whites, as shown in Table A. According to 1978 and 1980 average annual data of persons 65 and under from the National Health Interview Survey (NHIS), 25.7% of Hispanics (29.9% of Mexican Americans, 19.7% of Puerto Ricans, and 16.6% of Cubans), and 17.8% of Blacks had no health insurance protection (Trevino and Moss, 1983). This compares to 8.7% of Whites with no coverage. Insurance coverage of Indians and other minorities is not separated out in these data.

Aday et al. (1980), Gurnack (1980) and Andersen et al. (1981) similarly found that Mexican Americans are the least likely of any American population group to have insurance coverage. They concluded that this is due primarily to the lack of insurance benefits offered Hispanics through their sources of employment. In addition, this high level of uninsurance also relates to their relatively low family incomes, their mobility between states, possible language barriers in understanding the complexities of applying for AFDC, and their citizenship status.

The lower one's family income, the less likely one is to be insured (Trevino and Moss, 1983). Table B documents this finding for persons of every race. According to Trevino and Moss: "Inability to pay was the most frequent reason provided by all ethnic groups (for being uninsured)." (p. 46).

The relationship of income to insurance status is a critical issue particularly for minorities with disproportionately low income levels and high poverty rates. Based on 1982 data from the Census Bureau (1983), 33% of Black, 27.2% of Spanish origin, and 9.6% of White householders lived below the national poverty level of \$9,862. Poverty figures for their related children

under 18 are substantially higher: 47.3% Black, 38.9% Spanish origin, and 16.5% White children lived below poverty.

Even more startling is the poverty rate among persons in families with a female householder and no husband present: 56.2% Black, 55.4% Spanish origin, and 27.9% White. For related children under 18 living in these female-run households, 71.8% of Spanish origin, 70.7% of Black, and 46.5% of Whites all lived below poverty levels.

B. Medicaid-Only Covered Populations

Twenty percent of all Blacks, 13.4% of Hispanics (31.9% of Puerto Ricans, 10.7% Mexican Americans, and 5.4% of Cubans), and only about 2.7% of Whites (non-Hispanic) were covered by Medicaid only in 1980. Clearly, the importance of Medicaid as a source of insurance coverage for low-income minorities is evident from these statistics. If data from the Health Care Financing Administration (HCFA) were available on the number of minority women and children who receive Medicaid in 1983 or 1984, these percentages would be even higher since proportionately more women and children rely on Medicaid and since the poverty rate among minorities has increased since 1980 (McManus, 1983).

Several possible reasons for the high Medicaid coverage rates for Blacks and Hispanics are as follows: 1) their relatively high poverty rates make them eligible to qualify for welfare and thus become Medicaid eligible, and 2) some 40% of Puerto Rican and Black families are headed by females with no husband present vs. 16% of Mexican Americans and 12% of Whites (Bureau of Census, 1979), again making them eligible for AFDC.

C. Private Insurance

As expected, Blacks and Hispanics are far less likely to be privately insured than Whites, as shown in Table A. The NHIS combined data for 1978 and 1980, show 86.1% of Whites were privately insured as compared to 61.3% of Blacks, and 58.6% of Hispanics (74.2% of Cubans, 59.0% of Mexican Americans, and 47.7% of Puerto Ricans). Unfortunately, these data do not break down further in terms of full-year coverage or part-year coverage. This has more significance for minorities since they are more likely than Whites to be insured only some of the time (Wilensky and Walden, 1981). Upcoming published reports from the National Medical Care Utilization and Expenditures Survey (NMCUES) should provide this information.

IV. Medicaid as the Major Source of Insurance Coverage for Low Income Minority Women

A. Impact of Medicaid on Utilization, Health Status and Cost

Since the inception of Medicaid in 1965, access to and utilization of health services by low income individuals has markedly increased. Major improvements have been made in the past twenty years, as measured by the increase in numbers of women receiving prenatal care at an earlier stage (National Center for Health Statistics, 1967-1980). Infant mortality rates have sharply declined (Health U.S., 1983; CBO, 1981). To what extent these changes can be directly attributed to Medicaid financing is difficult to measure. Regardless, there is no question Medicaid is at least one very significant contributing factor that has reduced utilization differentials among poor and non-poor families, particularly as it relates to prenatal care, as described below.

In a California study on Medi-Cal's impact on perinatal outcomes, Norris and Williams (1983) found that between 1968 and 1978, Medi-Cal greatly increased access to and use of prenatal care. In 1968, Medi-Cal financed 45,927 hospital deliveries (13 percent of the total live births and fetal deaths). Medi-Cal-reimbursed deliveries more than doubled from 1968 to 1978 to 27 percent or 94,341 deliveries. Correspondingly, a far greater percentage of Medi-Cal women in 1978 initiated earlier prenatal care than did other Medicaid women in 1968.

Norris and Williams also found improved standardized perinatal mortality rates (for most birthweight groups) among their Medi-Cal insured populations of White (non-Spanish surname), White (Spanish surname), and Black women as compared to low income women not covered by Medi-Cal. They found that the highest crude and standardized perinatal mortality rates were for non-Medi-Cal infants born in county hospitals and infants whose mothers received no documented prenatal care. "It thus would appear that poor women who have joined the 'mainstream' by means of Medi-Cal have fared very well, while those remaining outside are exposed to increased risk of adverse pregnancy outcomes." (p.7)

Other researchers (Schwartz and Poppen, 1982; Hadley, 1983; Grossman and Jacobowitz, 1982 and 1984) have found important links between receipt of Medicaid and increased access to prenatal care and health status improvements.

Several reports of cost savings of Medicaid-financed prenatal care have been documented in testimony before Congress and in recent reports on the impacts of Medicaid costs. They are abstracted below:

- The Texas Department of Health found that the birth-related expenses of women that received Medicaid during pregnancy were \$210 less on average than the expenses of mothers who were not eligible for Medicaid until after delivery. (1981 state Medicaid data of over 9,000 births were examined.)
- In a recent administrative petition to DHHS Secretary Margaret Heckler, from nine California-based petitioners, the annual cost of not providing comprehensive maternity care to poor women was estimated to be approximately one-half billion dollars. The petitioners calculated that \$2 could be saved for every dollar spent on maternity care, as a result of a decreased need for newborn intensive care, rehospitalization of sick infants, and long term care costs of chronically ill children.
- Dr. Robert Goldenberg, an Alabama obstetrician, testified in 1981 before the Senate Finance Committee that several researchers have estimated as much as \$5-10 savings for every dollar spent on maternity care.
- In a study of 149 women receiving inadequate prenatal care, health officials in Oregon estimated that the cost of care for their five high-risk premature infants at \$150,000 could have better been spent on providing comprehensive prenatal care to all 149 women.
- Ohio's Children's Defense Fund calculated that for every \$2 million invested each year in prenatal care for at least 25 percent of the 22,000 women who are pregnant each year but are not served by Ohio's patient care clinics, some \$8 million dollars would be saved.
- The Harvard School of Public Health in a 1978 study found that for every dollar spent on prenatal care, \$3 were saved from reduced hospitalization.

Increasing evidence is mounting regarding the cost savings associated with Medicaid-financed prenatal care.

B. Current Trends

Even though Medicaid is not covering anywhere near the number of poor women and children that could benefit from extended coverage because of arbitrary eligibility standards,³ one cannot underestimate its importance in terms of women and children and dollars. In 1982, 5.4 million adults in families with dependent children (24.8% of the total number of unduplicated Medicaid recipients) and 9.6 million dependent children under 21 (44.3% of total) received Medicaid (Health Care Financing Review, Fall, 1984). Medicaid vendor payments in the amount of \$4.1 million for AFDC adults (13.9% of total) and \$3.5 million for their dependent children (11.8%) were spent in 1982.

Of the AFDC adults, it has been estimated that 80% or 4.4 million are women (Duvall et al., 1982). Of these women, approximately 80% or 3.5 million are women of childbearing age. Unfortunately, HCFA does not collect data on the estimated number of pregnant women eligible for and/or receiving Medicaid at any given time.

In spite of the large numbers of women and children receiving Medicaid, it is evident from these data that they consume relatively few Medicaid dollars compared to other recipient groups. This finding of the distribution of Medicaid recipients and expenditures can be clearly seen in Figures 1 and 2. The aged, blind and disabled consume the lion's share of resources.

Women and children are obtaining less and less of the total Medicaid dollar as compared to all other eligible groups, as shown in Table C. In 1972, AFDC-related women and children made up 62.3% of all Medicaid recipients and accounted for 33.4% of all Medicaid vendor payments. In 1982, proportionately more women and children received Medicaid (69.1% of all Medicaid recipients), yet only 25.7% was spent on them. Preliminary data for 1983 show this trend continuing. More and more Medicaid dollars are being spent on institutional care and less and less on ambulatory care. In other words, states are purchasing fewer ambulatory services in favor of nursing homes, intermediate care facilities, and hospitals. The consequence of this shift in

³ According to a report by Wilensky and Berk (1982), 17% of all persons living at or below poverty level are uninsured. Moreover, Medicaid reaches only 60% of individuals living below federal poverty standards. Rosenbaum and Weitz (1983) of the Children's Defense Fund extrapolated from these estimates and testified that if 7.8 million women of childbearing age live in poverty, some 1.3 million will be uninsured.

Medicaid resources has resulted in increased demands on other public and private funding sources and public services as well as rising levels of uncompensated care and bad debts. (McManus, Norton and Flint, forthcoming). Maternal and child health advocacy groups and policy groups are increasingly documenting this shift in public funding and the disproportionate impact it continues to have on women and children and the providers that care for them. Not to force any confrontation between needy groups, what instead should be considered is the relatively small costs and significantly large benefits of extending Medicaid coverage to more women and children. A handful of states are expanding Medicaid coverage, aside from CHAP, for these very reasons.

C. CHAP

With the October 1984 passage of the Budget Deficit Reduction Act, came increased Medicaid eligibility for many more pregnant women and newborns who were previously uncovered in many states:

- 1) first-time pregnant women who would be eligible for AFDC (or would be eligible as AFDC-unemployed parents if the State covered this group) if the child is born, from medical verification of pregnancy,
- 2) pregnant women in two-parent families where the principle breadwinner is unemployed, from medical verification of pregnancy,
- 3) children born on or after October 1, 1983, up to age five, in two-parent families, and
- 4) children born to a woman eligible for and receiving Medicaid at the time of the child's birth for one year as long as the woman remains eligible for Medicaid and the child remains a member of her household.

These eligibility expansions are estimated to benefit approximately 248,000 pregnant women and 217,000 children over the next five years, according to the Health Care Financing Administration. The challenge facing the MCH community is to inform potential recipients and providers (physicians, nurse midwives/nurse practitioners, clinics, and hospitals) of the changes in Medicaid eligibility and to monitor any cases where Medicaid has been denied to women and children in the above recipient categories.

D. Existing Problems with Medicaid

While the CHAP expansions in Medicaid reduce many of the state variations in eligibility affecting certain groups of pregnant women and children, several equally important and critical problems still exist with Medicaid:

1. Low AFDC Payment Standards

Large numbers of poor pregnant women are not "poor enough" to meet their states' excessively low AFDC payment standards and go uninsured. For example, Region IV statistics show that in Mississippi in 1982, a family of four had to make less than \$1,440 to qualify for Medicaid; in Alabama - \$1,776; in Tennessee - \$1,848; in South Carolina - \$1,052; in North Carolina - \$2,652; in Georgia - \$2,748; in Kentucky - \$2,820; and in Florida - \$2,952. Nationally, the poverty level for a family of four was set at \$9,860 in 1982. Region IV's state-set poverty standards in 1982 averaged less than half that amount -- \$4,137. To make matters worse, Region IV set their AFDC payment standards and Medicaid eligibility levels far lower than their own poverty standards -- a shocking \$2,286 -- only 23% of the national poverty standards. Blacks in Region IV represent a significant percent of the resident population in each state and a far greater percent of the persons living below poverty. In other words, Blacks and Black women specifically are severely impacted by state's low AFDC payment standards in Region IV, as shown below.

<u>Region IV</u>	<u>Resident Black Population</u>	<u>Black Population Below Poverty</u>
Mississippi	35%	66.0%
Alabama	26	52.1
Tennessee	2	33.1
South Carolina	38	62.6
North Carolina	22	46.9
Georgia	27	54.3
Kentucky	7	14.5
Florida	14	35.5

2. Restrictions on Mandatory and Optional Services

Restrictions on Medicaid mandatory and optional benefits often result in a limited "package" of reimbursed services. For Medicaid women who have little or no discretionary money, paying for additional services out-of-pocket is not feasible and, consequently, often foregone. These foregone services often include a sufficient number of prenatal care visits as well as nutritional supplements, pregnancy-related drugs, psychosocial counseling, and birth education classes. In addition, many states have placed arbitrary limits on the annual number of physician office visits, out-patient visits, visits to rural clinics and other clinics, and inpatient hospitalization. Unfortunately, few states placing these limits have exempted pregnant women, although some have since increased or at least adjusted the number, according to the type of severity of condition seen (McManus, 1983). For pregnant Medicaid women, many of whom are at high-risk, such limits place additional access burdens on them as well as on the providers who care for them.

3. Limited and Declining Physician and Hospital Participation

Limited and declining physician and hospital participation in Medicaid reinforces a two-tiered system of care for poor and near-poor pregnant women. OB/GYN participation in Medicaid is less than any other primary care physicians' participation, according to a 1982 study by Mitchell and Schurman. In their sample of over 1,800 physicians, Mitchell and Schurman reported the average participation rate of OB/GYNs was 8.4% as compared to 14.1% for pediatricians and 13.4% for general surgeons. Of even greater concern is the finding that 35.6% of OB/GYNs surveyed saw no Medicaid patients whatsoever. This contrasts sharply to pediatricians (23.1%) and general surgeons (9.7%). Other reports and an increasing number of newspaper articles (see Attachment 1) cite similar problems with low and decreasing OB/GYN participation in Medicaid. For example, one-third of Oklahoma physicians providing maternity care would not accept Medicaid as a method of payment in 1982 (Report of Intended Expenditures, 1983). Between 1974 and 1977, the number of OB/GYNs in California accepting Medi-Cal patients dropped by 30% (California Raza Health Alliance, 1979).

Mitchell and Schurman also reported that OB/GYNs (as well as general surgeons) receive very low Medicaid reimbursement rates. In fact, Medicaid paid less than 60% of the usual office visit fee. Similar findings have been reported in other states. California, a more "generous" state, reimbursed participating

physicians in 1982 at only one-third of the private fee for normal prenatal care and delivery (California Department of Consumer Affairs, 1982).

In a recent speech before the Infant Mortality Conference in Denver, John Poland (1984), the Medical Assistance Administration for Suffolk County, New York, described similar problems with New York's Medicaid reimbursement levels:

The current New York state (Medicaid) maximum allowable physician fee for complete obstetrical care -- prenatal, delivery and follow-up -- is \$275. The market place in Suffolk is \$1,200 to \$1,800: Up front! With this kind of pricing structure, the results are predictable: private obstetrical care is virtually unavailable to the Medicaid client in the medical market place.

The only option left to pregnant Medicaid women, according to Poland, is obstetrical care provided by clinics and hospital outpatient departments. These expensive services are reimbursed fully by Medicaid at costs ranging from \$60 to \$88 per visit. As Poland aptly states: "Thus, while the private obstetrician chooses between accepting a composite fee of \$275 or withholding services, the clinic or hospital can realize between \$850 to \$1,050 for the same array of services."

In response to these perverse Medicaid pricing policies, one town in Suffolk County (Huntington) is experimenting with having the county health department serve as the case manager, organizing thirteen obstetricians to accept Medicaid recipients on a strict rotation basis.

Major cost savings have already been reported. Prenatal care and delivery provided by obstetricians saved Medicaid about \$1,000 per client, or between \$65,000 to \$100,000 per year. Soon they expect to contract with a group of obstetricians on a capitation basis to provide an expanded package of services, including family planning, parent education, counseling, and gynecological services.

Low reimbursement rates for the "package" of perinatal care is common in all states (La Jolla, 1983). Total obstetrical care, including antepartum care, vaginal delivery, and postpartum care provided by a general practitioner was reimbursed on average only \$350 by Medicaid in 1982. Furthermore, states vary dramatically in their payments from a low of \$135 in Mississippi to a high of \$539 in Nevada. Clearly, these reimbursements are far below the rates reimbursed by private payors. And, as Sara Rosenbaum of the Children's Defense Fund, noted: "The irony in all of this is that the federal Medicaid regulation (42 CFR sec.

447.204) specifically provides that a Medicaid agency's payments must be sufficient to enlist enough providers so that services under the plan are available to the general population." Clearly, enforcement of this federal rule is long overdue.

Another unique factor affecting OB/GYN participation is that payment as mentioned above, is usually made for a "package" of services, often including up to 10-12 patient care visits, the delivery and post-partum care. For high risk women, the number and scope of services required is typically in excess of this "normal package." However, such differentials in case mix and need for services are seldom reflected in fee schedules. Moreover, billing for these services cannot take place until after the delivery, often resulting in a delay of some 10-18 months, further reducing the reimbursement amount in real dollars.

The importance of reimbursement, both amounts paid and methods used for OB/GYN participation cannot be underestimated. When comparing the high costs expended for care delivered in hospital outpatient departments, clinics and NICUs with the lower costs of OB/GYN care, a clear case can be made for increasing OB/GYN reimbursement on the basis of cost effectiveness. Several states, as noted above and in the case studies (Report 4), are proceeding in this manner.

If so few OB/GYNs participate in Medicaid, one can reasonably conclude even fewer specialists are seeing uninsured women, a large number of whom are minorities. As a consequence of this severe shortage of OB/GYNs caring for low income women, many states have expanded their coverage of nurse midwives and nurse practitioners. While this is extremely important in terms of extending access to perinatal care and improving case management for pregnant women, it also undergirds a dual class system of care for high-risk pregnant women and fails to solve the more basic problem of increasing OB/GYN participation in Medicaid. Some states and localities with OB/GYN shortages are requesting that the federal government define them as medically underserved. All of this is at a time when there is an oversupply of physicians, including OB/GYNs (Division of Medicine, Bureau of Health Professions, phone conversation-12/84; GMENAC, 1981).

Summarizing Mitchell and Schurman's data, the following generalizations can be drawn regarding strategies to increase physician participation: raise Medicaid fees, improve the processing of Medicaid claims, expand covered benefits (e.g., nutritional supplements), remove restrictions or allow for exemptions of covered services (e.g., increase the number of visits by high risk women), and expand Medicaid to cover more near-poor and poor women.

Equally important as the issue of reimbursement for OB/GYNs is the pressing problem of malpractice insurance. According to

the Washington Report on Medicine and Health (December 10, 1984), "a (malpractice) premium cost of \$70,000 annually is not uncommon for an OB/GYN." In this same article, editor Brazda refers to a recent Survey of the American Medical Assurance Company that found OB/GYNs and surgeons made up only 19% of their policyholders but 34.5% of all malpractice claims.

Poor pregnancy outcome raises the risk of costly malpractice for OB/GYNs and, as noted elsewhere, low income pregnant women are more likely than their privately insured counterparts to have a low birthweight infant. The threat of malpractice in caring for these high-risk women is a serious and increasing barrier to OB/GYN participation in Medicaid. In fact, the American College of Obstetricians and Gynecologists noted at July 1984 medical malpractice hearings that "60% of the nation's obstetricians had been sued at least once and 20% had been sued three times or more." As a result, almost 10% of OB/GYNs had terminated practice and 7% raised their fees as much as 30% or more to cover their malpractice expenses.

It should also be noted that malpractice cases involving birth injuries are the most expensive -- the "verdict midpoint is \$1.45 million." Brazda cites a Wisconsin Medical Society study showing that 31% of general practitioners, 19% of family physicians and 6% of OB/GYNs will no longer deliver infants because of malpractice fears.

Clearly, OB/GYN participation in the care of low income minority women is a major problem area and one deserving of new national and state attention. Incentives to encourage OB/GYN participation, in light of CHAP's enactment, DHHS initiatives to reduce LBW, IOM's findings on prevention of LBW, and the short and long-term potential for cost savings, deserve additional attention. In any effort to increase OB/GYN availability, the questions of malpractice and reimbursement must be seriously addressed.

A small number of states are beginning to experiment with reimbursement changes to increase OB/GYN involvement. These demonstrations will be described in greater detail in the case study section. For instance, a few states are increasing the Medicaid fees paid to OB/GYNs, expanding the scope of covered benefits, and improving billing efficiencies. In addition, through involvement of professional associations and their state chapters as well as coalition building of all perinatal providers, efforts have been made to increase physician participation. To what extent malpractice problems are being addressed is unclear.

V. Uncompensated Care⁴

Uncompensated care is reaching epidemic levels. Taking a minimal estimate, Sloan et al. (1984) calculated \$6.2 billion was spent nationwide on uncompensated care. Hospitals and states report more and more demands for costly uncompensated care yet fewer and fewer resources to respond to poor people in need of health care services.

Sloan also reports that hospitals "with high percentages of beds dedicated to obstetrics, neonatal intensive and intermediate care, and burn care have high amounts of uncompensated care on average." They also found hospitals in the South with the highest charity care - bad debt share. Many fear that hospitals attempting to reduce their share of bad debt, will cut back on obstetrical and newborn care for low income women and children. Some evidence of this occurring has already been reported in the South where tertiary hospitals are dropping out of the regional perinatal network, placing even greater uncompensated care demands on those hospitals serving high risk women and their infants.

A 1983 survey of uncompensated perinatal hospital care, conducted by the Mississippi Perinatal Awareness Project (Barber, 1983), found over 9,000 annual deliveries fall into the bad debt or charity care category. This translated into 30,000 obstetric patients days that went unreimbursed in the state of Mississippi in 1983. Using 1981 dollars, Barber estimated the loss to be in excess of \$6.3 million to Mississippi hospitals. The reasons behind this problem, according to the Perinatal Awareness Project staff, are the state's low socioeconomic status, low eligibility levels for Medicaid, and high unemployment. Not surprisingly, the top priority of this network of public and private providers is the development of improved financing methods for perinatal health care.

The state of Texas set up a 75-member gubernatorial and legislative Task Force on Indigent Care in 1982 to address the worsening issue of uncompensated care. In their preliminary report, consensus was reached on the following strategies:

⁴ Uncompensated care refers to the "free" or "charity" care provided to poor and uninsured persons by physicians and hospitals. Uncompensated care also includes bad debt from persons (often insured) who are unable to pay their portion of the bill.

- ° Implement a comprehensive perinatal plan focusing resources on indigent pregnant women and children;
- ° Expand Medicaid coverage to new groups of eligible patients and increase the income eligibility criteria to 50 percent of the poverty level by 1989;
- ° Require all hospitals as a condition of licensure to participate in the provision of health care to the medically indigent under a "fair share" formula;
- ° Require hospitals to provide a minimum level of indigent care as a condition of granting a certificate-of-need for capital expenditures;
- ° Clarify legal responsibility by setting requirements for state and local government financing and provision of services to the indigent; and
- ° Enhance adolescent pregnancy prevention programs." (Curtis, 1984)

Three of Texas' six strategies are directed at maternal and child care -- the populations that appear to heavily influence the level of indigent care in every state. Not surprisingly, many southern states (with their high poverty rates and their low AFDC payment levels) are beginning to organize around the problem of uncompensated care.

Another increasingly cited problem caused by insurance limitations deals with gaining admission to tertiary hospitals and newborn intensive care units (NICUs). In response to this problem, the state of Georgia, for example, recently passed legislation outlawing hospitals from turning away pregnant women in labor because of their inability to pay for services. As Sara Rosenbaum recently stated, "We have set up an extensive system of NICU services, but we are unable to finance these units anymore." In other words, the increasing demands for newborn intensive care (NIC) by uninsured and Medicaid-insured women coupled with the extremely high costs of NICUs and the reduced capacity of hospitals to cross-subsidize their public or uninsured patients with private-pay patients, have raised many ethical and economic questions about continuing the same course of high technology care. Consequently, many state health officials are increasing their emphasis on prenatal care and prevention of preterm labor.

While both prevention efforts and newborn intensive care are essential for the reduction of infant mortality, Budetti, et al. (1981), discussed the inherent problems in making trade-offs between the two:

The question concerning the results that could be expected from trading off some intensive postnatal care in favor of prevention-oriented programs is one which has important racial implications. Our analysis of present utilization and outcomes by race concludes that marked reductions in the availability of intensive care would have a greater adverse impact on blacks than on whites unless all correctable factors that predispose to low birthweight had previously been dealt with. This result would be predicted, because the disproportionate number of black births in the high-risk very low birthweight groups accounts for virtually all of the black-white differences in neonatal mortality rates. Thus, it appears that medical care of the newborn may be partially compensating for the socioeconomic, nutritional, and other inequities that play a large role in determining interracial differences in prematurity rates. For this reason, it is critical to be able to predict the result of programs aimed at reducing those inequities before considering reductions in the availability of neonatal intensive care. (p.7)

Clearly, most health officials encourage the expansion of preventive care to high risk women. But, such an effort should not be made at the expense of infants requiring intensive care, many of whom are low income and minority.

The excellent strides made in reducing mortality rates associated with training, technology and expansion of regionalized maternal and neonatal intensive care are seriously being threatened by the financial viability of obstetrical units and NICUs, the participation of OB/GYNs, and the inadequate insurance coverage of high risk women and their infants. Unless sufficient attention is placed on monitoring this problem and assuring access to obstetric services through improved financing, many fear even greater racial and income disparities in infant mortality.

VI. Research Gaps in Insurance Coverage of Maternal and Infant Care

- A. Inadequacy of all national and regional and state data sources to describe the present insurance coverage of pregnant women. Since so many major changes have occurred in public and private financing in the last five years, it is difficult to rely on 1977 and even 1980 data for conclusive findings.
1. No national Medicaid data are available on the average number of pregnant women that are eligible for and receiving Medicaid in a given year.
 2. Few insurance studies include information on when insurance coverage began (e.g., six months into the pregnancy, pre-pregnancy).
 3. The data seldom have adequate age breakdowns to see if insurance is more of a problem for young women.
 4. The data seldom include information on the extent of coverage (in terms of total or percent of dollar amounts) for specific components of maternal and infant care. For example, how much and what percent is insured for family planning, prenatal care (broken down by physician/nurse office visits, diagnostic procedures, drugs, psychosocial counseling), normal delivery, c-section, newborn costs (normal and high risk).
- B. Few if any, research studies have adequately assessed the relationship of insurance coverage to use of prenatal care and newborn intensive care.

VII. Recommendations for Improved Financing of Maternal and Infant Care

- A. Set up a task force/commission major report on the issue of uncompensated care for pregnant women and children. Assess current state activities surrounding uncompensated care for this population.
- B. Coordinate with ACOG to assess the problems of malpractice insurance and participation in Medicaid and identify possible mechanisms to moderate physician liabilities for birth-related suits and incentives for increased Medicaid participation.

- C. Assess the feasibility of increasing state-set AFDC payment limits to increase the Medicaid eligibles and to decrease the size of the uninsured pool of women and children.
- D. Assess the feasibility of requiring all states to include a medically needy program to their current Medicaid program to extend coverage to near poor women and children who have high medical bills that, if deducted from their incomes, would make them eligible for Medicaid.
- E. Assess the feasibility of expanding eligibility to pregnant women in two-parent families ("Ribicoff women").
- F. Monitor changes in expanded eligibility resulting from passage of the Budget Deficit Reduction Act (CHAP) sections in terms of characteristics of new eligibles (e.g., age, race, regions, income), participation rates, costs of new eligibles, utilization patterns (e.g., hospital and physician participation, changes in referral patterns), outcomes (e.g., increased timely and continuing use of pre-natal care, decreases in LBW, etc.). Assess efforts to inform potential new eligibles of changes in Medicaid.
- G. Increase the participation rates of existing Medicaid eligible women and children.
- H. Assess low cost, efficiency improvements in Medicaid, for example: increasing OB/GYN reimbursement rates; creating differential rates for low-risk and high-risk pregnancies; improved efficiency and speedier reimbursement of claims; improving coordination and payment of benefits from Medicaid to local Title V agencies.
- I. Because pregnancy only lasts 9 months and because so many high risk women initiate prenatal care in the 2nd and 3rd trimester (or not at all), mechanisms are needed to fast-track applications for Medicaid eligibility and other public and private insurance to obtain reimbursement and reduce the levels of uncompensated care and access problems created by limited insurance.
- J. Assess mechanisms for interstate Medicaid eligibility to assure coverage of migrant women and their children, most of whom are minorities.
- K. Encourage states to apply for Medicaid waivers to test the cost effectiveness of "locking-in" high risk women into a case-managed system of care, expanding the package of reimbursed services, and experimenting with different delivery alternatives. Replicate models, building on the California OB-Access, Michigan and South Carolina experiences.

- L. Exempt high-risk pregnant women and infants from limits on the use of physician services, outpatient services, rural and other health clinics, and inpatient hospitalization.
- M. Expand prenatal care benefits to include nutrition supplements, psychosocial and health education services, birth education classes, prenatal care vitamins, and other providers of care (e.g., nurse midwives and nurse practitioners) with authorization from the referring physician.
- N. Encourage use of the Early and Periodic Screening and Treatment Program (EPSDT) for pregnant adolescents to provide comprehensive prenatal care and maternity care services.
- O. Title V and Title XIX (Medicaid) agencies should develop consistent standards of perinatal care (covering both content and frequency and providers) for low and high risk women.
- P. Develop a model brochure (that could be adapted to include specific state information) for low income pregnant women, describing simply: a) how and where to obtain eligibility, b) the need for early prenatal care, and c) a listing of providers accepting Medicaid recipients. Disseminate widely in local welfare offices, MCH and FP clinics, OB/GYN offices, local health departments, and other sites. Combine this educational material with targeted outreach, building on many of the state demonstration and SPRANS grant models.
- Q. Provide technical assistance to Title V agencies, and other MCH providers interested in: a) applying for waivers, b) expanding their use of EPSDT, c) adding medically needy programs, d) adding optional categories of pregnant women and children, e) expanding optional benefits and f) coordinating Title V and XIX reimbursement, case management and standard setting.
- R. Examine to what extent states are relying on Jobs Bill monies to fund perinatal care and the likelihood of continued support from this source.
- S. Analyze the current availability of NICUs throughout the U.S. -- the number of beds by level of care, the average length of stay, and the changes since 1978 (when the last study by Budetti, et al., was conducted). Assess the costs, utilization, financing and effectiveness of NICUs and the shifts since 1978.

TABLE A

Percent Distribution of Persons Under 65 Years of Age,
According to Insurance Coverage Status, Hispanic Origin, and Race:
Standard Metropolitan Statistical Areas, Average Annual 1978 and 1980

Hispanic Origin and Race	Total	Coverage Status			
		Private	Medicaid only	Not covered	Other ¹
Percent Distribution					
All persons.....	100.0	80.0	6.1	11.6	2.4
Non-Hispanic					
All races ²	100.0	82.1	5.3	10.2	2.3
White.....	100.0	86.1	2.7	8.7	2.5
Black.....	100.0	61.3	20.0	17.8	1.0
Specified Hispanic					
All Hispanic ³	100.0	58.6	13.4	25.7	2.3
Mexican American.....	100.0	59.0	10.7	29.9	0.4
Puerto Rican.....	100.0	47.7	31.9	19.7	*0.7
Cuban.....	100.0	74.2	5.4	16.6	3.8

¹Includes persons covered by military or Veterans Administration health benefits, persons whose health insurance coverage is unknown, and all others.

²Includes all other races not shown separately.

³Includes Other Latin American, Other Spanish, and those with unknown specific Spanish origin.

Source: National Center for Health Statistics. Data from the National Health Interview Survey. Health, United States: 1983, pg. 46. DHHS Pub. No. (PHS) 84-1232. Public Health Service. Washington, DC: U.S. Government Printing Office, December 1983.

TABLE B

Percent of Population Under 65 Years of Age Not Covered by Health Insurance,
According to Family Income, Hispanic Origin, and Race:
Standard Metropolitan Statistical Areas, Average Annual 1978 and 1980

Hispanic Race and Origin	Family Income		
	Less than \$7,000	\$7,000- \$9,999	\$10,000 or more
	Percent of Population		
All persons.....	29.1	23.8	6.4
Non-Hispanic			
All races ¹	27.3	21.4	5.7
White.....	27.9	19.9	5.3
Black.....	25.9	24.6	9.1
Specified Hispanic			
All Hispanic ²	39.2	37.6	16.4
Mexican American.....	48.6	46.0	18.3
Puerto Rican.....	21.0	25.4	16.8
Cuban.....	30.6	23.7	10.6

¹Includes all other races not shown separately.

²Includes Other Latin American, Other Spanish, and those with unknown specific Spanish origin.

Source: National Center for Health Statistics. Data from the National Health Interview Survey. Health, United States: 1983, pg. 46. DHHS Pub. No. (PHS) 84-1232. Public Health Service. Washington, DC: U.S. Government Printing Office, December 1983.

TABLE C

Medicaid Unduplicated Recipients and Vendor Payments for AFDC: FY 1972-1983

A. Unduplicated Recipients (in thousands)

<u>Fiscal Years</u>	<u>Total Medicaid Recipients</u>		<u>Dependent Children Under 21</u>		<u>Adults in Family with Dependent Children</u>	
Ending June						
1972	17,606	100.0%	7,841	44.4%	3,137	17.8%
1973	19,622	100.0	8,659	44.1	4,066	20.7
1974	21,462	100.0	9,478	44.2	4,392	20.5
1975	21,958	100.0	9,598	43.7	4,529	20.6
1976	22,766	100.0	9,924	43.6	4,774	21.0
Ending September						
1977	22,753	100.0	9,651	42.4	4,785	21.0
1978	21,918	100.0	9,376	42.8	4,643	21.2
1979	21,520	100.0	9,129	42.4	4,582	21.3
1980	21,605	100.0	9,333	43.2	4,877	22.6
1981	21,980	100.0	9,581	43.6	5,187	23.6
1982	21,603	100.0	9,563	44.3	5,356	24.8
1983*	21,471	100.0	9,412	43.8	5,456	25.4

B. Vendor Payments (in millions)

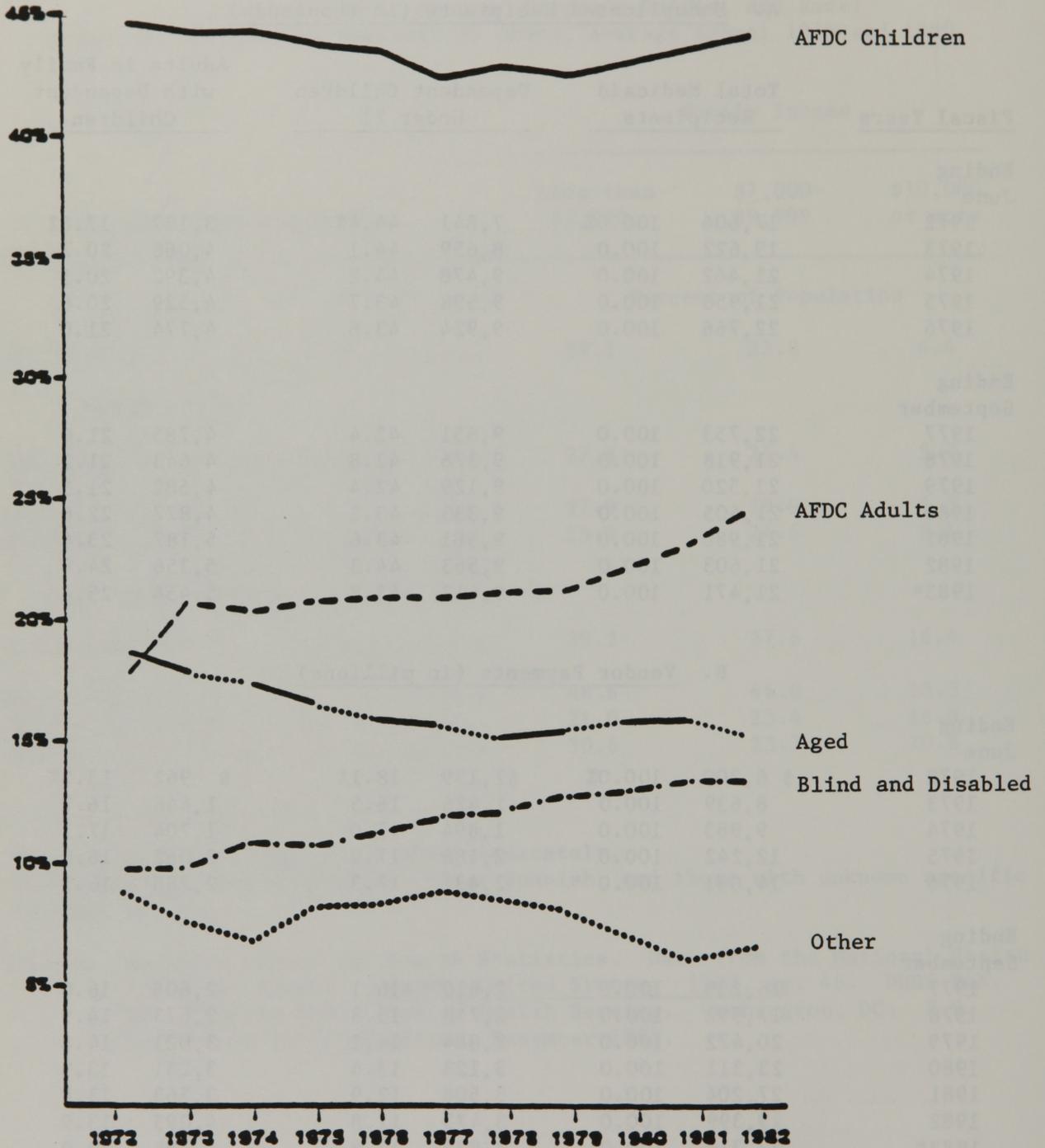
Ending June						
1972	\$ 6,300	100.0%	\$1,139	18.1%	\$ 962	15.3%
1973	8,639	100.0	1,426	16.5	1,446	16.7
1974	9,983	100.0	1,694	17.0	1,704	17.1
1975	12,242	100.0	2,186	17.9	2,062	16.8
1976	14,091	100.0	2,431	17.3	2,288	16.2
Ending September						
1977	16,239	100.0	2,610	16.1	2,606	16.0
1978	17,992	100.0	2,748	15.3	2,673	14.9
1979	20,472	100.0	2,884	14.1	3,021	14.8
1980	23,311	100.0	3,123	13.4	3,231	13.9
1981	27,204	100.0	3,508	12.9	3,763	13.8
1982	29,399	100.0	3,473	11.8	4,093	13.9
1983*	32,316	100.0	3,822	11.8	4,482	13.9

* Preliminary figures.

Source: Health Care Financing Review, Fall 1984, Vol. 6, No. 1, pp. 96-97.

FIGURE 1

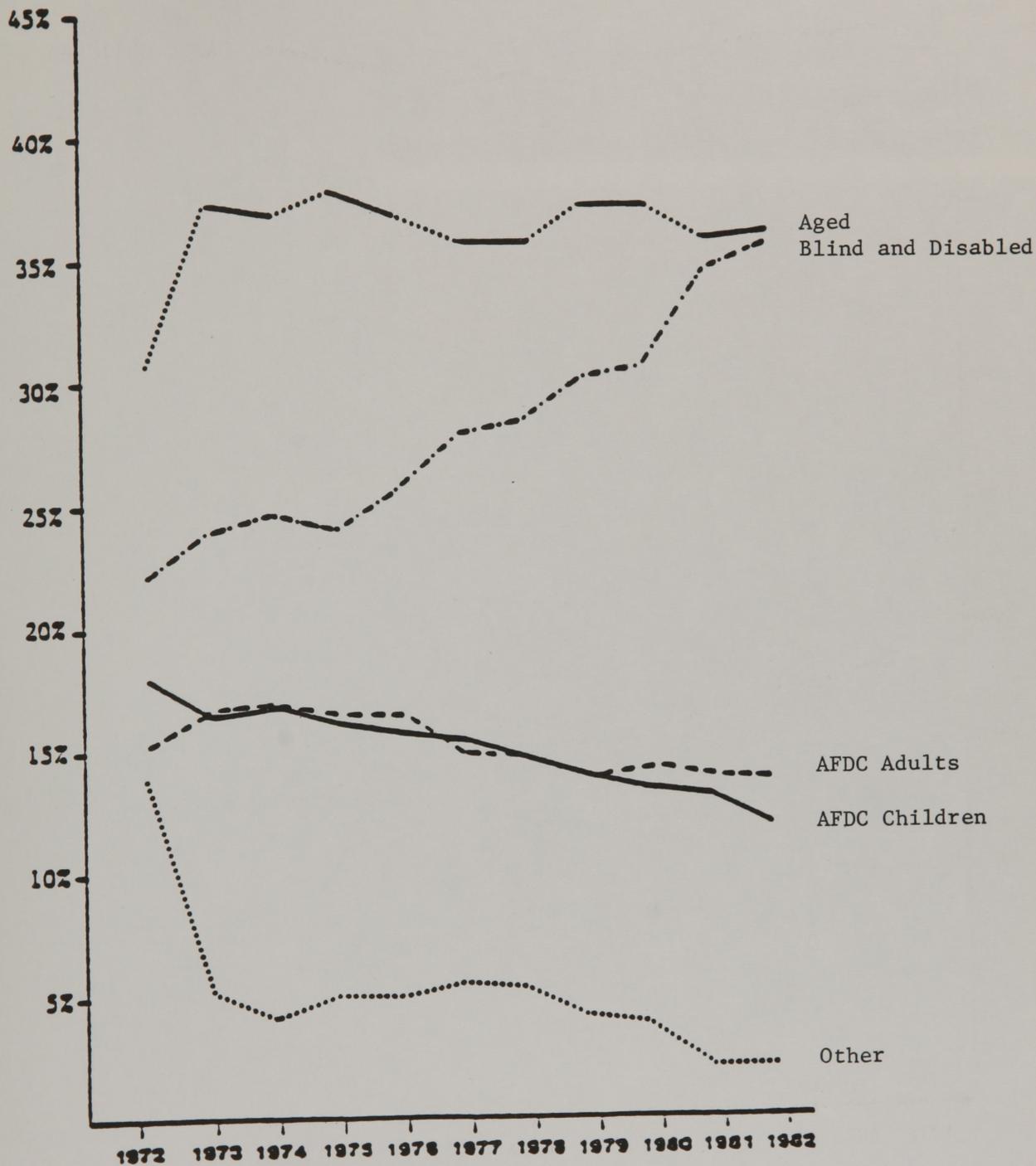
Distribution of Medicaid Recipients by Eligibility Category: 1972-1982



Source: Rymer, M. et al., Urban Systems Research and Engineering, Inc., "Short-Term Evaluation of Medicaid: Selected Issues," January 1984.

FIGURE 2

Distribution of Medicaid Recipients by Eligibility Category: 1972-1982



Source: Rymer, M. et al., Urban Systems Research and Engineering, Inc., "Short-Term Evaluation of Medicaid: Selected Issues," January 1984.

Evaluation of Interventions to Reduce Racial Disparities In Infant Mortality:

Review of Selected Infant Mortality
Interventions and Their Implications For
American Indians, Blacks and Hispanics

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REVIEW OF SELECTED INFANT MORTALITY
INTERVENTIONS AND THEIR IMPLICATIONS
FOR AMERICAN INDIANS, BLACKS AND HISPANICS

I. Introduction

This report is a summary of selected interventions and their impacts on reducing LBW¹, NMR², and PNMR³ among American Indian, Black and Hispanic women. Due to the limitations of the literature, differences within each minority group were not analyzed. Instead, the author focused on common problems and generalizations that might be made regarding each large minority group.

The intervention literature shows that program impacts vary, often quite dramatically, by maternal risk categories. Generally speaking, high risk women benefit the most from infant mortality interventions. Unfortunately, few program evaluations look at the differential impacts for minorities and for women with different risk factors and, as a result, often fail to detect changes in risk factors and outcomes (Peoples and Siegel, 1983). Drs. Peoples and Siegel conclude that ". . . more careful scrutiny of interactions and controlled analyses of subpopulation data may generate more precise and useful information" (p.604).

II. American Indian Women

Infants born to American Indian women have lower than expected rates of LBW and neonatal mortality despite their high teenage pregnancy rate, their limited use of prenatal care, and their low income status. Officials at the Indian Health Service (Handler, Vanderwagon, and Haffner) have no definitive answers regarding these trends. However, they believe, many factors may have contributed to these positive outcomes. Genetic factors may play a significant role. In addition, unlike other low income minority groups, Indians have access to services provided and financed by the Indian Health Service (IHS). While quality of and recruitment for IHS programs vary sharply, nonetheless, there is a built-in network of services that covers many Indian women. Indians not residing in reservations, however, must rely on existing public and private facilities. Many have noted the access problems resulting from this (Petersen, et al., 1984).

1 LBW = low birthweight.

2 NMR = neonatal mortality rates.

3 PNMR = postneonatal mortality rates.

The maternal and child health teams of the IHS typically include an obstetrician, pediatrician, clinical nurse, public health nurse, and consultants, as needed. Standards of perinatal care have been adopted and are presently being updated for the IHS. Health personnel are offered ongoing training and continuing education in perinatal care. In addition, the IHS continues to work cooperatively with the ACOG to increase physician recruitment, improve standards of care, and develop volunteer programs.

Operating somewhat like a health maintenance organization with a defined population, the IHS often provides prenatal care using a case-managed, aggressive outreach approach. If, for example, a woman does not maintain her scheduled prenatal care visits, a community health nurse often makes a home visit to see if there are any problems and to encourage continuing the necessary care. In a recent study of Sioux Indian women in South Dakota (Peterson, *et al.*, 1984), a prenatal consultative program (including risk assessment and patient management) was associated with reductions in fetal mortality.

Another possible though untested reason accounting for the improved LBW and NMR is that Indian women are fully insured for their obstetrical care and their infant's care under the IHS. Again, this has a presumably greater impact for reservation Indians. Physicians are salaried and hospitals⁴ are reimbursed for what they charge. Unlike Medicaid, the IHS does not pay a certain percentage below costs/charges. Thus, caring for Indian women does not present the uncompensated care problems for hospitals that caring for other minority women do (who are Medicaid-insured or uninsured). More investigation is needed on the American Indian's risk status and outcomes related to the role of insurance coverage and primary care networks that deliver standardized MCH services.

According to federal IHS officials, probable reasons for Indian women initiating prenatal care late are many: pregnancy is viewed as a healthy state and, as such, prenatal care is seen as discretionary; teenagers often fail to seek prenatal care until they begin to "show"; distance and cost required to travel to the nearest health center is often very burdensome. Despite their late initiation of prenatal care, most Indians believe that their births should occur in hospitals. Consequently, out-of-hospital births are minimal. Dr. Haffner of the IHS estimates that over 99% of all births to American Indians occur in the hospital. Sometimes, again due to geographical remoteness and weather, births occur in trucks or cars en route to the hospital.

⁴ Note: In some areas the IHS will only cover care delivered in certain designated hospitals.

A significant problem for this population of minority women appears to be alcohol abuse and fetal alcohol syndrome (FAS). Unfortunately, accurate estimates of alcohol abuse, alcoholism and FAS among Native American women are unavailable (NIAAA, 1982). Existing incidence and prevalence data for Indians, for the most part, are based on arrest records, suicide rates, and incomplete treatment records -- data that tend to be more representative of males than of females (Sandmaier, 1981). Recognizing these limitations, however, the National Institute on Alcoholism and Alcohol Abuse (NIAAA), in their Fifth Special Report to Congress (December, 1983), wrote:

Alcohol-related mortality is a major problem among Native Americans, with cirrhosis of the liver the fourth leading cause of death. Accidents are the leading cause, and the contribution of alcohol to fatal mishaps is substantial. Death rates attributable to major alcohol-related causes of death (alcoholism, alcohol psychosis, and cirrhosis of the liver with mention of alcoholism) are about eight times greater among Native Americans than for the U.S. population as a whole. (p.8)

In a recent article by Petersen, et al., (1984), entitled "Pregnancy Complications in Sioux Indians," the authors found exceedingly high rates of alcohol use and abuse and cigarette smoking:

The data concerning substance abuse during pregnancy . . . clearly indicates a monumental problem. Cigarette smoking was shown in 47.1% of the Sioux Indian women (N=405), 20.2% of the Sioux Indian women used alcohol during pregnancy, and 7.7% were using alcohol to the point of being classified as abusers (p.522).

Researchers at the University of Washington are now attempting to identify the number and characteristics of FAS babies in the IHS system. Clearly the issue related to alcohol abuse among pregnant women and their offspring is a major risk factor deserving of additional investigation and patient education and counseling. In addition, the fact that alcohol-related accidents are so high for American Indians could be a major contributing factor to their high rates of postneonatal mortality.

One project in White River, Arizona is attempting to prevent alcohol abuse and fetal alcohol syndrome among their Native American population. Staff trained to recognize and treat

alcohol abuse take extensive medical histories during the prenatal care visits. Those women identified at risk for alcohol abuse and FAS are provided intensive counseling and follow-up that continues after the infant has been delivered.

If risk assessment protocols for alcohol abuse and FAS as well as training programs for staff can be developed and evaluated, widespread replication could occur in a system like the IHS.

One final note: the infant mortality intervention literature on American Indians, as reviewed through the CDC literature search and the National Library of Medicine searches, was nonexistent. If articles, published or unpublished, exist through other sources, these should be identified. Moreover, the perinatal data that IHS collects on their service population should be carefully analyzed for its potential contribution to better understanding Indian women's health and risk status, perinatal outcomes, socio-demographic characteristics, health care delivery system characteristics, and costs of care.

Since the IHS operates somewhat like an HMO, greater emphasis might be placed on primary and secondary prevention. For example, greater encouragement of family planning, expanded patient education programs with a strong focus on substance abuse, and aggressive continuing child health care within their existing treatment system offers exciting potential.

III. Common Issues Among Black and Hispanic Women

Black and Hispanic women have in common many medical risk factors: high parity with short intervals between births, high rates of teen pregnancy, for example. They also share many of the same non-medical risk factors: insurance problems (previously discussed in the financing section), limited use of prenatal care, and extensive reliance on publicly funded services for their perinatal care (versus conventional private practice or prepaid health plans). Historically, most of the federal, state and local-funded projects (including Medicaid, Title V services and demonstration projects like the IPO and MIC projects, Title X family planning services, and WIC) were designed to serve low income and minority populations because of their high risk health status and the access problems they commonly experience. While not as organized/standardized nor as controlled as the Indian Health Service, a network of publicly funded maternal and child health services has existed for years in every state in the U.S. Not surprisingly, these programs have had their greatest impacts (in terms of increasing early initiation of prenatal care and reducing IMR) among high risk women many of whom are Black and Hispanic.

The program evaluation literature, though limited, shows that major strides have been made in improving use of prenatal care since the introduction of publicly funded programs. However, with recent funding cutbacks and changes in reimbursement, many states are reporting reductions in the availability of public services for low income women and children. In other words, those Black and Hispanic women and their children who rely on public programs also suffer the most during periods of realignment and retrenchment (Budetti, et al., 1982; McManus and Davidson, 1982; McManus, 1984; Rosenbaum, 1983 and 1984; U.S. Congress, Subcommittee on Health and the Environment, 1984; FRAC, 1984; California Public Advocates, 1983).

Several cities and states are beginning to report increases in LBW rates and IMR among their Black and Hispanic populations along with increasing poverty rates, AFDC payment standards not keeping pace with inflation, and reductions in public funding for maternal and child health services. It is unclear from the available research why these changes are occurring in some states and not in others with similar characteristics. Additional research is needed to investigate the impact of such changes in federal and state support of public services on use of prenatal care and newborn intensive care as well as on LBW, NMR and PNMR.

Women and children in general and Black and Hispanic women in particular are far more likely to be living in poverty than persons of other ages, sex, and races (Bureau of Census, 1982). Nationally, Blacks represented 11.7% of the U.S. resident population in 1980, yet they made up 28.3% of the number of persons below poverty (Bureau of Census, 1982). Similarly, 6.5% of the U.S. residents were of Spanish origin⁵ in 1980, yet 12.4% of the U.S. population living below poverty were of Spanish origin.

In the state of Virginia, for example, 19% of the population is Black. However, a shocking 46.7% of Virginia's poverty population is Black.⁶ In the state of Colorado, 12% of the

⁵ Persons of Spanish origin may be of any race.

⁶ Interestingly, the state of Virginia recently commissioned a report by Ernst and Whinney on AFDC (Aid to Dependent Children or ADC in Va.). They recommended an increase of 30% in ADC aid. Presently, recipients receive 90% of the standard of need based on the 1974 cost of living. Translated into real dollars, an average family of three (where the cost of living is defined as moderate) presently receives \$269 a month to live on. Ernst and Whinney recommend that this be brought up to \$354 a month. They also found that while many ADC recipients are eligible for Food Stamps, Housing Aid, and Fuel Assistance, few actually receive them. Virginia's
(Footnote continued)

population is of Spanish origin and 27.6% of the state's poverty population is Spanish. Similar disparities in population size and poverty size can be found in every state.

Analyzing poverty data for female householders with no husband present shows an even more dramatic difference by race and sex. The Bureau of Census (1983) reports that in 1982, 12.2% of all families lived below poverty.⁷ However, 36.3% of all families with a female household with no husband present were in poverty (Bureau of Census, Table 18, p. 36). For Black female households, the poverty rate in 1982 was 56.2% and for persons of Spanish origin, the poverty rate was 55.4%.

One final and important note on poverty data for Blacks and Hispanics from the Bureau of Census (1983, p. 22), shows that the poverty rate for Black and Hispanic families has increased between 1980 and 1982, as shown below:

Year	Percent Below Poverty			
	<u>All Races</u>	<u>White</u>	<u>Black</u>	<u>Spanish Origin</u>
1980	11.5	8.6	31.1	25.1
1981	12.5	9.5	33.2	25.9
1982	13.6	10.6	34.9	29.2

The poverty rate for persons of Spanish origin has increased the most. Whether or not this is due to higher rates of unemployment or a shifting age distribution (more younger persons) or other factors, is unclear.

In summary, the major theme to be highlighted in this section on common issues is the correlations between poverty status, race, sex, and infant mortality. With the changing poverty statistics among high risk populations, as described above, and the shifting demographics of our minority population (NOTE: by 1990, it is projected that one-third of all persons under 20 will be minorities, according to the DMCH Forward Plan), speedy and dramatic attention needs to be focused on insurance coverage

(Footnote 6 continued from previous page)

Board of Social Services plans to recommend ADC increases to the Virginia Legislature (though not the 30% that Ernst and Whinney recommend).

⁷ \$9,287 - poverty level for family with 4 persons in 1982.

and service provisions as well as aggressive adolescent pregnancy prevention to prevent increasing declines and disparities in IMR among Black and Hispanic women.

IV. Black Women

While Black and Hispanic women have in common many medical and non-medical risk factors, they differ significantly in pregnancy outcome, with Black women having higher rates of LBW, NMR and PNMR (Binkin, et al., forthcoming). Black women generally have higher relative risks of teenage pregnancy, single-parent families, poverty, limited use of prenatal and ambulatory care, and Medicaid reliance. Closer examination of other Black socio-demographic data might further elucidate the nonmedical risk factors that singly or in combination influence the high rate of Black infant mortality. (Note: Many of these have been discussed in the report by Samuels.) Some of these variables, though seldom analyzed, might include region and residence (SMSA central city, SMSA non-central city, urban non-SMSA, and rural), occupation (manual labor/level of exertion/hours worked per week) and regular source of care (yes/no; physician office/hospital outpatient/clinic/other).⁸

Health service researchers investigating 1) family planning (Edwards, et al., 1980; Grossman, 1984); 2) prenatal care (Gortmaker, 1979; Greenberg, 1983; Kessner, et al., 1973; Peoples and Seigel, 1983; Showstack, et al., 1984); 3) newborn intensive care (Budetti, et al., 1981; Grossman, 1984; Grossman and Jacobowitz, 1983); Lee et al., 1980; Williams, 1979); 4) extent of regionalization - Levels I, II, III and type of hospital care - private vs. public (Budetti, et al., 1982; Butterfield, 1981; Cordero, et al., 1982; Williams, 1979; Williams and Chen); 5) WIC supplemental feeding program (Kennedy, et al., 1982; Kotelchuck, et al., 1984; Rush, 1982); and 6) Improved Pregnancy Outcome Projects and the Maternal and Infant Care Projects (Goldenberg and Koski, 1984; Grossman, 1984; Peoples and Seigel, 1983; Sokol, et al., 1980; Sprague and Taylor, 1983) have consistently found that extending these services to Black women and their infants is associated with reductions in risk factors leading to infant mortality.

A recent report by Binkin, et al., (forthcoming) comparing Black neonatal mortality rates in California and Georgia, highlights this case in point. Using matched cohort records for California from 1980-81 and for Georgia from 1979-81, Binkin,

⁸ Note: Much of this information is available in the National Longitudinal Survey.

et al., found that Black Georgia mothers are at higher risk for neonatal mortality than Black California mothers. They speculated "that either Black mothers in Georgia are at higher risk of experiencing a neonatal death than those in California by virtue of other demographic or behavioral risk factors or, more likely, that the availability of prenatal, intrapartum, and postnatal care may be better for the largely urban California Black population when compared with the Georgia Black population, which is about 40% rural (p.7)."

Binkin, et al., commenting on the relatively greater viability of Black infants (vs. White infants) at an early gestational age and their increased risk of prematurity, stressed that physicians "should be aware of the higher viability of Black infants even at early gestational ages in the use of tocolytic agents and the transfer of mothers and infants." (p.1).

In summary, the intervention literature documents the impact of various prenatal, intrapartum and postnatal services on women at high risk for LBW, particularly Blacks. What appears lacking is the consistency of an organized system of perinatal care to treat Black women, many of whom are at high risk. Much of the knowledge, training, and technology (related to family planning, prenatal care, delivery, and postnatal care) are available. What is missing is the diffusion of and access to those services for such a high risk group as Black women. Particular attention to family planning for Black teenagers is an important element for any comprehensive strategy targeted at reducing Black IMR.

V. Hispanic Women

Hispanic women⁹ are at the greatest risk (as compared to Whites and Blacks) for being uninsured as well as being non-U.S. citizens (with all of the obvious implications for insurance coverage and use of health services). They also have the highest rates of out-of-hospital births. Like Blacks, a disturbingly large number live below poverty, lack access to prenatal care, rely on Medicaid, use publicly founded clinics and hospitals, conceive infants when they are both extremes of the reproductive cycle, have many births with short intervals between them, and use contraceptives on a limited basis. Fortunately, unlike Blacks, they are less likely to have LBW infants and consequently their NMR is lower as Williams, et al., (forthcoming) stated, ". . . (Hispanic's) higher birthweight-specific fetal and

⁹ U.S.-born Hispanics as compared with Mexicans or Cubans or Puerto Ricans or Central Americans vary in the degree to which each of the above risk factors affect them.

neonatal mortality suggest then, given equal access to medical care, their crude mortality rates could be even lower. . . ." (p.8)

Intervention literature on Hispanic infant mortality is very limited and often out-of-date. Literature on risk factors represents the bulk of what has been written to date. (Selby, et al., 1983; Williams, 1979; Williams and Chen; Williams, et al., forthcoming).

Since one out of ever three births in California is of Hispanic origin, it is not surprising that the intervention literature is mostly California-based. Norris and Williams (1983); Williams (1979); and Williams, et al., (forthcoming) have examined the influence of Medi-Cal, the size and type of delivery hospital, and use of early prenatal care and abortion on infant mortality. They found that adequate prenatal care and delivery at appropriate perinatal centers (public vs. private hospital, hospitals delivering large numbers of high risk infants) were critical factors in improving pregnancy outcomes among Hispanic women.

Other intervention literature on Hispanics (Anderson, et al., 1981) highlights their problems with access to medical care and differential patterns of use of care. Andersen's 1975-76 study of southwestern U.S. Whites and Hispanics (N = 1,092 Hispanics) found: low levels of insurance coverage, slightly fewer with a usual source of care, fewer seeing physicians or dentists or having preventive health exams, fewer receiving information from their physicians, and more having greater office waiting times. They also found that the family plays a very important role in the decision to seek medical care. Andersen concluded that more comprehensive financing of health care could have major implications for improving access to care among Hispanics. Vilma Falck in her 1975 article on health education for Hispanics focuses attention on the importance of communications and outreach, alternative delivery systems, and cultural differences in designing interventions.

The role of the family in terms of reducing low birthweight and neonatal mortality should be more closely examined by DHHS. To what extent, for example, does the Hispanic family (and other minority families) assist in providing adequate nutrition; rest; housing; child care; support for not smoking, drinking, and other drug-taking for the pregnant woman. In other words, what protective environment(s) does the Hispanic family create for their pregnant women? Does this "environmental protection" continue after the infant's birth and for how long? Could this environment be a critical factor in the relatively low LBW rates among Hispanics?

Hispanic postneonatal mortality rates are higher than among Whites. Very few definitive studies are available to explain the large differentials in PNMR as well as in LBW and NMR. Since access to perinatal services has a major effect on LBW and NMR, it is not surprising that it might also strongly influence PNMR, particularly since during the first year of life an infant is at his/her greatest risk of mortality until age 60 (Health, U.S.: 1983). That is, if minority women are less likely to have a usual source of care, to be privately insured, and to initiate early and continuous prenatal care, it is not surprising that their infants also lack access to care. Children are even more likely to be uninsured or Medicaid insured than their adult counterparts (Wilensky and Berk, 1982; McManus and Davidson, 1982). The relationship of their insurance status on postneonatal mortality rates needs further investigation.

The American Academy of Pediatrics, in its published periodicity schedule for children, recommends 8 visits during an infant's first year of life, including two during the normal newborn's hospital stay. (See attached AAP Guidelines for Health Supervision for periodicity and recommended content of care). In an upcoming article (in Pediatrics) on children's medical care use and costs based on 1980 NMCUES data, Butler, et al., document that minorities (Black and Hispanics) and low income persons are less likely than Whites and non-poor persons to have a regular source of care. They found that as many as 14% of Hispanic children, ages 0-2, saw no physician in the last year!

More analysis of the NMCUES and NHIS data for children under one, by race, is essential to better understand the high postneonatal mortality rates among Hispanics as well as Blacks. Unfortunately, the published data are available only for children under 17 or for children 0-6 and 7-17, masking that period in a child's life when they are at greatest risk for health problems and in greatest need for continuing child health care.

VI. Other Minority Women

Finding intervention literature on other minority women was like finding a needle in a haystack. Because of this gap in the literature, this section deals only with Indian, Black and Hispanic women. Additional studies are needed to analyze interventions to reduce LBW, NMR and PNMR among other minority women. Not only would this be useful in understanding specific problems, but it also could be enlightening in terms of learning what strategies have been effective in reducing IMR in other population groups.

GUIDELINES FOR HEALTH SUPERVISION

Each child and family is unique; therefore these **Guidelines for Health Supervision of Children and Youth¹** are designed for the care of children who are receiving competent parenting, have no manifestations of any important health problems, and are growing and developing in satisfactory fashion. **Additional visits may become necessary** if circumstances suggest variations from normal. These guidelines represent a consensus by the Committee on Practice and Ambulatory Medicine, in consultation with the membership of the American Academy of Pediatrics

through the Chapter Chairmen

The Committee emphasizes the great importance of **continuity of care** in comprehensive health supervision² and the need to avoid **fragmentation of care³**.

A **prenatal visit** by the parents for anticipatory guidance and pertinent medical history is strongly recommended.

Health supervision should begin with medical care of the newborn in the hospital

	INFANCY						EARLY CHILDHOOD					LATE CHILDHOOD					ADOLESCENCE			
	By 1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	24 mos	3 yrs	4 yrs	5 yrs	6 yrs	8 yrs	10 yrs	12 yrs	14 yrs	16 yrs	18 yrs	20+ yrs
AGE⁴																				
HISTORY																				
Initial/Interval	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MEASUREMENTS																				
Height and Weight	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Head Circumference	●	●	●	●	●	●														
Blood Pressure									●	●	●	●	●	●	●	●	●	●	●	●
SENSORY SCREENING																				
Vision	S	S	S	S	S	S	S	S	S	O	O	O	O	S	O	O	O	S	O	O
Hearing	S	S	S	S	S	S	S	S	S	O	O	O	S ⁵	S ⁵	S ⁵	O	S	S	O	S
DEVEL./BEHAV. ASSESSMENT⁶	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PHYSICAL EXAMINATION⁷	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PROCEDURES⁸																				
Hered./Metabolic Screening ⁹	●																			
Immunization ¹⁰		●	●	●			●	●			●						●			
Tuberculin Test						●			←	→			←	→			←	→		
Hematocrit or Hemoglobin ¹²						←	→		←	→			←	→			←	→		
Urinalysis ¹³				←	→				←	→			←	→			←	→		
ANTICIPATORY GUIDANCE¹⁴	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
INITIAL DENTAL REFERRAL¹⁵										●										

- Committee on Practice and Ambulatory Medicine, 1981.
- Statement on Continuity of Pediatric Care, Committee on Standards of Child Health Care, 1978.
- Statement on Fragmentation of Pediatric Care, Committee on Standards of Child Health Care, 1978.
- If a child comes under care for the first time at any point on the Schedule, or if any items are not accomplished at the suggested age, the Schedule should be brought up to date at the earliest possible time.
- At these points, history may suffice, if problem suggested, a standard testing method should be employed.
- By history and appropriate physical examination; if suspicious, by specific objective developmental testing.
- At each visit, a complete physical examination is essential, with infant totally unclothed, older child undressed and suitably draped.
- These may be modified, depending upon entry point into schedule and individual need.
- PKU and thyroid testing should be done at about 2 wks. Infants initially screened before 24 hours of age should be rescreened.
- Schedule(s) per Report of Committee on Infectious Disease, ed. 18, 1982.

- The Committee on Infectious Diseases recommends tuberculin testing at 12 months of age and every 1-2 years thereafter. In some areas, tuberculosis is of exceedingly low occurrence and the physician may elect not to retest routinely or to use longer intervals.
- Present medical evidence suggests the need for reevaluation of the frequency and timing of hemoglobin or hematocrit tests. One determination is therefore suggested during each time period. Performance of additional tests is left to the individual practice experience.
- Present medical evidence suggests the need for reevaluation of the frequency and timing of urinalyses. One determination is therefore suggested during each time period. Performance of additional tests is left to the individual practice experience.
- Appropriate discussion and counselling should be an integral part of each visit for care.
- Subsequent examinations as prescribed by dentist.

N.B.: Special chemical, immunologic, and endocrine testing are usually carried out upon specific indications. Testing other than newborn (e.g., inborn errors of metabolism, sickle disease, lead) are discretionary with the physician.

Key: ● = to be performed; S = subjective, by history; O = objective, by a standard testing method.

Prevention of Chronic Hepatitis B Virus Infection from Mothers To Infants

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PREVENTION OF CHRONIC HEPATITIS B VIRUS INFECTION FROM MOTHERS TO INFANTS

Perinatal Transmission of HBV Infections

Transmission of hepatitis B virus (HBV) from mothers who have either an acute HBV infection or who are chronic hepatitis B surface antigen (HBsAg) carriers to their infants has been well documented (1-3). About 80-90% of babies born to HBsAg positive mothers (if mothers are also HBeAg positive) will become infected, and approximately 90% of these infants will become chronic HBV carriers. Over 90% of these carriers can be prevented by immunization of the newborn with HBIG and HB Vaccine. There is increasing evidence that chronic HBsAg carriage, especially when acquired at birth or early in life, increases the risk of subsequent liver disease, i.e., chronic-active hepatitis, cirrhosis and primary hepatocellular carcinoma (PHC) (4). It has been estimated that 25% of these chronic carriers may die of cirrhosis or primary hepatocellular carcinoma (5). In addition, such persons are infectious and female carriers may subsequently perpetuate the cycle of perinatal transmission.

Infected infants usually will not become HBsAg positive until several weeks before birth. Although clinical jaundice and/or acute hepatitis is rare in infected infants, elevations in transaminase levels are frequent and fatal hepatitis in the neonate has been reported (6). Even if perinatal infection does not occur, the infant may be at risk of subsequent infection from other family contacts.

Incidence

Certain ethnic groups account for approximately two-thirds of infants at risk of HBV infection in the U.S. In a study in New York, San Francisco and Los Angeles, 8.6% of all women of Asian descent, including at least 2.4% of those who were native born, were found to be HBsAg positive (7). Other women may be at increased risk of being HBsAg positive because of occupation, life-style, exposure to an infected sexual partner or health-related reasons.

An estimated 10,000-15,000 HBsAg-positive women give birth each year in the United States of which approximately 7,000 are born to Asian women, 5,000 to other high risk women and 800 health workers (8). Mothers that have hepatitis B "e" antigen (HBeAg) along with HBsAg infect more than 90% of their infants and most of these infants also become chronic carriers (9). However, despite the correlation of HBeAg with infectivity, the absence of HBeAg-positive women cannot, with the present sensitivity of routine laboratory tests, be equated with a zero-risk of infection and subsequent development of the chronic carrier state in their infants. In addition, these infants may also be at risk of HBV infection from other chronic infected family or household members (10).

Screening and Prevention

The primary goal of postexposure prophylaxis for exposed infants is prevention of the HBV carrier state. In addition, there is a need to prevent the rare occurrence of severe clinical hepatitis in some of these infants. Testing for HBsAg only is recommended and infants of positive mothers should be immunized regardless of HBeAg status. The concurrent use of HB vaccine and various combinations of HBIG increases the protective efficacy rate to over 90% (11).

Since approximately 5% of perinatal infection may occur in utero, it appears likely that no form of postnatal prophylaxis will be 100% effective in this circumstance (12).

Cost

It is estimated that the cost to screen high risk women (265,283 births/year) would be \$9,316,950. The cost per case prevented would be \$3,406 which is less than PKU, T4 screening of neonates, and premarital syphilis screening (8).

RECOMMENDATIONS:

The following recommendations incorporate recommendations issued by the Immunization Practices Advisory Committee (ACIP) issued in June 1984 (12) and recommendations to be issued by the Committee on Infectious Diseases American Academy of Pediatrics (13).

1. High priority for screening should be given to women of Asian, Pacific Islander or of Alaskan Eskimo descent. Other "at risk" groups are outlined in the above referenced reports. These women should be tested for HBs prenatally, and if not, at the time of delivery or as soon as possible thereafter.
2. Hepatitis B immune globulin (HBIG), I.M. (0.5 ml) should be administered within 12 hours after birth and incorporated into routine procedures for newborn care, e.g., administering of vitamin K and prophylaxis of ophthalmology neonatorum. HBIG efficacy decreases markedly if delayed beyond 48 hours.
3. HB Vaccine should be administered IM in 3 doses of 0.5 ml (10 ug) each. The first dose should be given within 7 days of birth and may be given concurrently with HBIG but at a separate site. The second and third doses should be given at one month and six months, respectively, after the first.
4. Testing for HBsAg and anti-HBs is recommended at 12-15 months to monitor the final success or failure of therapy.
5. Susceptible personnel exposed to the blood of infants or mothers with HBV infection should be immunized with HBV vaccine. Also household members and sexual contacts of those HBsAg positive should receive the vaccine.

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Classified Bibliography of Minority Infant Health Studies

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Classified Bibliography of Minority Infant Health Studies

The Subcommittee on Infant Mortality of the Task Force on Black and Minority Health commissioned a bibliography of epidemiologic studies dealing with black and other minority groups. The Subcommittee recognized that epidemiologic analysis of differences in birthweight and infant mortality is the basis to establish risks for blacks and other minorities, relative to white rates. Moreover, epidemiologic studies examine related variables, such as maternal age, socioeconomic status, marital status, etc., to examine how much of the differences among racial and ethnic groups can be explained by other known risk factors.

Since published epidemiologic studies are usually indexed in the Index Medicus, this computerized bibliography was searched for all papers dealing with low birthweight or infant mortality which were published in English since 1980. Selected, older publications were included if they were judged to provide significant and timely information. Articles published during the latter half of 1984 were found through examination of tables of contents of key journals, including The American Journal of Obstetrics and Gynecology, Obstetrics and Gynecology, Journal of the American Medical Association, Pediatrics, The Lancet, The American Journal of Epidemiology, Seminars in Perinatology, and others. Additionally, the references published in key studies were reviewed, if they had not yet been included. This search produced 1,057 articles, many of which proved to be irrelevant to the issue of minority health.

Abstracts in computerized systems, such as the Index Medicus, do not include sufficient information to determine whether articles contain data on ethnic or racial differences in infant mortality, morbidity, or low birthweight. Therefore it was necessary to retrieve and review all 1,057 articles in order to select only those which were of value for the assessment of ethnic differentials. This classified bibliography includes only those published studies on perinatal and infant health, with major emphasis on low birthweight and infant mortality, which present rates or other data separately for at least two ethnic or racial groups.

Each article was abstracted by either a contract reviewer and/or a member of the Pregnancy Epidemiology Branch, Division of Reproductive Health, Center for Health Promotion and Education, Centers for Disease Control. Abstractors used a questionnaire which proved to be suitable for nearly all articles. For those articles where the questionnaire was not entirely appropriate, the reviewer attempted to use the format to the extent possible. For each article, the general approach, study design, data source(s), geographic area, reproductive outcomes, and risk factors were coded. In the attached table, codes for each questionnaire item are listed. Coded questionnaires were entered into a computerized file, the Infant Mortality and Low Birthweight Data Tape (copy included).

Suggestions for Use of Infant Mortality and Low Birthweight Review Data Tape

The computer tape contains three sections:

1. The SAS (Statistical Analysis System) data set for the bibliography.
2. A SAS program which generates a complete listing of the bibliography, sorted and printed separately by name of the first author, title, journal, and year published.
3. A SAS program which enables the user to select articles that fulfill certain criteria. This program contains a series of "IF" statements that can be modified by the user. There is an "IF" statement for all variables, and those that are not needed for a specific selection can be deleted. For example, it would be possible to produce a listing of cross sectional studies that examine the effect of prenatal care on infant mortality. This can be accomplished by deleting all "IF" statements in the program except:

```
IF XSECT = 1 ;  
IF INFD = 1 ;  
IF PNC = 1 ;
```

In selecting papers that study low birthweight, both the LBW and VLBW variables should be included.

To use these two programs, the user must provide the appropriate job control language (JCL) and DATA statement.

This file, while extensive, should not be considered comprehensive. The user may wish to supplement his or her search, through examination of studies published since 1984, further use of existing computerized databases, and review of references from key papers.

Table: Description of Variables on Infant Mortality
and Low Birthweight Review Data Tape

Variable Name	Type*	Descriptive Name	Comment
A. Identification of articles or books			
NUM	N	Article number	These numbers were sequentially assigned as articles were entered into the registry.
YRPUB	N	Year published	Citation of journal articles
TITLE	A	Title of article	
AUTHOR1	A	1st Author	
AUTHOR2	A	2nd Author	
AUTHOR3	A	3rd Author	
AUTHOR4	A	4th Author	
AUTHOR5	A	5th Author	
AUTHOR6	A	6th Author	
AUTHOR7	A	7th Author	
AUTHOR8	A	8th Author	
AUTHOR9	A	9th Author	
AUTHOR10	A	10th Author	
JOURNAL	A	Journal	
VOLUME	A	Volume	
PAGESTR	N	Starting page	
PAGEEND	N	Ending page	
Citation of books			
BOOK	A	Name of book	
BKAUTH1	A	1st Author of book	
BKAUTH2	A	2nd Author of book	
BKAUTH3	A	2nd Author of book	
PUBSHLR	A	Publisher	
CITY	A	City published	
BKYEAR	A	Year published	
PPSTART	N	Starting page	
PPEND	N	Ending page	
B. Description of articles			
TYPE	A	Type of article	Codes are: 1=Original--methodology, 2=Original--research, 3=Review, 4=Editorial, 5=Abstract, 6=Conference, 7=Other (includes letters)
COLLECT1	N	Year data collected	Years represented by data reported in study, 00 if unknown, not stated or not applicable
COLLECT2	N	Year data collected	

SAS Variable Name	Type	Descriptive Name	Comment
<u>The following variables are coded: 1=Yes, 2=No, 8=Not Applicable, 9=Unknown</u>			
General approach of study			
RISKID	N	Risk factors	Identification of risk factors for adverse outcomes
INTERVEN	N	Interventions	Investigation of interventions (preventive or therapeutic)
CHANGE	N	Trends	Analysis of trends in reproductive outcomes
Study design			
COHORT	N	Cohort study	Exposure groups defined at outset, and rate of disease/outcome studied
CC	N	Case-control	Disease/outcome groups defined at outset, and exposure measured
XSECT	N	Cross sectional	Rates of disease and exposure studied in an entire population. Note: May be analyzed in manner similar to a cohort study. Typically these studies examine a variety of exposures and outcomes.
EXP	N	Experimental	Clinical trial
SERIES	N	Case series	
REPORT	N	Case report	
O_STUDY	N	Other	
Type of data used			
MATCH	N	Matched records	Matched, or linked, birth and infant death certificates
UNMATCH	N	Unmatched records	Unlinked vital records
HOSPITAL	N	Hospital data	Hospital-based data
CLINIC	N	Clinic data	Clinic-based data
O_DATA	N	Other data	Other data sources
Location of study. In most cases, only one category will be checked representing the primary geographic unit of study. For example, a study of infant mortality in Atlanta, GA would be CITY (Yes), STATE (No), STATENAM (not applicable).			
LHOSP	N	Hospital	Includes multicenter studies
CITY	N	City	City or county
REGION	N	Region	Perinatal region
STATE	N	State	

SAS				
Variable		Descriptive		
Name	Type	Name		Comment
STATENAM	A	Name of state		Standard 2-letter codes, NA (Not applicable) if STATE is NO
SECT	N	Section of country		
USA	N	National, USA		
NATION	N	Other nation		
INTERNAT	N	International		
O_LOC	N	Other location		
				Outcomes studied. Note: In some studies certain characteristics can be both an outcome and a risk factor, particularly birthweight.
FETAL	N	Fetal death		Fetal death or stillbirth
DO_24H	N	Death 1st day		
D1_6D	N	Death 1-6 days		
D7_72D	N	Death 7-27 days		
PERI	N	Perinatal death		Definition varies, e.g. 20 weeks-1 month, 28 weeks-7 days
NND	N	Neonatal death		Usually deaths <28 days
PNND	N	Postneonatal death		Usually deaths 28 days - 1 year
INF	N	Infant death		Neonatal plus postneonatal deaths
VLBW	N	Very low birthweight		Usually birthweight <1500g
LBW	N	Low birthweight		Usually birthweight <2500g. Note: Many studies consider birthweight in categories, e.g. 250-500g intervals, or as a continuous variable. In these, VLBW and LBW are YES.
PRETERM	N	Preterm delivery		Usually <37 weeks gestation
SIDS	N	Sudden infant death		
O_DTH	N	Other cause		
MATMM	N	Maternal morbid/mortal		Maternal morbidity or mortality
PRELAB	N	Premature labor		Threatened abortion or preterm labor
NEURO	N	Neurological deficit		Developmental delays or other neurologic deficit
BDEFECT	N	Birth defect		
O_MORBID	N	Other morbidity		
				Maternal risk factors examined
MATAGE	N	Maternal age		
RACE	N	Race or ethnicity		Mother or infant
ED	N	Educational level		
B_ORDER	N	Birth order		
B_INTER	N	Birth interval		
FDAB	N	Previous fetal loss		

SAS			
Variable		Descriptive	
Name	Type	Name	Comment
PREID	N	Previous infant death	
SES	N	Socioeconomic status	
MARITAL	N	Marital status	
PRECON	N	Pre-existing conditions	Illnesses, e.g. diabetes, heart disease, etc.
PGCON	N	Pregnancy complications	Illnesses or conditions arising during pregnancy
IPCOMP	N	Intrapartum complications	
PGMED	N	Medications in pregnancy	
SMOKE	N	Smoking	
ETOH	N	Alcohol	
DRUG	N	Illicit drug use	
O_HABIT	N	Other habits	
M_DIET	N	Maternal nutrition	
O_MAT	N	Other maternal factors	
FATHER	N	Paternal characteristics	Paternal risk factors examined
			Infant risk factors examined
BW	N	Birthweight	
G_AGE	N	Gestational age	
SEX	N	Sex of infant	
CONDIT	N	Condition at birth	APGAR score, other characteristics
O_INF	N	Other infant factors	
			Medical care (prenatal, intrapartum, newborn) risk factors
FUND	N	Public funding of care	
PNC	N	Prenatal care	
MONITOR	N	Fetal monitoring	
TOCO	N	Tocolytic agents	
O_RX	N	Other therapies	
ATTEND	N	Delivery attendant	
DELIVER	N	Delivery location	Hospital, birth center, home, etc.
METHOD	N	Delivery method	Cesarean section, vaginal delivery
NICU	N	Newborn intensive care	
O_CARE	N	Other care factors	
			Postnatal care risk factors
FUNDPOST	N	Funding of postnatal care	
WCC	N	Well child care	
SERVICE	N	Service utilization	
I_DIET	N	Infant nutrition	
O_POST	N	Other postnatal care	

SAS			
Variable		Descriptive	
<u>Name</u>	<u>Type</u>	<u>Name</u>	<u>Comment</u>
			Programs to reduce morbidity or mortality
P_DIET	N	Nutrition programs	
P_EDPNC	N	Prenatal education	
P_EDPOST	N	Postnatal education	
P_PNC	N	Prenatal care programs	This differs from PNC. PNC refers to the effect of prenatal care. P_PNC refers to the effect of specific prenatal care programs.
P_SIDS	N	SIDS programs	
P_REGION	N	Regionalization	
T_MAT	N	Maternal transport	
T_INF	N	Infant transport	
O_PROG	N	Other programs	
URBAN	N	Urban vs. rural residence	
O-RISK	N	Other risk factors	

* A = alphanumeric, N = numeric

Evaluation of Interventions to Reduce Racial Disparities in Infant Mortality:

Case Studies of Selected Interventions

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CASE STUDIES OF SELECTED INTERVENTIONS

I. Overview

This report includes summaries of five demonstration projects designed to reduce LBW and IMR. They are the California OB Access Project, the New York Evaluation of the Cost Effectiveness of an Intensive Program of Prenatal Care, the South Carolina High Risk Perinatal Program, the Washington, D.C. Better Babies Project, and the St. Paul, Minnesota Adolescent Pregnancy Prevention Services. The reasons they were selected were because of their evaluation designs, their findings of effectiveness, and their focus on financing as well as delivery of comprehensive services. (Note: The New York study is just beginning). The final section of this report is a summary of the 1984 SPRANS¹ grants that relate to reducing racial disparities in infant mortality.

For more information on programs designed to reduce infant mortality, please review the recent summaries prepared by the Intergovernmental Health Policy Project/Association of State and Territorial Health Officials (IHPP/ASTHO, 1984) and the Institute of Medicine (IOM) report on prevention of low birth-weight (January, 1985). The IHPP in cooperation with the ASTHO Foundation have prepared descriptions of exemplary programs directed at 1) LBW, preterm births and prenatal care programs, 2) perinatal, infant, and child care programs, 3) adolescent pregnancy programs, and 4) special programs, including those particularly aimed at minorities.

The IOM report has extensively reviewed the literature related to the prevention of LBW. The program evaluations that were reviewed included the Prematurity Prevention Programs (Creasy, *et al.*, 1983), HMO studies, Maternity and Infant Care Projects, Improved Pregnancy Outcome Projects, Community Health Centers, Nurse Midwife Programs, OB Access and other demonstration projects.

¹ DMCH grants that are designated as Special Grants of Regional and National Significance.

II. California Obstetrical Access Project (OB Access)²

A. Description

The OB Access Project was designed as a pilot study to increase access to prenatal, delivery and postpartum services for Medi-Cal and other low income women in 13 urban and rural counties between July, 1979 and June, 1982.³ To accomplish their task, the state contracted with county health departments, a university medical center, community clinics and health coalitions to increase physician participation in previously underserved areas. The Medi-Cal package of reimbursable services was expanded to include eight or more prenatal care visits; nutrition, psychosocial, and health education assessment and counseling; birth education classes (16 hours); prenatal care vitamins; and over 30 diagnostic tests, as needed. The method of reimbursement was also changed from a package/global fee to itemized billing with an advance payment mechanism to more fairly differentiate the care received by high risk women. To accomplish these changes, the state obtained a waiver from HCFA (under Section 1115A). In addition to these changes in reimbursement, two additional program strategies were adopted: 1) a system of Medi-Cal eligibility with careful explanation of services and registration, and 2) a case-managed system of multidisciplinary care.

B. Study and Control Populations

Over the three-year period, some 5,244 women were served by the OB Access Project. Of the 1,980 women registered in the first year, 49.8% were Hispanic, 27.4% were White, 11.8% were Black; 3% were American Indian, 1.7% were Asian; and the remaining 6.3% were reported as "Other" or "Unknown/Not Reported." Two comparison populations were selected from 1) the San Joaquin Perinatal Project (SJPP), and 2) the Oakland Perinatal Health Project (OPHP).

² Supported by the State of California's Health and Welfare Agency, Department of Health Services, Community Health Services Division, Maternal and Child Health Branch, 741-744 P Street, Sacramento, California 95814, (914) 322-2950.

³ In 1977, 20 of 58 California counties had no resident OB/GYN.

Not unlike many of the other IMR evaluations, the comparison population is not an experimental control group. It is not matched for several important SES variables. For example, the racial make-up of the two control projects are quite different: 22.5% Hispanic in OPHP and 74.1% in SJPP; 29% Black in OPHP and 3.5% in SJPP. The age of the registrants was also very different: 17 and under - 8.2% in OB Access, 13.1% in OPHP, and 8.1% in SJPP; and 35 and over - 3.7% in OB Access, 2.9% in OPHP, and 12% in SJPP. The project period covered also varied for each group. In addition, the actual content of the prenatal, intrapartum and postpartum medical care was not adequately specified in the published reports to determine differences among sites.

C. Evaluation Plan

Four evaluation objectives were specified in the OB Access preliminary evaluation report (California, 1984):

- "1. To attempt to measure any increase in access to OB services for Medi-Cal women in project areas.
2. To determine the impact of a comprehensive package of OB services provided to project registrants.
3. To assess the costs of delivering comprehensive OB services to project registrants relative to the impact of these services.
4. To provide information covering project participation, demographics, case costs, and outcome to serve as a data base from which to make future decisions on the provision of OB services under the Title XIX and Title V programs." (p.9)

The evaluation design is described as an "after only with comparison group" non-experimental design (p.10). Comparison data were obtained from statewide Medi-Cal populations and from the "Matched Groups," using state vital statistics birth records linked with Medi-Cal records.

To evaluate project outcome on OB Access patients, the following measures were used: maternal weight gain and hematocrit level; complication rates during prenatal, intrapartum and postpartum periods; LBW rates, Apgar scores, gestational age, and abnormalities. The key dependent variables were birthweight and expected perinatal mortality rate (which controls for sex, race and plurality). The following study findings were reported by the program's evaluators. Caution is advised regarding these results, particularly regarding the LBW effects, since the "control" populations are not adequately matched and potential

selection bias is not sufficiently explored. The strength of the OB Access Project is in the comprehensiveness of the services delivered, not necessarily in the evaluation design. While this program may in fact be cost effective, the evaluation is unfortunately not sensitive enough to document this claim.

D. Study Findings

1. Access to perinatal care. Researchers found access in underserved areas was increased; more initiated prenatal care in the first trimester, a high proportion of the pregnant women completed care (84%), and the majority were able to receive the whole package of benefits.
2. LBW. The OB Access population had half the incidence of LBW (4.7%) as did the comparison groups of Medi-Cal recipients (7.1%). The very low birthweight rate (VLBW, under 1,500 grams) was 61% lower in the OB-Access population (1.3% vs. 0.5%).
3. Cost Savings. While the mean total claim for OB Access care (with an adjustment for physicians who billed only the prenatal care to OB-Access and the delivery to Medi-Cal) was \$250 higher per case than for a Medi-Cal reimbursed case, researchers found major savings accruing from reductions in LBW and VLBW rates and the associated decreased labor and delivery complications and premature birth. Korenbrot (1984) calculated that if Medi-Cal were to extend its benefits similar to those provided by OB Access, every \$1.00 spent would yield \$1.70 in reduced costs for newborn intensive care.

E. Limitations and Comments

1. Lack of an adequately matched control population, as discussed under Study and Control Populations.
2. The evaluation is based on only 80% of the total registrants who completed care.
3. Unspecified reasons why some of the participants did not complete the full "unit of services" -- premature birth, migration, behavioral problems, etc. This could be very important in targeting hard-to-reach persons.
4. Selection bias in the choice to participate in the comprehensive OB Access project is not adequately explained.

III. New York Evaluation of the Cost Effectiveness of an Intensive Program of Prenatal Care⁴

A. Description

Fifteen demonstration projects have been funded by the New York State Department of Health (with over \$2 million of federal Jobs Bill funds) to reduce the incidence of preterm births and LBW due to intrauterine growth retardation (IUGR).

To reduce preterm delivery, the New York projects include the following components: 1) identification of high risk women based on health status, SES, prior reproductive performance, and current pregnancy; 2) intensive prenatal care; 3) patient education on the signs and symptoms of preterm labor (PTL); 4) extensive staff training and education; 5) around-the-clock availability of specially-trained staff; and 6) use of tocolytic agents and prompt hospitalization, as indicated.

Interventions to reduce LBW associated with IUGR are directed at behavioral, social and economic factors. To increase early initiation of care, community health promotion strategies are used. To decrease poor nutrition, smoking, and substance abuse, patient education activities are available. To assure individualized, continuous and comprehensive care, a case-managed system is employed.

The state of New York recently received funds from the Division of Maternal and Child Health (under a SPRANS grant) to evaluate the cost effectiveness of these ongoing 15 demonstration projects.

B. Study and Control Population

Approximately 10,000 pregnant women in 15 high risk areas (defined as census tracts and/or health areas, where the three-year IMR exceed 15 deaths per thousand live births and/or where the incidence of birthweight less than 2 kg exceeds 2.5% of total live births) will be served during the first year. Evaluators will collect data on 5,000 of these women. (Note: Each project differs to some extent in their outreach and follow-up efforts, prenatal care protocols, women to be served, and service area.) A comparison group "with the identically documented experience"

⁴ Supported by the State of New York and DHHS' Division of Maternal and Child Health, Dr. Solbritt Murphy, MCH Director, (518) 474-3664.

of at least 3,000 pregnant women will be used in 5 control projects providing high quality standardized prenatal care services.

C. Evaluation Plan

The three evaluation objectives are:

- 1) "To measure the effectiveness of the project outreach activities in enrolling women at risk into first trimester prenatal care.
- 2) To measure effectiveness of follow-up methods for maintaining a continuous course of prenatal care.
- 3) Measure the relative cost effectiveness of intensive prenatal care programs." (SPRANS grant application, p.12).

Using vital record data before and after the projects were implemented, researchers will assess changes in time of first prenatal visits, number of visits, LBW, gestational age, and spontaneous fetal and neonatal deaths.

Project/service data will be collected on 1) the prenatal care (PC) service plan for intensive and routine care groups, 2) outreach and follow-up efforts, 3) distribution of enrolled women by risk -- very high, high, moderate, low, and 4) service areas.

Cost data will be obtained for 1) PC costs X number of visits, 2) special lab and diagnostic tests done off-site-received X number of visits, 3) tocolytic agents by administration methods X dosage, 4) hospitalization costs for mother/infant dyad, and 5) project grant dollars.

D. Study Findings

By November 1985, the evaluation is expected to be completed. With this information, New York researchers expect to evaluate the cost effectiveness of prenatal care that includes active outreach in registering pregnant women in the first trimester, use of a standardized risk assessment tool, intensive prenatal care for "at risk" women, and health education and patient follow-up.

E. Limitations and Comments

1. Race is included as a moderate risk factor but defined only in terms of White and Non-White (includes "black, red, yellow"). This should be disaggregated to at least include Hispanic, if not others.
2. The challenge to evaluate 15 somewhat different programs should not be underestimated.
3. The difficulties and importance of finding matched control populations have been stated over and over again. Hopefully, this New York study will have more success in controlling more non-medical factors than other studies have succeeded in doing.
4. Any efforts to further define the characteristics of the delivery system and financing of care should be encouraged (see Report 5 on data limits for possible indicators).
5. It is unclear in the descriptive materials that the author has the extent to which Medicaid or the Jobs Bill pay for the full costs of care for some or all of the study and control sites. This could be a critical factor in determining selection bias. Also, it would be useful in understanding physician and hospital participation.
6. More detail on the cost of prenatal care would be useful (broken down by cost for health education and counseling services, etc.).
7. While cost information will be collected, it might also be useful to examine, if applicable, the reimbursed amount (e.g., did Medicaid pay 80% of hospital costs and 10% of patient education, etc.?).

IV. South Carolina's Statewide High Risk Perinatal Program

A. Description

A statewide system of perinatal care has been operating in South Carolina since 1976 to identify high risk obstetric patients and to assure appropriate care for both the pregnant woman and her infant. Several different efforts are underway to achieve these goals. First, all WIC prenatal care patients (40% of South Carolina's pregnant women) are screened using a standardized risk screening system (Heins, 1978). If the woman is greater than 30 weeks gestation, however, she is not eligible "because of needed time for intervention." (Jackson, 1984) The

high risk women that meet the eligibility standards are then referred to board certified/eligible OB/GYNs and provided with public health nurse case management, social work evaluation, nutrition counseling and health education. Delivery is restricted to Level II or III hospitals and the patient receives one-year of follow-up for family planning.

Second, a LBW Prevention Program has been recently developed building on the "Creasy model." In several sites throughout the state, women are screened for risk of preterm labor and SGA (SGA accounts for nearly half of South Carolina's LBW problem).

Third, with funding from DHHS, a standardized risk assessment system and intervention strategy are being developed for their Family Planning Program. The goal of this effort is to identify high risk women before they become pregnant and offer family planning consultation.

Fourth, a priority infant tracking system was designed to reduce postneonatal mortality. Women with one or more of the following risk factors (data available on the birth certificate) are contacted and offered preventive child care including immunizations, WIC, and other support services: 1) infant was LBW (less than 2500g), 2) mother's age was under 18, 3) mother made less than 5 prenatal visits or care started after the 6th month, 4) mother had less than 12 years of education, and 5) mother had a previous child born alive and is now dead.

Additional strategies underway include plans to initiate a Medically Needy Program under Medicaid. This will add groups of needy women and children who can subtract their high medical bills from their income (spend down) and become eligible for Medicaid. Dr. Jackson, South Carolina's Commissioner of Health and Environmental Control, commented on this (1984): ". . . We are sure that this will not address a large portion of the access problem (because the standard of payment is so low in our state), but it does help."

The state is also requesting a waiver from HCFA to provide pregnant women covered by Medicaid the same standard of care that pregnant women are receiving in the High Risk Perinatal Program.

Funding is provided to high risk women who do not receive Medicaid, private insurance or CHAMPUS, and are below 150% of the federal poverty standard. Some women meeting these requirements are not eligible, presumably because they have other financial resources. Included in the reimbursed services are prenatal care, laboratory tests and drugs, up to 3 days for each pre-delivery hospital admission and 3 days for delivery. Obstetricians are paid "a clinician fee" for their prenatal and delivery services. A newborn evaluation by the pediatrician and one day of hospital care is also reimbursed. If a high risk newborn of a

program mother requires intermediate care, an application must be made to determine if the state will pay for the extended hospital stay (payment is based on the risk of the infant).

Contracts were let with five Level III NICUs to provide care to a specified number of infants, based on the percent of the total statewide number of very low birthweight infants (under 1500g) each hospital provided care to in the previous year. Hospitals had to agree to accept referrals from within their regions and/or find a bed for the infant. A flat rate of up to \$5,000 is paid for hospitalization and physician charges for each infant. A small amount was given to each tertiary center for outreach, education, neonatal transport and neonatal developmental follow-up. The High Risk Perinatal Program also sends out a multidisciplinary team, if requested, to provide on-site hospital review and consultation.

B. Study and Control Populations

As stated above, only women who are less than 30 weeks gestation, with five or more risk factors, not receiving Medicaid or other forms of insurance, and below 150% of the poverty standard are eligible. In fiscal years 1983-1984, almost twice as many high risk women were able to be served (1,400 women), using Jobs Bill funding. However, due to escalating medical care costs and the large numbers of high risk women eligible for the program, the state is having to cut back.

Some 573 matched pairs of program and non-program women were retrospectively evaluated for the first three years of the program (1976-1978). The matching was based on race, age, parity, and outcome of previous pregnancy (fetal death, LBW, neonatal death, three consecutive spontaneous abortions, C-section) (Heins, et al., 1983). "Risk items scored for program and non-program high risk women were nearly identical to those of the entire group."

C. Evaluation Plan

Heins, et al., (1983), evaluated the program's impact using 573 matched controls, as described above, based on the following dependent variables: fetal mortality, neonatal mortality, perinatal mortality (fetal deaths occurring after 20 weeks gestation, plus all live-born infants who die within 27 days after birth), LBW, and normal birthweight.

D. Study Findings

1. The non-program comparison group had almost twice the number of fetal and neonatal deaths as the perinatal program group (53.2/1,000 vs. 30.5/1,000). Heins found no statistical difference in birthweight distribution among the two groups.
2. Postneonatal mortality was less for program mother's infants.
3. A greater number of program women had more prenatal care visits to board certified OB/GYNs and delivery was more likely to occur in a Level II or III hospital. Specifically, some 10.5% of program women made only 0-4 prenatal care visits compared to 17.7% of non-program women. Another 27.8% of program women vs. 39.2% of non-program women made 5-9 prenatal care visits. In addition, over 93% of program women vs. 76% of non-program women delivered in a Level II or III hospital.
4. In 1983, South Carolina had their first significant infant mortality decrease in 4 years. In 1982, the IMR was 16.1. In 1983, it dropped to 15.0. ("That makes us 49th, ranked just above Mississippi." -- Jackson, 1984).

E. Limitations and Comments

1. It is not possible to assess the impacts of the specific program elements that made the difference in decreasing perinatal mortality.
2. It is unclear from the published information on the program what happens to high risk women who are more than 30 weeks gestation and otherwise eligible for the program. Are a certain set of minimal services provided for them such as tertiary hospital referrals, MCH clinic follow-up, and/or family planning following the infant's birth?
3. Has the program been able to define a core set/minimum basic set of services that is essential for reducing certain risk factors?
4. Does the state continue follow-up of the low and moderate risk women who are not receiving any health insurance and who are below 150% of the poverty level? This group, in other states, might be considered at high risk because of South Carolina's high poverty rate relative to the U.S. national (15.9% vs. 12.5% in 1980; of the 15.9% poverty population in South Carolina, 36.5% is White, 62.6% is Black

and 1.8% is Hispanic) and the low AFDC payment levels. (In 1982, a family of 4 needed to make less than \$2,052 to become eligible for AFDC and thereby qualify for Medicaid.) What about this group's LBW, NMR, and PNMR? What about the availability and participation of OB/GYNs, FP/GPs, pediatricians, and nurse midwives to care for these women and their infants? Also, are these women and their infants being treated at hospitals that have the appropriate level of services? Clearly, the state, with limited resources and a desire to improve IMR, made some difficult choices about how many women it could serve. However, in any effort such as this, an ongoing monitoring system should be set up (in addition to the infant tracking system) to assess: 1) the availability and appropriateness of services to treat these women and their infants, and 2) the outcomes of "low and moderate risk" women in terms of LBW, NMR and PNMR. With this information, the state, if it hasn't already done so, could assess the sensitivity and specificity of the risk assessment tools and determine the cost benefit of extending or not extending care to this group.

5. Some long-term funding sources need to be identified because of the apparently heavy reliance on Jobs Bill Funds and because of the program cutbacks that have already occurred. The possibilities for raising the AFDC payment standard should be seriously considered. As it stands now, much of the funding for these services are state monies. By making more women eligible, the costs could be shared by the state and federal government.
6. This statewide effort highlights the improved outcomes and the expanded organization and coordination of perinatal services that can be achieved if 1) funds are available to pay for physician and hospital care, and 2) access to more comprehensive care is extended.

V. District of Columbia's Better Babies Project

A. Description

The D.C. Better Babies Project is a three-year research and demonstration effort designed to reduce low birthweight in seven high-risk census tracts. (Note: 15.5% was the average LBW rate in these census tracts 1980-82.) Funded by a consortium of local and national foundations and the federal government, the project plans to 1) provide aggressive outreach to identify as many pregnant women as early as possible, 2) enroll these pregnant women in prenatal care, 3) maintain continuous prenatal care, 4) increase participant's compliance to the prenatal care regimen,

and 5) link participants with existing health education services designed to reduce smoking, substance abuse, stress, and improve nutrition.

In July 1983, the service delivery component began as a combined effort of the Visiting Nurse Association and the Family Place, Inc. of Washington. A multidisciplinary team of nine persons (a registered nurse, a social worker, six service coordinators, and a house manager) work out of the project's drop-in center. Overall coordination of the project is being provided by the Greater Washington Research Center, the original project designer.

B. Study and Control Populations

Pregnant women in seven census tracts in Washington, D.C. will be served, most of whom are Black and low income. On average, 425 infants are born each year to women from these areas. Unfortunately, the author had no information on the sociodemographics and the risk factors of women in the study area and in the control site. Matched controls will be selected from a D.C. public health clinic. The study population will also be compared against vital records maintained by the D.C. Department of Human Services.

C. Evaluation Plan

The National Institute on Child Health and Human Development (NICHD) is funding the evaluation component of the project. Because this effort is just getting underway, data is not available. The following seven research questions will be evaluated:

- "1. What percent of pregnant women living in the target area can the project identify by the 26th week of their pregnancy?
2. Of those women identified by the project, what percent agree to participate and how do they differ from those who did not participate?
3. Of women who participate, which of the identifiable risk factors are present and in what percentages?
4. What are the characteristics of the women with identifiable high risk factors who participate in the intervention efforts to reduce these risks?

5. How do weight gain, smoking, and drinking habits change for women participating in project interventions compared to women queried as controls during prenatal visits to a D.C. public health clinic?
6. Did the early onset and number of prenatal visits of women in the project improve compared to nonparticipants in the target area and in the city as a whole based on D.C. vital records?
7. What was the pregnancy outcome (fetal death, incidence of LBW, and birthweight distribution) of women in the project, the target area, and the city during the operation of the project based on D.C. vital records."

(National Institute on Child Health and Human Development, 1984).

D. Study Findings

[Will be available after November 30, 1986.]

E. Limitations and Comments

1. Since this project is just beginning, no information is available on effectiveness. However, the design of the project, targeted at a very high risk population, should offer useful intervention strategies for others aiming to enroll hard-to-reach pregnant women.
2. The program staff and evaluators should, if they have not already, attempt to define to the extent possible the content of the prenatal care delivered, the intensity of the outreach and case management, and the related health education services to better identify those factors that are associated with improved pregnancy outcomes.
3. No mention was made in the published material the author had on linkages with or funding from the District government, area hospitals, providers, and schools. The continued operation and appropriate referrals could depend greatly on such linkages. In addition, no information was provided on family planning and infant follow-up as a component of this program. Also, will the health care team provide preterm labor prevention education to this group of women?

4. Are all of the services provided by the Better Babies Project fully reimbursed? How are Medicaid, WIC, and Title V services being tapped? To what extent will the project staff assist the program participants in gaining eligibility for necessary subsidized services?

VI. St. Paul, Minnesota's Adolescent Pregnancy Prevention Services

A. Description

The St. Paul Adolescent Pregnancy Prevention Program has successfully operated as a Maternal and Infant Care (MIC) Project since 1973. In an effort to prevent adolescent pregnancy and to reduce poor pregnancy outcomes among adolescents, the MIC Project developed a comprehensive multidisciplinary program of education, counseling, and family planning services for adolescents.

After two years of intensive community and school planning, the MIC Project began in an inner city junior-senior high school in St. Paul. Operating out of a former storage room, the project provided prenatal and postpartum care, VD testing and treatment, pregnancy testing, pap smears and contraceptive information and counseling. (Note: Contraceptives were not provided at school but by the school clinic staff at a special evening adolescent clinic at St. Paul-Ramsey Hospital.) To begin with, few students used the clinic. Once the clinic was moved to a more attractive site and the services were expanded to include physicals, immunizations and a weight reduction program, the clinic became more popular. According to Edwards, *et al.*, (1980), 50% of the entire study body and 92% of the pregnant students were using the clinic at the end of the 1975-76 school year. In addition, continued contraceptive use was high and fertility rates fell by 56% (from 79 in 1973 to 35 births per 1,000 in 1976). (See evaluation for additional information on results).

Presently, clinics are operating in two senior high schools because the original school closed. A health care team at each school includes a family planning nurse practitioner who also provides prenatal care; a clinic attendant who routes all the patients and is available for support; a clinic social worker who discusses the adolescent's relationship and family environment; an OB-BYN who is available one morning a week at each school, a pediatrician and pediatric nurse associate who offer health exams and immunizations; a nutritionist who educates the students about nutrition related to family planning and prenatal care; a dental hygienist who offers counseling, screening and referrals; a day care director who operates the school's day care center; and a health educator who develops curriculum and teaches all the junior and senior high classes.

B. Study and Control Populations

Some 403 students were seen by the three MIC school clinics between April 1973 and May 31, 1979. All students who received contraceptive services were followed up until they were 18 or graduated.

A control population of 1,762 adolescents were selected from the MIC hospital-based teen contraceptive clinic. They were matched for age, race, gravidity, parity, contraceptive method, continuation and loss to follow-up.

In addition, a retrospective review was made of medical records of 85 pregnant students who gave birth at the local hospital after receiving their care at the MIC school clinics. These were compared with MIC patients who had not received prenatal care at the school clinics.

C. Evaluation Plan

The St. Paul MIC Project evaluated the use of clinic services, contraceptive usage, fertility rates, obstetric problems, and pregnancy outcomes among students in the original school. Edwards, et al., (1980) summarizes their impressive findings:

" . . . By the end of the third year (1976), 50% of the entire student body had attended the clinic at least once and 92 percent of the pregnant students had obtained prenatal services. The school dropout rate after delivery was reduced from 45% in 1973 to 10% in 1976. Furthermore, no repeat pregnancies occurred among those students who delivered with the project and returned to school. The 12-month contraceptive continuation rate for the three years was 86.4 per 100 women (calculated by the life-table method). The fertility rate for the school population fell from 79 per 1,000 to 35 per 1,000." (p.11)

Since expanding into the two schools, utilization of the clinics is up to 75% of all students (1978-1979 school year). The number of females obtaining family planning services has also risen to 25% of all female students. Comparing the racial make-up of the school MIC clinic with the MIC teen clinic, they found more minorities enrolled in the school clinic -- 33% vs 15%.

Adolescent contraceptors enrolled in the school MIC clinic had longer continuation rates, were less likely to become pregnant, and more likely to deliver a healthy infant. Enrollment of pregnant teens was 66% and 70% at each respective school. Of the 85 students who delivered, 45% were White, 41% Black, 9% Spanish American, and 4% Other Races. In 94% of these cases, prenatal care was begun before the third trimester and only 6% had less than 5 prenatal visits. Of the 85 pregnant adolescents, 11% gave birth prematurely and 7% were LBW. This was no different from the other MIC population.

Since the project began in the two schools, there has been more than a 40% decline in the number of pregnancies and the fertility rate has dropped by 23%. Project staff believe that the lack of staff turnover, confidential and personal services, ready access to care, free services, a team approach, educational and social support services, and involvement of the partner and parents, as requested, are the major factors contributing to their success.

Edwards, et al., in their 1980 Family Planning Perspectives article, reported that their effectiveness could be improved by a new junior high school sexuality curriculum and expanded use of the clinics by junior high school students.

D. Limitations and Comments

1. From the data the author had, it was difficult to examine the similarities in the matched MIC teen project. If they were older, as the article states, the fact that prematurity and LBW rates were the same, may in fact represent a strength of the school MIC project. In other words, one would expect a higher rate of LBW and prematurity among a younger population.
2. The amount of time (two years) spent on community development should be underscored for others interested in replicating the program.
3. The provider characteristics (little staff turnover, team approach, supportive environment, and multiple services) are obviously very critical in assuring ease of access for adolescents and approval from parents and school staff and administration.

VII. Summary of 1984 DMCH SPRANS Grants Relevant to Infant Mortality Among Minorities

A. Overview

Seventeen 1984 grants were selected from the Division of Maternal and Child Health's (DMCH's) Special Programs of Regional and National Significance (SPRANS) for their relevance to reducing racial disparities in infant mortality. Table 1 briefly describes each grant, the intervention strategy, the minorities sampled and the evaluation design.

These SPRANS grants fall generally into one or more of the following four categories: 1) interventions directed at and extending outreach and access for high risk women (#2, #3, #4, #5, #6, #7, #11, #13, #17), 2) improved risk assessment and development of treatment protocols (#2, #3, #4, #10), 3) development of alternative delivery systems (#5, #8, #11), and 4) data base development and program evaluation (#1, #9, #12, #14, #15, #16). Because these grants are in their first or second year of operation, evaluation data are unavailable. Table 1 briefly describes those grants with a major evaluation component.

The majority of these SPRANS grants are directed at extending access to appropriate services, a commonly cited problem among high risk women and minorities. In the North Carolina Migrant Farmworker grant (#11), for example, principal investigator Watkins found the mean number of prenatal care visits by the study population to be 2.5. This is far below the standards recommended by the American College of Obstetricians and Gynecology (ACOG).⁵ Moreover, because of their migrant status, these farmworkers are seldom covered by Medicaid. In addition, their employers typically fail to provide health insurance coverage.

On the Indian reservations of Fort Totten and Standing Rock in North Dakota (#13), somewhat different access problems have been identified and addressed. While Indian women are insured by the Indian Health Service, availability of physicians and nurse midwives to serve in remote areas is problematic. In Fort Totten, the major provider of obstetrical services, the University Medical School OB/GYN Residency Program, is being phased out. In Standing Rock, less than 10% of the reservation families have phones. Clearly, the problems of enrolling and maintaining women in adequate prenatal care are significant when physicians

⁵ ACOG (1983) recommends a minimum of one health care visit in the first 13 weeks, followed by one visit per month in weeks 14-32, a visit every two weeks from 32-36 weeks of pregnancy, and weekly visits thereafter.

and nurses are unavailable and when distance, weather and communication barriers severely isolate pregnant women and their infants. The SPRANS grant is designed to extend care to pregnant women using community health nurses.

Hispanic pregnant women in Hartford, Connecticut (#5) complain of access problems related to language, insurance coverage, and cultural beliefs. To increase their ease of access, community support networks are being organized by 8 volunteer comadronas.

In each of these examples, the DMCH-funded grants are directed towards facilitating access to preinatal services, recognizing the unique needs of their target populations.

B. Recommendations

Similar to the inventory of DMCH efforts related to infant mortality (ASTHO Fdn., 1984), there is a need to prepare a report summarizing (as shown in Table 1) all of the DHHS demonstration and research and training grants and contracts funded since 1980 related to infant mortality among minorities. From this a workbook could be developed and widely disseminated. It could be organized by program area (e.g., outreach, prenatal care, delivery, maternal and infant follow-up) or by program description, training and education, community organization, financial support, and evaluation. If such a workbook were prepared, MCH groups interested in developing a program could write directly to that project for assistance.

So often these programs are unaware of similar efforts underway in other communities and states and consequently have to start from scratch in organizing the program, developing the training, education and risk assessment tools, and conceptualizing the evaluation. Clearly, any efforts DHHS can support to facilitate the diffusion of innovation related to infant mortality among minorities would be beneficial. In addition, such an effort at this would assist program planners and evaluators who are unable to obtain information on minorities from the published literature.

TABLE 1

DIVISION OF MATERNAL AND CHILD HEALTH: 1984 SPRANS GRANTS
RELEVANT TO REDUCING RACIAL DISPARITIES IN INFANT MORTALITY

<u>State/Title/Contact</u>	<u>Description</u>	<u>Intervention Strategy</u>	<u>Minorities Sampled</u>	<u>Evaluation Design</u>
1. <u>Calif./Automated Perinatal System/Ronald Williams (805-961-3143).</u>	Collect additional perinatal information to better determine sources of poor perinatal outcomes.	Data base expansion on perinatal care.	All	N/A
2. <u>Calif./Border Maternity Health Care Project/Sylvia Agurie (916-443-9076) (CA 281).</u>	Identify barriers to prenatal care (PC) and reasons for late initiation of PC, develop treatment protocols, increase binational and cross-cultural communications between public and private officials.	Access to perinatal care and treatment protocols (LBW, NM, (PNM)).	Mexican women and Mexican American women.	Two Control Groups: <u>Study Grp 1:</u> Pregnant women in Mexico and receiving treatment protocol. <u>Control Grp 1:</u> Pregnant women in Mexico not participating in protocol. <u>Study Grp 2:</u> Pregnant women in U.S. and receiving treatment protocol. <u>Control Grp 2:</u> Pregnant women in U.S. not participating in protocol.
3. <u>Calif./Infant Growth and Development Project.</u> ?	Develop cross-cultural screening mechanism and intervention programs for families at risk for child abuse and neglect.	Child abuse and neglect screening and outreach program (PNM).	All high risk families.	?

TABLE 1 (page 2)

<u>State/Title/Contact</u>	<u>Description</u>	<u>Intervention Strategy</u>	<u>Minorities Sampled</u>	<u>Evaluation Design</u>
4. Colo./Low Birth Weight Prevention Project/Daniel Gossert (303-320-6137 ext. 430).	Identify early high risk pregnancies (for LBW), develop and test standardized risk assessment tools and intervention to reduce risk (under-nutrition, smoking, alcohol use, discontinued use of contraceptions).	Early identification and targeted outreach of high risk women, risk assessment, and health education (risk reduction) (LBW).	All high risk.	CDC Pregnancy Surveillance System (used by WIC) with additional information on risk taking behaviors; control experimental groups: 1) program births vs. all other Colorado births; 2) program participants that reduced risk vs. program participants that did not; 3) program births vs. births by women not participating in similar sociodemographic; and 4) program participants participating in FP vs. program participants who did not.
5. Conn./Hispanic Maternal and Child Health Network - The Comadrona Model/John Sayers (203-566-2887) (CT 142).	Identify and train lay health workers and develop community networks to increase access. Develop materials.	Access to care through lay health workers and community networks (LBW, NMR, PNMR).	Hispanic women.	Collect baseline information on risk factors. Process evaluation of materials, training, and intervention.
6. GA./Continuum Alliance for Human Development, Inc./Charlotte Wilen (GA 555).	Develop coordination and build public and private coalitions to increase access.	Access to care through coalition building (LBW, NMR, PNMR).	Low income and minority women.	?

TABLE 1 (page 3)

<u>State/Title/Contact</u>	<u>Description</u>	<u>Intervention Strategy</u>	<u>Minorities Sampled</u>	<u>Evaluation Design</u>
7. <u>Miss./Mississippi</u> <u>Outreach Perinatal</u> <u>Education Project/</u> <u>Elin Holgren</u> <u>(601-354-6680).</u>	Build network of public and private providers to increase access. Identify barriers to care as perceived by physicians and hospitals.	Access to care through coalition building and improved financing (LBW, NMR, PNMR).	High risk women.	?
8. <u>N.J./Nursing</u> <u>Coordination of</u> <u>Perinatal Ser-</u> <u>vices/Margaret</u> <u>Gregory (NJ 003).</u>	Coordinate through nurses the available services for prenatal care and delivery, visits to inpatient maternity units, referrals to community services and home visits.	Case management using nurses (LBW, NMR, PNMR).	High risk women.	?
9. <u>N.Y./Evaluation</u> <u>of the Cost</u> <u>Effectiveness of</u> <u>an Intensive</u> <u>Program of</u> <u>Prenatal Care/</u> <u>Solbritt Murphy</u> <u>(518-474-3664)</u> <u>(NY 547).</u>	Evaluate cost effectiveness of 15 ongoing prenatal care demonstration projects serving about 10,000 women. Active outreach, risk assessment, intensive prenatal care, and follow-up will be process measures. Outcome measures will be birth weight and gestational age, spontaneous fetal deaths, and neonatal mortality. Cost measures will be prenatal care costs, special lab and diagnostic tests, tocolytic agents cost and hospitalization costs.	Evaluate costs and effectiveness of intensive prenatal services (LBW, NM).	Low income, high risk women.	Patient Summary Records (described in case studies) - Vital Records Data will be collected on about 5,000 women-infant dyads. Five control rates will be selected. Crude pre/post comparisons of vital records data and matched pre/post comparisons of the enrollees and control group will be conducted. Inter-project comparisons will be done where possible.

TABLE 1 (page 4)

<u>State/Title/Contact</u>	<u>Description</u>	<u>Intervention Strategy</u>	<u>Minorities Sampled</u>	<u>Evaluation Design</u>
10. <u>N.C./Prevention of Preterm Labor in Northwest NC/ J. Kiffin Penry (919-748-4548) (NC 272).</u>	Train and expend concept of risk assessment and patient education of preterm labor (PTL).	Preterm labor prevention (LBW).	All women at risk for PTL.	?
11. <u>N.C./Improving the Health of Migrant Farmworkers' Mothers and Children/ Elizabeth Watkins (919-966-2017) (NC 415).</u>	Assess risk and provision of services. Recruit and train lay health workers. Develop educational modules/materials.	Risk assessment, access to care, lay health workers (LBW, NMR, PNR).	Migrant farmworkers (52% Black American, 27% Hispanic, 19% Haitian, 2% White).	?
12. <u>N.C./Region IV Network for Data Management and Utilization/ Mary Peoples (919-966-2017) (NC 301).</u>	Compare Region IV state perinatal and crippled children's services (CCS) data in terms of definition, collection, analysis and dissemination.	Data base coordination for improved management and evaluation.	All Title V program participants.	?
13. <u>N.D./Demonstration Project for Native Americans/ Robert Wentz (701-224-2493) (ND 006).</u>	(Two separate efforts-- Fort Totten and Standing Rock). Increase access to prenatal care. Reduce women's failure to participate in prenatal care.	Develop linkages to increase access and use of prenatal care (LBW, NMR, PNMNR).	Native American women.	?

TABLE 1 (page 5)

<u>State/Title/Contact</u>	<u>Description</u>	<u>Intervention Strategy</u>	<u>Minorities Sampled</u>	<u>Evaluation Design</u>
14. Ohio/Maternal and Child Health Information Network/Laurence Platt (614-466-5332) (OH 298).	Develop computerized MCH data system coordinated with Ohio's Department of Public Welfare (EPSDT), WIC, CCS, etc.	Data base development and coordination.	All Title V program participants.	?
15. R.I./Integrated MCH Information System/William Hollinshead (401-277-2312) (RI 498).	Similar to Ohio's (see above).	Data base development and coordination.	All Title V program participants.	?
16. Utah/Statewide Perinatal Data Collection and Analysis/Peter van Dyck (803-533-6161) (UT 326).	Develop standard format for collection and analysis of Utah's perinatal data.	Data base development and analysis.	Utah perinatal population.	?
17. Misc./Community-Based Advocacy Project/Carol Huber (608-251-4008) (Wisc 540).	Develop advocacy base to increase MCH services in underserved areas, to improve their usage, to increase general awareness of MCH issues.	Access to care through coalition building.	?	Process evaluation.

Pregnancy and Infant Health

Promoting Health/Preventing Disease:
Objectives for the Nation

Office of the Assistant Secretary for Health
Department of Health and Human Services

1980

PREGNANCY AND INFANT HEALTH

1. Nature and Extent of the Problem

Assuring all infants a healthy start in life and enhancing the health of their mothers are among the highest priorities in preventing disease and promoting health. The principal threats to infant health are problems associated with low birth weight and birth defects which can lead to lifelong handicapping conditions. Of particular concern are the disparities in the health of mothers and infants that exist between different population groups in this country. These differences are associated with a variety of factors, including those related to the health of the mother before and during pregnancy as well as parental socioeconomic status and lifestyle characteristics. Although the precise relationship between specific health services and the health status of pregnant women and their infants is not certain, the provision of high quality prenatal, obstetrical, and neonatal care, and preventive services during the first year of life, can reduce a newborn's risk of illness and death. Of particular concern are adolescents, whose infants experience a high degree of low birth weight and whose health problems should be addressed in a broad context taking into consideration social and psychological implications.

a. Health implications

- Maternal and infant mortality and morbidity records show striking demographic variations:
 - an overall rate of maternal mortality of 9.6 per 100,000 live births in 1978, but with a rate for blacks almost four times that for whites;
 - an infant mortality rate of 13.8 per 1,000 live births in 1978, but with the infant mortality rate for black babies 92 percent higher than for whites;
 - infant mortality rates for individual States ranged from 10.4 to 18.7 in 1978;
 - infant mortality rates in 1977 for 26 major cities (with populations greater than 500,000) ranged from 10.0 to 27.4; 22 of the 26 major cities had higher rates than the National average of 14.1 in 1977.
- The greatest single problem associated with infant mortality is low birth weight; nearly two-thirds of the infants who die are low birth weight.
- Maternal factors associated with a high risk

of low birth weight babies are: age (17 and under, and 35 and over), minority status, high parity, previous unfavorable pregnancy outcome, low education level, low socioeconomic status, inter-pregnancy interval less than 6 months, inadequate weight gain during pregnancy, poor nutrition, smoking, misuse of alcohol and drugs and lack of prenatal care.

- High quality early and continuous prenatal, birth and postnatal care can decrease a newborn's risk of death or handicap from pregnancy complications, low birth weight, maternal infection from sexually transmitted disease and developmental problems, both physical and psychological.
- After the neonatal period the causes of infant mortality and morbidity, many of which may be preventable, are: disorders related to a high risk birth, infectious diseases, congenital anomalies, accidents, lack of health care and abuse.

b. Status and trends

- Although the overall rate has been gradually improving since 1965, an excessive number of infants born in the United States are of less than optimal birth weight for survival and good health. This includes:
 - approximately 7 percent of all babies are of low birth weight, that is, 2,500 grams or less; the rate is almost twice as high for blacks; other industrialized nations experienced substantially lower rates during the period 1970-1976; for example in Japan 5.3 percent of births were low birth weight and in Sweden 4.1;
 - approximately another 17 percent of all newborns in the United States in 1978 had birth weights falling between 2,501 and 3,000 grams.
- Many children in the United States are born to women who have an increased risk of having a low birth weight infant or other health problems, particularly:
 - the 25 percent of women giving birth in 1978 who made no prenatal visit during the first trimester and the 5 percent who had no prenatal care during either of the first two trimesters;

- the pregnant teenagers (at higher risk for low birth weight babies) who accounted for 17 percent of the infants born in 1978;
- the two-thirds of pregnant teenagers in 1976 whose pregnancies were not intended when they occurred;
- the births to single women (26.2 births per 1,000 single women in 1978) for whom the data indicate special risk of poor health outcomes for mother and infant.

2. Prevention/Promotion Measures

a. Potential measures

- Education and information measures include:

- developing, implementing and evaluating the quality and quantity of health education curricula in schools and communities, with emphasis on lifestyle risk factors (poor nutrition and use of alcohol, cigarettes and drugs), as well as family life and parenting;
- developing, implementing and evaluating preventive educational strategies and materials for use in private and public prenatal care;
- increasing the use of mass media to encourage more healthful lifestyles; developing television and radio programs that support healthful lifestyles;
- making prospective parents at high risk of impaired fetuses aware of genetic diagnosis and counseling services so that those affected can make informed decisions consistent with their personal ethical and religious values;
- promoting, educating and supporting breastfeeding where possible.

- Service measures include:

- family planning services which optimize the timing of pregnancies;
- prenatal care which routinely includes education on avoidable risks to maternal and fetal health during pregnancy;
- assuring that all populations are served by organized medical care systems that include providers (physicians, nurse practitioners, nurse midwives, nutritionists and others) who are trained to deliver prenatal, postnatal and infant care on site (requires personnel strategies and economic and professional incentives);
- developing local, easily accessible prenatal services for all, including access to amniocentesis for high risk pregnant women;
- regionalizing prenatal and perinatal services so that all women and newborns receive diagnostic and therapeutic care appropriate to their assessed needs;
- assuring adequate linkages, including trans-

portation, to regional centers for high risk expectant mothers and newborns;

- outreach perinatal and infant care services for currently underserved populations, such as teenage expectant mothers;
- evaluating the quality of perinatal and infant care being received and relating program activities to pregnancy and infant health outcomes;
- identifying and tracking infants and families with medical, congenital, psychological, social, and/or environmental problems;
- reducing the number of low birth weight infants by reducing teenage and other high risk pregnancies, reducing damaging effects from alcohol, cigarettes and other toxic substances, improving nutrition, and assuring participation in comprehensive preconceptional, inter-conceptional and early and continuing prenatal care;
- eliminating unnecessary radiation exposure to pregnant women and babies;
- assuring that all programs of primary care support and contribute to the fulfillment of objectives related to maternal and infant health;
- encouraging parent support groups, hotlines, and counseling for parents of high risk infants and supports for lowering stress levels in troubled parents who may have potential for child abuse.
- See Family Planning, Immunization, and Sexually Transmitted Diseases.
- Legislative and regulatory measures include:
 - requiring that all Federally funded programs for delivering perinatal care assure adequate health and prenatal education, screening for pregnancy risks and patient plans for care during labor and delivery appropriate to discovered risks, and for infant follow-up and care through the first year of life;
 - requiring fiscal and pregnancy outcome accountability in publicly funded prenatal and perinatal programs;
 - reducing exposures to toxic agents that may contribute to physical handicaps or cognitive impairment of babies.
- Economic measures include:
 - reviewing all programs that finance or provide health services for mothers and children in order to:
 - assure inclusion of health promotion and preventive services;
 - optimize their effect by reducing overlaps, pockets of neglect and contradictory objectives;
 - adequate public financing for outreach, early and continuous prenatal care, deliveries, support services, intensive care when needed and continuing care of infants;

— consideration of direct Federal financing tied to uniform standards of performance where public health departments show potential for expanding maternal and child health services to populations in need.

b. Relative strength of the measures

- The relative effectiveness of various interventions to improve pregnancy outcome and infant health is not without controversy. The records of many demonstration projects, both domestic and foreign, amply confirm that dramatic improvements can be made in the indicators of maternal and infant health. For example, the infant mortality rate for American Indians was reduced by 74 percent between 1955-1977 and maternal mortality decreased from 2.2 times the total U.S. rate in 1958, to below the total U.S. rate by 1975-76. Unfortunately, studies have not generally been designed to yield firmly defensible data on the relative contribution of programs. However, the evidence indicates that emphasis be placed on family planning which optimizes the timing of pregnancies, early identification of pregnancy and routine involvement of all pregnant women in prenatal care. Therefore, the following priorities are strongly suggested:

- systems of care that reach everyone with basic services, emphasizing advantageous personal health behavior and including outreach, education, and easy access to community-based services without social, economic, ethnic or time or distance barriers;
- measures which prevent unwanted pregnancies and which optimize the most favorable maternal age for childbearing, including sex education, contraception, easy access to pregnancy testing, genetic counseling, prenatal diagnosis and associated counseling;
- early and continuing prenatal care, particularly for those at greatest risk—poor, poorly educated women, those near the beginning or the end of their reproductive age, those with previous pregnancy loss and those with recent pregnancy;
- nutrition education and food supplementation as needed, as well as parent education on importance of good infant nutrition, preventive measures essential to avoid childhood disease and accidents and parenting conducive to sound emotional development;
- cessation of smoking during pregnancy (which may contribute much more to the improvement of birth weight and to favorable pregnancy outcome than is now fully documented);
- regionalized programs of care with referral system which assure access to levels of care appropriate to special risks.

3. Specific Objectives for 1990

- Improved health status
 - a. By 1990, the National infant mortality rate (deaths for all babies up to one year of age) should be reduced to no more than 9 deaths per 1,000 live births. (In 1978, the infant mortality rate was 13.8 per 1,000 live births.)
 - b. By 1990, no county and no racial or ethnic group of the population (e.g., black, Hispanic, Indian) should have an infant mortality rate in excess of 12 deaths per 1,000 live births. (In 1978, the infant mortality rate for whites was 12.0 per 1,000 live births; for blacks 23.1 per 1,000 live births; for American Indians 13.7 per 1,000 live births; rate for Hispanics is not yet available separately.)
 - c. By 1990, the neonatal death rate (deaths for all infants up to 28 days old) should be reduced to no more than 6.5 deaths per 1,000 live births. (In 1978, the neonatal death rate was 9.5 per 1,000 live births.)
 - d. By 1990, the perinatal death rate should be reduced to no more than 5.5 per 1,000.* (In 1977, the perinatal death rate was 15.4 per 1,000.)

*NOTE: The perinatal death rate is total deaths (late fetal deaths over 28 weeks gestation plus infant deaths up to 7 days old) expressed as a rate per 1,000 live births and late fetal deaths.
 - e. By 1990, the maternal mortality rate should not exceed 5 per 100,000 live births for any county or for any ethnic group (e.g., black, Hispanic, American Indian). In 1978, the overall rate was 9.6—the rate for blacks was 25.0, the rate for whites was 6.4, the rate for American Indians was 12.1; the rate for Hispanics is not yet available separately.)
 - f. By 1990, the incidence of neural tube defects should be reduced to 1.0 per 1,000 live births. (In 1979, the rate was 1.7 per 1,000.)
 - g. By 1990, Rhesus hemolytic disease of the newborn should be reduced to below a rate of 1.3 per 1,000 live births. (In 1977, the rate was 1.8 per 1,000.)
 - *h. By 1990, the incidence of infants born with Fetal Alcohol Syndrome should be reduced by 25 percent. (In 1977, the rate was 1 per 2,000 births or approximately 1,650 cases.)

*NOTE: Same objective as for Misuse of Alcohol and Drugs.
- See Nutrition.
- Reduced risk factors
 - i. By 1990, low birth weight babies (2,500 grams and under) should constitute no more than 5 percent of all live births. (In 1978, the proportion was 7.0 percent of all births.)
 - j. By 1990, no county and no racial or ethnic

group of the population (e.g., black, Hispanic, American Indian) should have a rate of low birth weight infants (prematurely born and small-for-age infants weighing less than 2,500 grams) that exceeds 9 percent of all live births. (In 1978, the rate for whites was about 5.9 percent, for Indians about 6.7 percent, and for blacks about 12.9 percent; rates for Hispanics are not yet separately available; rates for some other nations are 5 percent and less.)

k. By 1990, the majority of infants should leave hospitals in car safety carriers. (Baseline data unavailable.)

— See Nutrition, Family Planning, Smoking and Health, Misuse of Alcohol and Drugs, Sexually Transmitted Diseases, Immunization, Occupational Safety and Health, Toxic Agent Control, and Accident Prevention and Injury Control.

- Increased public/professional awareness

l. By 1990, 85 percent of women of childbearing age should be able to choose foods wisely (state special nutritional needs of pregnancy) and understand the hazards of smoking, alcohol, pharmaceutical products and other drugs during pregnancy and lactation. (Baseline data unavailable.)

— See Nutrition, Smoking and Health, Misuse of Alcohol and Drugs, Sexually Transmitted Diseases, Immunization, Occupational Safety and Health, and Toxic Agent Control.

- Improved services/protection

m. By 1990, virtually all women and infants should be served at levels appropriate to their need by a regionalized system of primary, secondary and tertiary care for prenatal, maternal and perinatal health services. (In 1979, approximately 12 percent of births occurred in geographic areas served by such a system.)

n. By 1990, the proportion of women in any county or racial or ethnic groups (e.g., black, Hispanic, American Indian) who obtain no prenatal care during the first trimester of pregnancy should not exceed 10 percent. (In 1978, 40 percent of black mothers and 45 percent of American Indian mothers received no prenatal care during the first trimester; percent of Hispanics is unknown.)

o. By 1990, virtually all pregnant women at high risk of having a fetus with a condition diagnosable *in utero*, should have access to counseling and information on amniocentesis and prenatal diagnosis, as well as therapy as indicated. (In 1978, about 10 percent of women 35 and over received amniocentesis. Baseline data are unavailable for other high risk groups.)

p. By 1990, virtually all women who give birth should have appropriately-attended, safe delivery, provided in ways acceptable to them and

their families. (In 1977, less than .3 percent of births were unattended by a physician or midwife. Furthermore, of births which are attended by a physician or midwife, an unknown share are not considered satisfactory by the women or their families.)

q. By 1990, virtually all newborns should be provided neonatal screening for metabolic disorders for which effective and efficient tests and treatments are available (e.g., PKU and congenital hypothyroidism). (In 1978, about 75 percent of newborns were screened for PKU; about 3 percent were screened for hypothyroidism in the early 1970's, with the rate now rapidly increasing.)

r. By 1990, virtually all infants should be able to participate in primary health care that includes well child care; growth development assessment; immunization; screening, diagnosis and treatment for conditions requiring special services; appropriate counseling regarding nutrition, automobile safety, and prevention of other accidents such as poisonings. (Baseline data unavailable.)

— See Nutrition, Immunization, Accident Prevention and Injury Control.

- Improved surveillance/evaluation systems

s. By 1990, a system should be in place for comprehensive and longitudinal assessment of the impact of a range of prenatal factors (e.g., maternal exposure to radiation, ultrasound, dramatic temperature change, toxic agents, smoking, use of alcohol or drugs, exercise, or stress) on infant and child physical and psychological development.

4. Principal Assumptions

- Assurances of participation in essential services will be enhanced by various programs of outreach and by communication with client groups to achieve styles of service that are appropriate and acceptable to different populations, and by initiating or expanding publicly sponsored programs of care as may be necessary for people who are not reached by private and traditional provider systems.

- Current efforts to ensure an adequate supply of food will be continued and extended (WIC and food stamps).

- Information will be routinely provided to pregnant women on serum alpha-fetoprotein screening; screening will be provided for medical, obstetric, psychosocial and genetic risks, and participation assured in appropriate levels of diagnosis, support and treatment.

- Prenatal care will routinely include education on avoidable risks to maternal and fetal health during pregnancy, and to infant health following birth.

- Perinatal and infant care will include but not be limited to:

- nutritional education and supplementation as

- needed, including preparation and support for breastfeeding (See Nutrition);
- psychosocial supports which promote parenting behavior conducive to parent-child attachment;
- promotion of lifestyles that encourage good parental, infant and child health practices;
- linkages that assure antenatal identification of risks, risk reduction activities and completed plans for participation in appropriate intrapartum and continuing infant care;
- provision of Rhesus immune globulin to all Rh negative women, not previously sensitized, who have a known or presumed Rh positive pregnancy.
- Achieving objectives that deal with mortality and low birth weight presumes participation in comprehensive services that will also work to reduce maternal and infant morbidity associated with lifestyle and environmental risks, including:
 - alcohol and drug use;
 - smoking;
 - management of parental stress;
 - toxic substances during pregnancy and lactation;
 - occupational safety and health;
 - prevention of infant and child accidents;
 - See Misuse of Alcohol and Drugs, Smoking and Health, Control of Stress and Violent Behavior, Toxic Agent Control, Occupational Safety and Health, Accident Prevention and Injury Control.
- Reduction of unwanted and unintended pregnancies will achieve reduction of pregnancies in teenage and late childbearing years, and will concentrate childbearing during optimum maternal ages. Efforts to reduce unwanted pregnancies are presumed to provide for:
 - education on sex, family life and reproductive health;
 - ready access to all forms of family planning services;
 - ready access to pregnancy testing, with associated counseling and referral;
 - See Family Planning.
- All needful infants and families will participate in support services (e.g., food supplementation, income supports, day care, minimum housing) that are defined by National standards which assure equity.
- All pregnant women will have access to regionalized systems of maternity care which assure services appropriate to need.
- Agencies receiving public funds related to health care—including Federal, State and local units of government, private agencies, and quasi-public agencies such as HSAs—will adopt these or more stringent objectives, and will document their progress toward meeting them.

5. Data Sources

a. To National level only

- Health Interview Survey (HIS). Smoking and drinking prevalence among women of childbearing age. DHHS-NCHS. NCHS *Vital and Health Statistics*, Series 10, selected reports, and NCHS *Advance Data from Vital and Health Statistics*, selected reports. Continuing household interview survey; National probability samples.
- Hospital Discharge Survey (HDS). Deliveries in hospital. DHHS-NCHS. NCHS *Vital and Health Statistics*, Series 13, selected reports. Continuing survey, National probability sample of short-stay hospitals.
- National Ambulatory Care Survey (NAMCS). Visits to private physicians for prenatal care. DHHS-NCHS. NCHS *Vital and Health Statistics*, Series 13, selected reports. Continuing survey; National probability sample office-based physicians.
- National Reporting System for Family Planning Services (NRSFPS). Visits to family planning clinics. DHHS-NCHS. Annual Reports. Continuous sample survey since June 1977; continuous full count reporting from 1972 to June 1977.
- National Natality Follow Back Survey. Selected data from 1964-66 Follow Back. NCHS *Vital and Health Statistics*, Series 22. Survey of mothers with legitimate live births; sample of birth records.
- 1980 National Natality Survey/1980 National Fetal Mortality Survey. Birth and fetal deaths by numerous characteristics not available from the Vital Registration System. DHHS-NCHS. Currently in the field. Public use data tapes will be available from the survey. National sample survey.
- National Survey of Family Growth (NSFG). Characteristics of women of childbearing age. DHHS-NCHS . . . NCHS *Vital and Health Statistics*, Series 23, selected reports, and *Advance Data from Vital and Health Statistics*, selected reports. Periodic surveys at intervals of several years; National probability sample.

b. To State and/or local level

- National Vital Registration System
 - Natality: Births by age, race, parity, marital status. Most States also have number of prenatal visits, timing of first prenatal visit, educational level of mother, sometimes of father. DHHS-NCHS. NCHS *Vital Statistics of the United States*. Vol. 2, and *Monthly Vital Statistics Reports*, Series 21. Continuous reporting by States; full count of birth certificates 38 States, 50 percent sample sample remaining States. (Many States issue their own earlier reports).
 - Mortality. Deaths (including infant and fetal

deaths) by age at death, sex, race. Some States link mortality and natality thus making full natality data available. DHHS-NCHS. *Vital Statistics of the United States*, Vol. 1, parts A and B; and NCHS *Monthly Vital Statistics Report* by States, Series 21, selected reports. Continuous reporting by States, all events. (Many States issue their own earlier reports.)

- Hospitalized illness discharge abstract systems.

- Professional Activities Study (PAS). Patients in short stay hospitals; patient characteristics, deliveries, diagnoses of congenital anomalies, procedures performed, length of stays. Commission on Professional and Hospital Activities, Ann Arbor, Michigan. An-

nual reports and tapes. Continuous reporting from 1900 CPHA member hospitals; not a probability sample, extent of hospital participation varies by State.

- Other hospital discharge systems as locally available.

- Selected health data. DHHS-NCHS. NCHS *Statistical Notes for Health Planners*. Compilations and analysis of data to State level.

- Area Resource File (ARF). Demographic, health facility and manpower data at State and county level from various sources. DHHS-Health Resources Administration. *Area Resource File—a Manpower Planning and Research Tool*, DHHS HRA-80-4, Oct 79. One time compilation.

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