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Access to Prenatal Care and County Size: Implications for Service Delivery

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The impact of population size across twenty-three west Michigan counties was examined to determine access to prenatal care, low birth weight, and infant mortality. Surveys were completed by forty-five managers of hospitals and county health departments. Service availability, sociodemographic, system-related and lifestyle factors were examined as contributors to perinatal support utilization. Low birth weight and infant mortality were highest in the small- and large-sized counties. Positive birth outcomes in medium-sized counties may have been due to greater availability of infant and child health services through health departments, and the targeting of resources to specific problem areas, such as smoking cessation. The need for a comprehensive maternity system, which views health care as a basic right, is discussed.

Providing access to health care is a basic social obligation. Infant mortality, one indicator of societal health, reflects the level of commitment toward children. The United States devotes a larger share of GNP to health care than many other countries, yet ranks nineteenth in the world in infant mortality rates, with 10 infant deaths per 1,000 live births in 1989 (Williams & Miller, 1991). Approximately 40,000 infants die in their first year of life annually in the U.S. (Children's Defense Fund, 1991): a rate which has been described as institutional violence (Adams, 1991). This number places the United States behind Hong Kong, Singapore, Ireland, and Spain, which have infant mortality rates ranging from 7 to 9 per 1,000 births. While the U.S. infant mortality rate improved steadily between 1940 (47 per 1,000) and 1981 (11.9 per 1,000), change has been slow over the past decade (11.5 to 10.0 per 1,000 births). In 1989, Japan reported the lowest infant mortality rate (4 per 1,000), followed by Sweden and Finland, with rates of 6 infant deaths per 1,000 live births. Aside from simply recording infant deaths, infant mortality

rates serve as indirect markers of potential developmental disabilities, overall infant health, and incidence of child abuse and neglect (Kostelny & Garbarino, 1987; Roberts, Lynch & Golding, 1980). Both the U.S. Surgeon General and the Children's Defense Fund (1991) have set a year 2000 goal of no more than 7 infant deaths per 1,000 live births for the U.S.

Low birth weight (\leq 2,500 grams or 5.5 pounds) is a major determinant of infant mortality. These infants are significantly more likely to die in their first month of life than normal birth weight infants (Institute of Medicine, 1986). Birth weight has been described as a crucial intervening variable between socioeconomic and maternal factors and their effect on infant mortality (Rivara, Culley, Hickock & Williams, 1985). In the United States, 6.9 percent of babies were born at low birth weight in 1988, a percentage which ranks the U.S. 28th in the world, tied with Turkey, Kuwait, and Chile (Children's Defense Fund, 1991). The Surgeon General has set a year 2000 goal to reduce the incidence of low birth weight to no more than 5 percent of live births (March of Dimes, 1990).

Significant service delivery gaps in the U.S. health care system, especially in the delivery of maternal and child services, have been identified (Brown, 1992; Children's Defense Fund, 1991; Williams & Miller, 1991). For example, economic and psychosocial barriers to the use of prenatal care, have received considerable attention (Cooney, 1985). Prenatal care is increasingly viewed as a continuum of care, ranging from medical services to preventive care, such as the provision of social support, which can extend beyond pregnancy (Brown, 1992; Michigan Department of Public Health, 1990). The need for a well-designed maternity system, defined as "the complicated network of publicly and privately financed services through which women obtain prenatal, labor and delivery, and postpartum care" is long overdue (Brown, 1989). The current system is fragmented and overly complex, especially for low-income, uninsured or under-insured women, who have low rates of participation.

The impact of prenatal care on reducing low birth weight and infant mortality has demonstrated efficacy (Schwartz, 1989). For example, Michigan data from 1986 show that women who had adequate prenatal care (based on month of pregnancy care

began, gestational age at birth, and number of prenatal care visits) had an infant mortality rate of 8.6 per 1,000 live births compared to 30 per 1,000 live births among women with inadequate prenatal care (Lifelines for Children, 1989). Indeed, access to care, outreach efforts, and flexible programs played a central role in facilitating positive birth outcomes. Understanding factors which influence participation in maternal and child health and education programs and subsequent perinatal outcomes can be classified into three groups: sociodemographic, system-related, and attitudinal or lifestyle (Brown, 1989).

Sociodemographic Factors

Demographic risk factors commonly associated with receiving inadequate prenatal care, and poor birth outcomes, include being nonwhite, less than 17 years of age, of low socioeconomic status, unmarried, and having less than a high school education (Hansell, 1991; Institute of Medicine, 1986). Cooney (1985) analyzed 85,000 live birth records in New York City and found that late or no prenatal care was associated with being a Medicaid recipient and an education of less than 12 years. In 1988, only 61 percent of black births were to women who had received adequate early prenatal care. The black infant mortality rate is nearly twice the rate as for whites, with 17.6 deaths per 1,000 live births in 1988 (Children's Defense Fund, 1991). Unmarried teenagers and newly arrived immigrants also have especially high rates of late or inadequate prenatal care participation.

System-Related Factors

Aspects of the health care delivery system also impact utilization of maternal and child education and health programs. A core issue is the fact that the poor have not been integrated into the mainstream of American health care (Cooney, 1985). System-related factors include insurance coverage, maternity care providers acceptance of Medicaid, availability of Medicaid, and "unfriendly" clinics (Brown, 1989). Receipt of prenatal care is also influenced by availability of prenatal services in the community, transportation, insurance coverage, and child care (The Alan Guttmacher Institute, 1989). One study investigated predictors of prenatal care utilization in a stratified random

sample of 1904 women, selected from Maine birth certificate files. Those who were less likely to receive adequate prenatal care were younger women (especially adolescents), less educated, low income, a Medicaid recipient, had longer travel time, and a rural residence. Interestingly, the amount of time required to travel to a prenatal care provider was a significant predictor when controlling for all the above variables (McDonald & Coburn, 1988); especially important in rural and less densely populated areas.

Increased effectiveness of perinatal technology is a major factor contributing to improved infant survival over the past 20 years, especially in the care of low birth weight infants. Regionalization is a current strategy to provide a comprehensive and coordinated system of obstetric, fetal, and neonatal health care within a geographic area (Rosenblatt, Mayfield, Hart & Baldwin, 1988). There is presently no nationally recognized uniform criteria for levels of care provided by perinatal health care programs. The Michigan State Medical Society (1982) has developed guidelines for regionalized perinatal care, where level I hospitals provide services primarily for uncomplicated obstetric and newborn patients, level II hospitals provide health care for patients at risk due to potential or actual complications, and level III hospitals treat very high risk patients.

Studies examining the effectiveness of regionalization in improving the survival of low birth weight infants report conflicting results. Gortmaker and colleagues (1985) analyzed data from four states and found infants born in level III hospitals had the highest survival rate, followed by those born in urban level I or level II hospitals. In contrast, Rosenblatt and colleagues (1988) studied outcomes of regionalized perinatal care in Washington state, and found that neonatal outcomes were not greatly influenced by the location of the hospital. Similarly, a study in central Appalachia of a health program's effectiveness found no greater improvement in neonatal mortality in the counties with intensive maternal and child health programs than in those without such services (Rivara, et al., 1985). These authors point to economic status and improved utilization of prenatal care as essential for improving infant mortality rates in rural areas.

Attitudinal/Lifestyle Factors

Principal psychosocial risk factors for low birth weight, the leading cause of infant mortality, include smoking, poor nutritional status, alcohol or substance abuse and stress (Institute of Medicine, 1986). One study of substance use and prenatal care within a longitudinal sample of 1,664 predominantly white, urban, high-school educated women aged 15 to 30 years found that 67% smoked cigarettes, 38% drank alcohol, and 30% smoked marijuana during their pregnancy (Abma & Mott, 1991). These findings underscore the need for maternal education about substance use at the time prenatal care is provided. Additionally, women may not seek prenatal care because the pregnancy was unplanned or is unwanted, teens may fear parental discovery, prenatal care may not be valued or understood, or the signs of pregnancy may not be recognized (Brown, 1989).

Michigan as an Example

Within the United States, Michigan's infant mortality rate ranks 41st among the fifty states, with an overall rate of 11.1 per 1,000 live births in 1989 (The Annie E. Casey Foundation, 1992). This rate mirrors the national trend in reflecting a significant gap between black (22.5 per 1,000) and white (9.3 per 1,000) infant deaths (Michigan Department of Public Health, Center for Health Statistics, 1991). A recent study of child mortality in Michigan found that perinatal conditions, including low birth weight and prematurity, and birth defects accounted for 42% of the deaths in children from birth to 19 years of age. Further, children who lived in poverty were 3.2 times more likely to die from perinatal conditions than non-low income children (Lifelines for Children, 1989). Over the past 5 years, Michigan has made a number of efforts to improve access to prenatal care, including the declaration of prenatal care as a basic health service to all women in 1986, implementation of a Maternal Support Services Program in 1987, and the initiation of expanded Medicaid eligibility for pregnant women with incomes up to 185% of the poverty level in 1988 (Michigan Department of Public Health, 1989).

In sum, access to prenatal care is complex, associated with a multitude of factors. While there is an association between rural and urban poor populations and higher infant mortality rates, questions remain as to how counties of varying population size differ in regard to access to perinatal support services and subsequent birth outcomes. This study examined counties of varying population size, in regard to service availability, sociodemographic, system, and lifestyle factors associated with utilization of maternal and child health care services, and subsequent low birth weight and infant mortality rates.

Method

Subjects

The present study surveyed service providers from twenty-three west Michigan counties. Selected counties constitute the central, lakeshore and northwest quadrant of the state, and include 23 of 83 (28%) state counties. County selection stemmed from project collaboration with the West Michigan Chapter of the March of Dimes, which services this region. The March of Dimes conducted this survey as part of a national Healthy Mothers Healthy Babies Campaign, which set a 1990 goal of reducing the infant mortality rate to 9 deaths per 1,000 live births. This chapter area has county populations ranging from 9,000 to 487,000, with a mean county size of 63,709.

During the fall of 1990, forty-five surveys were mailed to directors of all 27 hospitals and 18 county health departments in the 23 target counties. This included a total of one level III, 4 level II, and 22 level I hospitals. It is notable that only one highly specialized level III hospital services the very high risk mothers and infants for all 23 communities. Among those mailed, 28 (62%) questionnaires were returned. Respondents were asked to describe perinatal services provided by their agency, as well as the population with barriers to service utilization. Responses came from 20 of the 27 hospitals (74%), and 8 of the 18 county health departments (44%). Hospital questionnaire respondents were primarily obstetrics managers (65%), and also included assistant directors (15%), head nurses (10%), and regional coordinators (10%). County health department surveys

were completed by directors (40%), nurses (20%), social workers (20%), and managers (20%).

Measurement Procedures

Two questionnaires were developed for the purpose of this study, one for hospitals and one for county health departments. The 83-item *Hospital Needs Assessment Survey* asked respondents to describe educational and clinical services provided, perceived barriers to prenatal care, number of mothers and infants affected by service gaps, substance abuse, family violence, and low birth weight, and what they viewed as the most critical perinatal health problems facing their community. Availability of prenatal care and other services to teenage, unmarried, low income, primiparous, and substance-abusing mothers received particular attention in survey questions. A similar format was utilized for the 83-item *County Health Department Needs Assessment Survey*, which used language more relevant to this setting. Reliability and validity of these instruments have not been determined.

Measurement of the Variables

Infant Mortality and Low Birth Weight were defined as the number of infant deaths in the first year of life, per 1,000 live births; and as the percentage of infants born per year weighing less than 2,500 grams, respectively. These statistics per county for 1989 were used, in as much as 1990 figures were not available due to changes in birth and death certificate data collection procedures (Michigan Department of Public Health, Office of the State Registrar and Center for Health Statistics, personal communication, August, 1991). It should be noted that births are reported by place of birth, not mothers residence, which might add to the large county low birth weight rates, and reduce those in medium and small counties. Hospital and county health department survey respondents were also asked to provide estimates of low birth weight and infant mortality.

Service Availability was assessed by asking respondents to describe service provided by their agency in the past year, such as routine and high risk prenatal care, health promotion, perinatal outreach, and home services. Respondents were also asked

to describe educational programs offered, such as information on substance use during pregnancy, nutrition, parent education, fetal development, infant care and lamaze. They were also asked to identify unmet service needs in their community, such as transportation, and estimate how many patients were served in the past year.

Sociodemographic Characteristics included questionnaire items which asked the age, marital status, educational level, income, and ethnicity of women and teens with barriers to prenatal care. Respondents were also asked what they perceived as the primary cause of low birth weight, and to identify the most critical perinatal health issues facing their community.

System-Related Factors included items identifying barriers to receiving adequate prenatal care (no visits in the first trimester), such as type of payment, language, outreach, and limited number of providers. They were also asked to identify the impact of economic factors, type of payment, income level, and reimbursement policies on receiving prenatal care. Regionalization was determined by applying standards developed by the Michigan State Medical Society (1982) to assess levels of hospital care (I, II, III) available in each county. County population figures were based on statistics provided by the March of Dimes, as this survey was conducted through their office. This organization bases their population statistics on data available through the Office of the State Registrar.

Attitudinal/Lifestyle Factors were identified by asking respondents to estimate the number of infants affected by alcohol or drug abuse, cigarette smoking, stress, family violence, child abuse, nutrition during pregnancy, and other factors associated with compromised child outcomes.

Analytic Strategy

Data were analyzed to gain a descriptive understanding of the availability of prenatal care in these 23 counties. Often when decisions regarding allocation of resources to counties are made, representatives from larger areas have been more vocal, and better able to influence the distribution of such monies. In effort to understand the needs of all counties in the service areas equally, the data were divided by county size. Three categories were

created, which enabled comparisons between small, medium and large counties. Counties considered large were those with a population of 500,000 to 150,001, medium counties had populations of 150,000 to 50,001, and small counties had populations under 50,000. The mean size of large counties was 326,897; for medium counties was 64,729, and for small counties was 25,910. An interesting geographical note: the large counties were clustered together, medium counties were in the same general region, and small counties were woven throughout the entire survey area.

Proportions or means (\pm SD) are presented for descriptive data. The analyses focused on infant mortality, birth weight, service availability, sociodemographic, system-related and lifestyle factors influencing utilization, across small, medium and large-sized rural counties. More complex analyses were not performed due to low response rates for many of the central response categories.

Results

Among the 28 respondents, those from the three large counties included respondents from 5 hospitals and 3 county health departments. The four medium-sized counties included responses from 7 hospitals and 1 county health department. The sixteen small counties included respondents from 8 hospitals and 4 county health departments. Table I summarizes the demographic characteristics of county survey respondents.

Level of care provided by each of the 20 hospitals surveyed were determined using the Michigan State Medical Society (1982) guidelines. Among the large counties, responses came from both (100%) of the level II, and 3 of the 6 (50%) level I hospitals. The only level III hospital in the survey region did not respond. The medium counties included responses from 6 of the 7 (86%) level I, and the one (100%) level II hospitals. Small counties had responses from 8 of the 9 (89%) level I, and no level II hospitals.

Infant Mortality. Average infant mortality rates across counties are also summarized in Table 1. Among large counties, infant mortality rates ranged from 8.7 to 10.6 deaths per 1,000

Table 1

Demographic Characteristics of County Survey Respondents (n = 28)

	County Size		
	Large (n = 8)	Medium (n = 8)	Small (n = 12)
	No.	No.	No.
County Responses			
Hospitals	5	7	8
Health Departments	3	1	4
Level of Hospital Care			
Level I	3	6	8
Level II	2	1	0
Level III	0	0	0
	M	M	M
Population	326,897	64,729	25,910
Total Live Births	5,084	1,002	326
Infant Deaths	42	7	3
Low Birth Weight	299	48	18
	%	%	%
Low Birth Weight	5.9	4.8	5.8
Infant Mortality	9.4	7.9	9.8

live births in 1989, with a mean rate of 9.4. Medium sized county rates ranged from 5.4 to 10.7, with a mean of 7.9 per 1,000, and the smallest county rates ranged from 2.2 to 19.8, with a mean of 9.8 per 1,000 (Michigan Department of Public Health, Office of the State Registrar and Center for Health Statistics, 1990).

Respondents were asked to estimate how many infants had died in the past year. Professionals from large counties estimated a mean of 113 ($SD = 12.0$) infant deaths, medium counties estimated one ($SD = 1.4$) infant death, and small counties reported a mean of 9 ($SD = 4.5$) infant deaths. These estimates are consistent with state registrar data.

Table 2

Factors Associated With Access to Prenatal Care by County Size

	County Size									
	Large			Medium			Small			
	M	SD	n	M	SD	n	M	SD	n	
<i>Service Availability</i>										
<i>Education Programs Offered</i>										
Hospitals	9	5.4	5	4	3.1	7	3	2.1	8	
Health Departments	7	6.4	3	1	—	1	7	4.2	4	
<i>Maternal/Child Health Services</i>										
Hospitals	2	2.8	5	2	1.6	7	1	0.7	8	
Health Departments										
Maternal	5	1.0	3	5	—	1	6	2.2	4	
Child	7	1.2	3	9	—	1	5	3.3	4	
<i>System Related</i>										
Inadequate Prenatal	103	145.0	3	115	84.0	4	11	9.0	5	
<i>Lifestyle</i>										
<i>Substance Abuse</i>										
Hospital	24	39.8	5	25	39.8	7	12	26.8	8	
Health Departments	—	—	—	—	—	—	88	53.0	4	
	%	n		%	n		%	n		
<i>Primary Drug</i>										
Alcohol	0	—		100	7		100	8		
Cocaine	100	5		0	—		0	—		
	%	(n = 5)		%	(n = 5)		%	(n = 9)		
<i>Sociodemographic</i>										
<i>Marital Status</i>										
Single	100			100			83			
Married	0			0			16			
<i>Age</i>										
Teenage	50			60			17			
18-20	50			40			33			
21-23	0			0			33			
24-26	0			0			0			
27-30	0			0			17			

Education			
Less than high school	100	75	66
High school diploma	0	25	33
Ethnicity			
African-American	50	0	20
Caucasian	25	100	60
Hispanic	0	0	20
Unspecified	25	0	0

Low Birth Weight. The mean percentages of low birth weight infants (less than 2500 grams) born in 1989 by county size are located in Table 1. Among the large counties, this mean was 5.9%, for medium counties it was 4.8%, and for small counties was 5.8% (Michigan Department of Public Health, Office of the State Registrar and Center for Health Statistics, 1990). Survey responses estimating low birth weight infants also coincided with state registrar data. Large counties reported a mean of 34 ($SD = 44.5$), medium counties estimated a mean of 24 ($SD = 21.6$), and small county professionals reported a mean of 36 ($SD = 27.7$) low birth weight infants born in the past year.

Service Availability. Hospitals and county health department estimates of how many education and service programs provided in the past year are summarized in Table 2. Large county hospitals provided an average of 9 ($SD = 5.4$) educational programs and 2 ($SD = 2.8$) maternal or child services. Large county health departments offered an average of 7 ($SD = 6.4$) educational programs, 5 ($SD = 1.0$) maternal health services, and 7 ($SD = 1.2$) child health services in the past year. Medium county hospitals provided an average of 4 ($SD = 3.1$) educational programs, and 2 ($SD = 1.6$) maternal or child services in the past year. One medium county health department estimated 5 maternal health services, 9 child health services, and one educational program were available. Finally, small county hospitals offered an average of 3 ($SD = 2.1$) educational programs, and 1 ($SD = 0.7$) maternal or child service. These health departments estimated an average of 6 ($SD = 2.2$) maternal health services and 5 ($SD = 3.3$) child health services were provided in the past year. Small county health departments provided an average of 7 ($SD = 4.2$) educational programs.

Sociodemographic Characteristics. When asked to describe demographic characteristics of women or teens who had difficulty obtaining prenatal care or family planning services, respondents pointed to several patterns (see Table 2). In large counties ($n = 5$), women with difficulty obtaining care were single, were either teens or between the ages of 21 and 23 years, had less than a high school education. Ethnicity was 50% African-American, 25% Caucasian, and 25% from unspecified cultural backgrounds. Medium counties ($n = 5$) described the risk population as single, 60% teens and 40% women between the ages of 18–20 years. Also, 75% had less than a high school education and all were from a Caucasian background. Finally, the small counties ($n = 9$) described women with barriers to prenatal care as 83% single and 16% married. Seventeen percent were teenaged, 33% were between the ages of 18 and 20 years, 33% between 21 and 23 years, and 17% were between 27 and 30 years of age. Also, small communities described the average education level as less than high school (66%). Ethnicity was reported as 60% Caucasian, 20% African-American, and 20% Hispanic.

System-Related Factors. Hospitals and health department estimates of the number of women in their county with inadequate prenatal care (no visits in the first trimester) in the past year are located in Table 2. Large counties reported a mean of 103 women ($SD = 145$); medium counties a mean of 115 women ($SD = 84$); and small counties reported a mean of 11 women ($SD = 9$) serviced annually with inadequate prenatal care.

Hospitals and health departments rank ordered the most common barriers to women seeking prenatal care in their community. The large county hospitals ($n = 5$) equally ranked limited number of providers, access to health care, and legal risk as the most urgent barriers for women. Next most urgent were type of payment, third party reimbursement, low income, and transportation. County health departments in large counties ($n = 3$) ranked the following barriers: access to health care, legal ask, reimbursement policies, limited number of providers, type of payment, transportation, and low income status.

Medium county hospital respondents ($n = 7$) ranked the following barriers to prenatal care: limited number of providers,

access to health care, low income, transportation, outreach program availability, and type of payment. The medium county health department listed transportation, social support, and low income served as the most urgent barriers facing women in their community. Finally, small county hospitals ($n = 8$) identified the following barriers to prenatal care: legal risk, third party reimbursement, low income, transportation, access to health care, limited number of providers, and type of payment. Small county health departments ($n = 4$) ranked type of payment, medicolegal risk, limited number of providers, reimbursement policies, low income, access to health care and frequent patient cancellations as the most crucial barriers to perinatal support.

Attitudinal/Lifestyle Factors. Hospitals were asked to identify the leading cause of low birth weight in their county. Large county hospitals ($n = 5$) most often cited smoking (33%), lack of prenatal care (33%) and patient beliefs or attitudes (33%). Medium county hospitals ($n = 7$) described smoking (50%), low education levels (17%), poor nutrition (17%), and premature delivery (17%) as most significant. Small county hospitals ($n = 8$) reported smoking (36%), low socioeconomic status (27%), poor nutrition (18%), limited access to prenatal care (9%), and premature delivery (9%) as central factors.

Hospitals and health departments estimated how many infants had been affected by substance abuse in the past year, and what they perceived as the primary drug (see Table 2). Large hospital respondents ($n = 5$) estimated that an average of 24 ($SD = 39.8$) infants were affected by drug abuse in the past year, listing cocaine (100%) as the drug of choice. Medium county hospital respondents ($n = 7$) estimated that an average of 25 ($SD = 39.8$) infants were affected by drug abuse in the past year, reporting alcohol (100%) use as the predominant drug. Estimates of drug abuse were not completed by either large or medium county health departments. Finally, small county hospital respondents ($n = 8$) estimated that an average of 12 ($SD = 26.8$) infants were affected by drug abuse in the past year, reporting alcohol (100%) as the primary drug. Small county health departments ($n = 4$) estimated that an average of 87.5 ($SD = 53$) infants were affected by drug abuse in the past year, listing either alcohol (50%) or cigarettes (50%) as the primary drug.

Discussion

A clear pattern across survey counties was the considerable number of respondents who could not fully respond to survey questions because the information was not monitored by their agency. In many cases, answers were provided, but respondents could not provide numerical estimates. One hospital provider suggested the development of an infant tracking system to enable counties to better estimate numbers of infants affected by limited access to services, incidence of prenatal substance abuse exposure, low birth weight, and other child health indicants. This finding supports the March of Dimes (1990) recommendation that a computerized infant data base be developed and implemented nationwide. Presently, no comprehensive state or national data exists (Brown, 1989), and completeness and accuracy of data available in medical records is unreliable (Goldfarb, et al., 1991). Poor record keeping hinders efforts to determine incidence and outcome of infant health issues by state, much less within geographical pockets. A comparable system for suspected child abuse cases has been implemented in California, which maintains a statewide, centralized file of data. Located in the Department of Justice, Bureau of Criminal Statistics and Special Services, this Central Registry tracks perinatal issues, and provides feedback regarding the effectiveness of intervention efforts at little additional cost (Daro, 1987). In many European countries, such as France and Denmark, tracking systems are uniformly begun at birth and are rooted in health care, a design which assures continuing participation of the infant in provider systems (Williams & Miller, 1991).

A second theme was the frequent citing of the limited number of Medicaid providers in the communities, and the paucity of these professionals who would accept low income patients. While other studies have reported a significant relationship between being a Medicaid recipient and inadequate prenatal care (Cooney, 1985; McDonald & Coburn, 1988), less attention has been paid to barriers which Medicaid recipients face when attempting to locate a physician to treat them. Many private physicians refuse to see Medicaid patients because of problems with reimbursement, audits (Cooney, 1985), malpractice, and

increased medical and liability risk (Schwethelm, et al., 1989). There are currently notable disincentives to practicing obstetrics, particularly rising malpractice insurance costs (Brown, 1989). Presently, Michigan's medical liability insurance premiums are the third highest in the nation (Andrews, 1991), forcing many physicians out of obstetrics. Additionally, survey respondents identified legal risk, payment method, and low socioeconomic status as barriers in receiving adequate prenatal care across counties. This finding supports numerous other studies which have identified poverty as a persistent underlying factor affecting access to prenatal care (Brown, 1989; McDonald & Coburn, 1988; Schwethelm, et al., 1989; St. John & Winston, 1989).

A third pattern across all county sizes was respondents identification of limited patient transportation, and the need for more outreach programs. These findings mirror those reported by others who suggest that public health programs need to better address the multiple risks associated with poor pregnancy outcomes (Miller, et al., 1989; Schwethelm, et al., 1989; St. John & Winston, 1989). In the present study, several of the small counties had very few or no obstetricians for the entire county, requiring women to drive up to 65 miles for prenatal care and delivery. For low income women, with no or unreliable transportation, outreach efforts, such as the provision of mobile transport units, could make a notable difference in increasing service utilization. Such programs are most likely to be effective if part of a well-designed maternity care system (Brown, 1989).

Relatively little is known about how population size affects access to prenatal care and birth outcomes. The present study identifies several important patterns. First, the largest and smallest of the counties surveyed had the highest infant mortality rates, as well as the highest percentage of low birth weight infants, in comparison to medium county rates. Several factors may contribute to this finding. The risk population was more diverse in the large and small counties. Women who did not receive prenatal care in their first trimester in medium counties, by contrast, were a fairly homogeneous group, perhaps enabling them to more easily meet their service needs. For counties serving diverse client groups, effort needs to be directed toward the design of culturally relevant intervention approaches to

better address sociodemographic characteristics. For example, as a result of this survey, it was discovered that the smaller counties had a significant illiterate Hispanic population, many whom were not seeking prenatal care. Consequently, one of the hospitals developed a videotape in Spanish, which demonstrated healthy pregnancy behaviors, such as good nutrition, smoking cessation, and seeking perinatal support.

Second, lifestyle factors contributing to low birth weight varied by population size. Large and small counties identified a greater number of factors as playing a role. Specifically, large county respondents identified smoking, patient beliefs and attitudes, and lack of service utilization; small counties reported smoking, low socioeconomic status, and poor nutrition, as primary factors contributing to low birth weight. In contrast, medium counties were able to point to cigarette smoking as the primary cause of low birth weight. Perhaps medium-sized counties were better able to target their maternal services to identified problem areas, such as smoking cessation. Indeed, the small and large rural programs might benefit from better addressing maternal beliefs and attitudes more specifically. For example, Goldfarb, et al (1991) compared the effectiveness of a mandatory Medicaid program in Philadelphia, to the traditional Medicaid program, and found no significant differences in access to services. These researchers suggested that particular health behaviors, such willingness to seek help during pregnancy, be the focus when targeting hard to reach populations.

Additionally, the drugs affecting infants varied across population size. Hospital respondents identified cocaine as the primary drug in large counties, while alcohol was cited in medium counties. Both alcohol and cigarettes were identified by health departments and hospitals in the small counties. Cigarettes and cocaine are both associated with higher risk of low birth weight, and alcohol with growth retardation. Further, prenatal exposure to each of these substances is associated with poor developmental outcomes (Kronstadt, 1991). Use of legal drugs, such as alcohol and cigarettes, may well be more resistant to change due to the social sanctioning and easy availability of these substances. More research is needed to understand the extent to which substance abuse during pregnancy, as opposed to other lifestyle

factors, accounts for poor birth outcomes. Finally, across county sizes, hospital professionals most often cited cigarette smoking during pregnancy as the leading causes of low birth weight in their county. Smoking is a well-known and notoriously persistent risk factor for low birth weight (Abma & Mott, 1991; Bloch, 1992). This finding lends support to continued efforts toward raising public awareness, increasing the number of alcohol or drug treatment centers for pregnant women, and educating patients and professionals about teratogenic effects of alcohol and other substances (Olson, Burgess, & Streissguth, 1992).

Third, system-related factors contributed to prenatal care utilization. In the medium counties, a relatively high number of women had not obtained first trimester prenatal care. This finding is inconsistent with their higher low birth weight and infant mortality rates. Maternal and child health care services provided by hospitals and health departments were comparable across population size, with the exception of medium county health departments providing more services to infants and children, than did large or small counties. Perhaps in these medium-sized counties, with populations near 65,000, health departments played an especially important role in improving birth outcomes through the provision of child health care services. Such programs in this study included well-child and walk-in clinics, immunization, outreach, home services, after hours care, and other children's diagnostic and treatment programs. These services may have been able to compensate for late prenatal care, and possibly even prevent postneonatal mortality.

While the large county hospitals provided the most specialized care, they did not fare better in regard to birth outcomes than the smaller communities. Rather, the medium-sized counties, with no level III hospitals, had the lowest numbers of low birth weights and infant deaths. Medium counties actually had the fewest number of hospitals per capita, which may have been compensated for by maternal and child health care services available through the health departments. Thus, increased neonatal intensive care unit availability alone will not eliminate many of the disparities in infant mortality rates (Gortmaker, et al., 1989). Rather, highly specialized care may be most effectively used in conjunction with flexible, community-based

programs. For example, a prenatal/postpartum care program (PPC) for low income women in Michigan was unable to meet its enrollment goals due to several institutional, economic, psychological, and informational barriers. In a careful evaluation of the program, Miller and colleagues (1989) suggest that the need for well-coordinated, consistently funded programs, with special attention to transportation and physician reimbursement might best address implementation barriers.

In sum, this study suggests that availability of perinatal care, offered on a walk-in or after hours basis, with attention to infant and child health care services, outreach and transportation, is necessary to address the incidence of low birth weight and infant mortality. The persistence of cigarette smoking and substance abuse during pregnancy across county populations was notable, and calls for services to address patient attitudes, beliefs and behaviors. The identification of needs by geographic pockets, and targeting specific problem areas, is essential to increase prenatal care utilization across counties of varying size. Policies which are responsive to creative, flexible programming may facilitate reaching this goal. Antipoverty approaches, health care insurance, and liability issues remain at the forefront. The need for a comprehensive maternity care system, which integrates the poor, and offers a continuum of services across health care systems, is the challenge to be met.

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